# DOCUMENT RELEASE AND CHANGE FORM

**Prepared For the U.S. Department of Energy, Assistant Secretary for Environmental Management**

**By Washington River Protection Solutions, LLC., PO Box 850, Richland, WA 99352**

**Contractor For U.S. Department of Energy, Office of River Protection, under Contract DE-AC27-08RV14800**

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

1. **Doc No:** HNF-SD-WM-TSR-006  **Rev.** 08F

2. **Title:** TANK FARMS TECHNICAL SAFETY REQUIREMENTS

3. **Project Number:** ☒ N/A

4. **Design Verification Required:** ☐ Yes ☒ No

5. **USQ Number:** ☒ N/A N/A-6

6. **PrHA Number**  Rev. ☒ N/A

7. **Approvals**

<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearance Review</td>
<td>Aardal, Janis D</td>
<td>Aardal, Janis D</td>
<td>10/08/2018</td>
</tr>
<tr>
<td>Design Authority</td>
<td>Goetz, Tom</td>
<td>Goetz, Tom</td>
<td>09/25/2018</td>
</tr>
<tr>
<td>Checker</td>
<td>Smith, Ryan D</td>
<td>Smith, Ryan D</td>
<td>09/25/2018</td>
</tr>
<tr>
<td>Document Control Approval</td>
<td>Scales, Anthony</td>
<td>Scales, Anthony</td>
<td>10/08/2018</td>
</tr>
<tr>
<td>Originator</td>
<td>Omberg Carro, Susan K</td>
<td>Omberg Carro, Susan K</td>
<td>09/25/2018</td>
</tr>
<tr>
<td>Responsible Engineering Manager</td>
<td>Goetz, Tom</td>
<td>Goetz, Tom</td>
<td>09/26/2018</td>
</tr>
<tr>
<td>USQ Evaluator</td>
<td>Smith, Ryan D</td>
<td>Smith, Ryan D</td>
<td>09/26/2018</td>
</tr>
</tbody>
</table>

8. **Description of Change and Justification**

Incorporates the Safety Basis Amendment approved by ORP in letter 18-NSD-0022 for Tank Farms Automation.

9. **TBDs or Holds** ☒ N/A

10. **Related Structures, Systems, and Components**

a. **Related Building/Facilities** ☒ N/A

b. **Related Systems** ☒ N/A

c. **Related Equipment ID Nos. (EIN)** ☒ N/A

11. **Impacted Documents – Engineering** ☒ N/A

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Rev.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. **Impacted Documents (Outside SPF):**

N/A

13. **Related Documents** ☐ N/A

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Rev.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPP-13033</td>
<td>07K</td>
<td>TANK FARM DOCUMENTED SAFETY ANALYSIS</td>
</tr>
</tbody>
</table>

14. **Distribution**

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baxter, Diana</td>
<td>NUCLEAR SAFETY</td>
</tr>
<tr>
<td>Goetz, Tom</td>
<td>NUCLEAR SAFETY</td>
</tr>
<tr>
<td>Murry, Wendy I</td>
<td>RECORDS SUPPORT DLA</td>
</tr>
<tr>
<td>Omberg Carro, Susan K</td>
<td>NUCLEAR SAFETY</td>
</tr>
<tr>
<td>Raven, Rebecca P</td>
<td>PERFORMANCE ASSURANCE</td>
</tr>
<tr>
<td>Smith, Ryan D</td>
<td>NUCLEAR SAFETY</td>
</tr>
<tr>
<td>Woehle, Christopher P</td>
<td>PERFORMANCE ASSURANCE</td>
</tr>
</tbody>
</table>
Tank Farms Technical Safety Requirements

Prepared by

R. D. Smith
Washington River Protection Solutions, LLC

Date Published
October 2018

Prepared for the U.S. Department of Energy
Office of River Protection

Contract No. DE-AC27-08RV14800
PREFACE

The tank farms Technical Safety Requirements define acceptable conditions, safe boundaries, bases thereof, and management or administrative controls required to ensure safe operation of the tank farm facilities. Controls required for public safety, significant defense-in-depth, and significant facility worker safety are included.

The Technical Safety Requirements are based on the preventive and mitigative features determined to be essential in RPP-13033, Tank Farms Documented Safety Analysis, which is prepared in accordance with Title 10, Code of Federal Regulations, Part 830 (10 CFR 830), “Nuclear Safety Management,” Subpart B, “Safety Basis Requirements.” The Technical Safety Requirements constitute an agreement or contract between the U.S. Department of Energy, Office of River Protection, and the Tank Operations Contractor, Washington River Protection Solutions LLC, regarding the safe operation of the tank farm facilities. As such, once approved, the Technical Safety Requirements cannot be changed without approval from the Manager, U.S. Department of Energy, Office of River Protection, or designee, and Washington River Protection Solutions LLC.

The format and content for the Technical Safety Requirements are based on the requirements of 10 CFR 830.205, “Technical Safety Requirements;” the guidance provided by DOE G 423.1-1, Implementation Guide for Use in Developing Technical Safety Requirements; and Tank Operations Contractor policy. The Technical Safety Requirements are maintained as a separate, controlled document (HNF-SD-WM-TSR-006, Tank Farms Technical Safety Requirements).

The Technical Safety Requirements do not specifically cover environmental regulatory requirements that are contained in Title 40, Code of Federal Regulations, “Protection of Environment.” Environmental protection is assured as part of the Tank Operations Contractor environmental management program.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREFACE</td>
<td>ii</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF TERMS</td>
<td>viii</td>
</tr>
<tr>
<td>Section 1 USE AND APPLICATION</td>
<td>1-1</td>
</tr>
<tr>
<td>1.1 Definitions</td>
<td>1.1-1</td>
</tr>
<tr>
<td>1.2 Logical Connectors</td>
<td>1.2-1</td>
</tr>
<tr>
<td>1.3 Completion Times</td>
<td>1.3-1</td>
</tr>
<tr>
<td>1.4 Frequency</td>
<td>1.4-1</td>
</tr>
<tr>
<td>1.5 Notes</td>
<td>1.5-1</td>
</tr>
<tr>
<td>1.6 Tank Farm Facilities</td>
<td>1.6-1</td>
</tr>
<tr>
<td>1.7 Safety Limits (SL)</td>
<td>1.7-1</td>
</tr>
<tr>
<td>1.8 Limiting Control Settings (LCS)</td>
<td>1.8-1</td>
</tr>
<tr>
<td>1.9 Limiting Conditions for Operation (LCO)</td>
<td>1.9-1</td>
</tr>
<tr>
<td>1.10 Surveillance Requirements (SR)</td>
<td>1.10-1</td>
</tr>
<tr>
<td>1.11 Administrative Controls (AC)</td>
<td>1.11-1</td>
</tr>
<tr>
<td>1.12 Design Features</td>
<td>1.12-1</td>
</tr>
<tr>
<td>1.13 Cross References</td>
<td>1.13-1</td>
</tr>
<tr>
<td>Section 2 SAFETY LIMITS</td>
<td>2-1</td>
</tr>
<tr>
<td>2.0 SAFETY LIMITS (SL)</td>
<td>2.0-1</td>
</tr>
</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Section</th>
<th>OPERATING LIMITS AND SURVEILLANCE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY</td>
</tr>
<tr>
<td>3.0</td>
<td>SURVEILLANCE REQUIREMENT (SR) APPLICABILITY</td>
</tr>
<tr>
<td>3.1</td>
<td>DST PRIMARY TANK VENTILATION SYSTEMS</td>
</tr>
<tr>
<td>3.2</td>
<td>SST STEADY-STATE FLAMMABLE GAS CONTROL</td>
</tr>
<tr>
<td>3.3</td>
<td>RESERVED FOR FUTURE USE</td>
</tr>
<tr>
<td>3.4</td>
<td>DST INDUCED GAS RELEASE EVENT FLAMMABLE GAS CONTROL</td>
</tr>
<tr>
<td>3.5</td>
<td>DST ANNULUS FLAMMABLE GAS CONTROL</td>
</tr>
<tr>
<td>3.6</td>
<td>DCRT STEADY-STATE FLAMMABLE GAS CONTROL</td>
</tr>
<tr>
<td>3.7</td>
<td>DST FLAMMABLE GAS MONITORING CONTROL</td>
</tr>
<tr>
<td>3.8</td>
<td>RESERVED FOR FUTURE USE</td>
</tr>
<tr>
<td>3.9</td>
<td>RESERVED FOR FUTURE USE</td>
</tr>
<tr>
<td>3.10</td>
<td>WASTE TRANSFER SYSTEM FREEZE PROTECTION</td>
</tr>
<tr>
<td>3.11</td>
<td>DST ANNULUS HIGH-LEVEL ALARM (AUTOMATION)</td>
</tr>
<tr>
<td>4.0</td>
<td>SURVEILLANCE REQUIREMENTS</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
</tr>
<tr>
<td>5 ADMINISTRATIVE CONTROLS</td>
<td>5-1</td>
</tr>
<tr>
<td>5.0 ADMINISTRATIVE CONTROLS (AC)</td>
<td>5.1-1</td>
</tr>
<tr>
<td>5.1 Purpose</td>
<td>5.1-1</td>
</tr>
<tr>
<td>5.2 Contractor Responsibility</td>
<td>5.2-1</td>
</tr>
<tr>
<td>5.3 Compliance</td>
<td>5.3-1</td>
</tr>
<tr>
<td>5.4 Technical Safety Requirement VIOLATIONS</td>
<td>5.4-1</td>
</tr>
<tr>
<td>5.5 Organization</td>
<td>5.5-1</td>
</tr>
<tr>
<td>5.6 Safety Management Programs</td>
<td>5.6-1</td>
</tr>
<tr>
<td>5.7 Waste Leak Evaluation Program</td>
<td>5.7-1</td>
</tr>
<tr>
<td>5.8 Specific Administrative Controls</td>
<td>5.8.1-1</td>
</tr>
<tr>
<td>5.8.1 DST Induced Gas Release Event Evaluation</td>
<td>5.8.1-1</td>
</tr>
<tr>
<td>5.8.2 Flammable Gas Controls</td>
<td>5.8.2-1</td>
</tr>
<tr>
<td>5.8.3 Reserved for Future Use</td>
<td>5.8.3-1</td>
</tr>
<tr>
<td>5.8.4 Low-Level Radioactive, Mixed, and TRU Waste Packaging Flammable Gas Controls</td>
<td>5.8.4-1</td>
</tr>
<tr>
<td>5.8.5 Waste Transfer System Overpressure and Flow Transient Protection</td>
<td>5.8.5-1</td>
</tr>
<tr>
<td>5.8.6 Double Valve Isolation</td>
<td>5.8.6-1</td>
</tr>
<tr>
<td>5.8.7 Waste Transfer System Valve Closure Controls</td>
<td>5.8.7-1</td>
</tr>
<tr>
<td>5.8.8 Waste Transfer System Freeze Protection</td>
<td>5.8.8-1</td>
</tr>
<tr>
<td>5.8.9 Reserved for Future Use</td>
<td>5.8.9-1</td>
</tr>
<tr>
<td>5.8.10 Reserved for Future Use</td>
<td>5.8.10-1</td>
</tr>
<tr>
<td>5.8.11 DST Leak Detection Pit Pumping Control</td>
<td>5.8.11-1</td>
</tr>
<tr>
<td>5.8.12 In-Pit Heater High Temperature Protection</td>
<td>5.8.12-1</td>
</tr>
<tr>
<td>5.9 Administrative Control Key Elements</td>
<td>5.9.1-1</td>
</tr>
<tr>
<td>5.9.1 DST and SST Time to Lower Flammability Limit</td>
<td>5.9.1-1</td>
</tr>
<tr>
<td>5.9.2 Ignition Controls</td>
<td>5.9.2-1</td>
</tr>
<tr>
<td>5.9.3 Waste Transfer-Associated Structure Cover Installation and Door Closure</td>
<td>5.9.3-1</td>
</tr>
<tr>
<td>5.9.4 Waste Characteristics Controls</td>
<td>5.9.4-1</td>
</tr>
<tr>
<td>5.9.5 Nuclear Criticality Safety</td>
<td>5.9.5-1</td>
</tr>
<tr>
<td>5.9.6 Emergency Preparedness</td>
<td>5.9.6-1</td>
</tr>
</tbody>
</table>

(continued)
# Table of Contents (continued)

## Section 6 DESIGN FEATURES

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 DESIGN FEATURES</td>
<td></td>
</tr>
<tr>
<td>6.1 Waste Transfer Primary Piping Systems</td>
<td>6.1-1</td>
</tr>
<tr>
<td>6.2 Hose-in-Hose Transfer Line (HIHTL) Systems</td>
<td>6.2-1</td>
</tr>
<tr>
<td>6.3 Isolation Valves for Double Valve Isolation</td>
<td>6.3-1</td>
</tr>
<tr>
<td>6.4 Extended Reach Sluicer System Hydraulic System Pressure Reducing Devices</td>
<td>6.4-1</td>
</tr>
<tr>
<td>6.5 Reserved for Future Use</td>
<td>6.5-1</td>
</tr>
<tr>
<td>6.6 242-A Evaporator Slurry Line Vacuum Breaker PSV-CA1-4</td>
<td>6.6-1</td>
</tr>
<tr>
<td>6.7 Compressed Air System Pressure Relieving Devices</td>
<td>6.7-1</td>
</tr>
<tr>
<td>6.8 Low-Level Radioactive, Mixed, and TRU Waste Packaging Vents</td>
<td>6.8-1</td>
</tr>
<tr>
<td>6.9 Waste Transfer Freeze Protection Temperature Monitoring Systems</td>
<td>6.9-1</td>
</tr>
</tbody>
</table>

## Section 7 REFERENCES

<table>
<thead>
<tr>
<th>Appendix A BASES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B 2.0 SAFETY LIMITS (SL)</td>
<td>A 2.0-1</td>
</tr>
<tr>
<td>B 3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY</td>
<td>A 3.0-1</td>
</tr>
<tr>
<td>B 3.1 DST PRIMARY TANK VENTILATION SYSTEMS</td>
<td>A 3.1-1</td>
</tr>
<tr>
<td>B 3.2 SST STEADY-STATE FLAMMABLE GAS CONTROL</td>
<td>A 3.2-1</td>
</tr>
<tr>
<td>B 3.3 RESERVED FOR FUTURE USE</td>
<td>A 3.3-1</td>
</tr>
<tr>
<td>B 3.4 DST INDUCED GAS RELEASE EVENT FLAMMABLE GAS CONTROL</td>
<td>A 3.4-1</td>
</tr>
<tr>
<td>B 3.5 DST ANNULUS FLAMMABLE GAS CONTROL</td>
<td>A 3.5-1</td>
</tr>
<tr>
<td>B 3.6 DCRF STEADY-STATE FLAMMABLE GAS CONTROL</td>
<td>A 3.6-1</td>
</tr>
<tr>
<td>B 3.7 DST FLAMMABLE GAS MONITORING CONTROL</td>
<td>A 3.7-1</td>
</tr>
<tr>
<td>B 3.8 RESERVED FOR FUTURE USE</td>
<td>A 3.8-1</td>
</tr>
<tr>
<td>B 3.9 RESERVED FOR FUTURE USE</td>
<td>A 3.9-1</td>
</tr>
<tr>
<td>B 3.10 WASTE TRANSFER SYSTEM FREEZE PROTECTION (AUTOMATION)</td>
<td>A 3.10-1</td>
</tr>
<tr>
<td>B 3.11 DST ANNULUS HIGH-LEVEL ALARM (AUTOMATION)</td>
<td>A 3.11-1</td>
</tr>
<tr>
<td>Table</td>
<td>Page</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>1.4-1</td>
<td>Frequencies and Allowable Extensions ........................................ 1.4-2</td>
</tr>
<tr>
<td>3.2-1</td>
<td>SST Flammable Gas Concentration Surveillance Frequencies ................... 3.2-4</td>
</tr>
<tr>
<td>3.7-1</td>
<td>DST Flammable Gas Concentration Surveillance Frequencies .................... 3.7-4</td>
</tr>
<tr>
<td>5.5-1</td>
<td>Tank Farm Facilities Minimum Operations Shift Complement ........................ 5.5-3</td>
</tr>
<tr>
<td>5.8.9-1</td>
<td>Temperature Monitoring Frequency Based on the Outside Air Temperature ..... 5.8.9-4</td>
</tr>
<tr>
<td></td>
<td>List of Terms</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>List of Terms</td>
</tr>
<tr>
<td>2</td>
<td>AC                            Administrative Control</td>
</tr>
<tr>
<td>3</td>
<td>BBI                           best-basis inventory</td>
</tr>
<tr>
<td>4</td>
<td>CFR                           Code of Federal Regulations</td>
</tr>
<tr>
<td>5</td>
<td>CSER                          criticality safety evaluation reports</td>
</tr>
<tr>
<td>6</td>
<td>DCRT                          double-contained receiver tank</td>
</tr>
<tr>
<td>7</td>
<td>DF                            Design Feature</td>
</tr>
<tr>
<td>8</td>
<td>DOE                           U.S. Department of Energy</td>
</tr>
<tr>
<td>9</td>
<td>DSA                           documented safety analysis</td>
</tr>
<tr>
<td>10</td>
<td>DST                           double-shell tank</td>
</tr>
<tr>
<td>11</td>
<td>EPDM                          ethylene-propylene-diene monomer</td>
</tr>
<tr>
<td>12</td>
<td>ERSS                          extended reach sluicer system</td>
</tr>
<tr>
<td>13</td>
<td>EF                            degrees Fahrenheit</td>
</tr>
<tr>
<td>14</td>
<td>ft                             foot</td>
</tr>
<tr>
<td>15</td>
<td>gal                           gallon</td>
</tr>
<tr>
<td>16</td>
<td>GRE                           gas release event</td>
</tr>
<tr>
<td>17</td>
<td>h                             hour</td>
</tr>
<tr>
<td>18</td>
<td>HEPA                          high-efficiency particulate air (filter)</td>
</tr>
<tr>
<td>19</td>
<td>HIHTL                         hose-in-hose transfer line</td>
</tr>
<tr>
<td>20</td>
<td>HPU                           hydraulic power unit</td>
</tr>
<tr>
<td>21</td>
<td>IMUST                         inactive miscellaneous underground storage tank</td>
</tr>
<tr>
<td>22</td>
<td>ISMS                          Integrated Environment, Safety, and Health Management System</td>
</tr>
</tbody>
</table>
List of Terms (continued)

1 in. inch
2 L liter
3 lb pound
4 LCO Limiting Condition for Operation
5 LCS Limiting Control Setting
6 LFL lower flammability limit
7 min minute
8 NFPA National Fire Protection Association
9 ORP U.S. Department of Energy Office of River Protection
10 PAC Protective Action Criteria
11 pH power of hydrogen (negative logarithm of hydrogen-ion concentration)
12 PNNL Pacific Northwest National Laboratory
13 RCSTS replacement cross-site transfer system
14 RPP River Protection Project
15 SAC Specific Administrative Control
16 SIL safety integrity level
17 SL Safety Limit
18 SMP safety management program
19 SR Surveillance Requirement

(continued)
List of Terms (continued)

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSC</td>
<td>structures, systems, and components</td>
</tr>
<tr>
<td>SST</td>
<td>single-shell tank</td>
</tr>
<tr>
<td>TOC</td>
<td>Tank Operations Contractor</td>
</tr>
<tr>
<td>TRU</td>
<td>transuranic</td>
</tr>
<tr>
<td>TSR</td>
<td>Technical Safety Requirement</td>
</tr>
<tr>
<td>ULD</td>
<td>unit-liter dose</td>
</tr>
<tr>
<td>USOF</td>
<td>unit sum-of-fractions</td>
</tr>
<tr>
<td>USQ</td>
<td>unreviewed safety question</td>
</tr>
<tr>
<td>w.g.</td>
<td>water gauge</td>
</tr>
<tr>
<td>WAC</td>
<td>Washington Administrative Code</td>
</tr>
<tr>
<td>WAT</td>
<td>waste accumulator tank</td>
</tr>
<tr>
<td>WRPS</td>
<td>Washington River Protection Solutions LLC</td>
</tr>
<tr>
<td>WTP</td>
<td>Waste Treatment Plant</td>
</tr>
</tbody>
</table>

Mathematical symbols:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;</td>
<td>greater than</td>
</tr>
<tr>
<td>≥</td>
<td>greater than or equal to</td>
</tr>
<tr>
<td>&lt;</td>
<td>less than</td>
</tr>
<tr>
<td>≤</td>
<td>less than or equal to</td>
</tr>
<tr>
<td>%</td>
<td>percent</td>
</tr>
</tbody>
</table>


SECTION 1

USE AND APPLICATION
### Definitions

---

The defined terms of this section are unique definitions. They appear in CAPITALIZED type and are applicable throughout these Technical Safety Requirements (TSR) 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.

Following the definitions of CAPITALIZED terms, this section also includes definitions related to the 242-A Evaporator.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIONS</td>
<td>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.</td>
</tr>
<tr>
<td>ACTIVE/INACTIVE</td>
<td>ACTIVE/INACTIVE applies to WASTE TRANSFER PUMPS. ACTIVE WASTE TRANSFER PUMPS are those that are capable of being used for waste transfers. INACTIVE WASTE TRANSFER PUMPS are those that have been permanently disabled from use (e.g., power supplies permanently disconnected), such that waste transfers cannot be made without engineering change.</td>
</tr>
<tr>
<td>AND</td>
<td>AND is used to connect two or more sets of criteria that must both (all) be satisfied for a given logical decision. See Section 1.2, “Logical Connectors.”</td>
</tr>
<tr>
<td>BASES</td>
<td>BASES provide summary statements of the reasons for the selection of the Safety Limits (SL) and the Operating Limits and associated Surveillance Requirements (SR). The BASES show how the numeric values, Conditions, ACTIONS statements, and SRs fulfill the purpose derived from the safety documentation (see Appendix A, “BASES”).</td>
</tr>
</tbody>
</table>

(DOE G 423.1-1) - annotated.

(continued)
1.1 Definitions (continued)

CONCURRENT VERIFICATION

The act of checking by qualified personnel that a given operation or field calculation conforms to established criteria, as well as checking a component position, without the requirement that the check be at a separate occasion or independent of activities related to establishing the components position.

GAS-TRAPPING

GAS-TRAPPING systems and equipment are systems or equipment that may contain flammable gases generated by tank wastes, including flammable gases generated by corrosion in a tank-waste environment, and that have a configuration that can trap flammable gases and accumulate a flammable gas concentration > 25% lower flammability limit (LFL).

IMMEDIATELY

IMMEDIATELY requires an action to be commenced without delay and continuously pursued in a controlled manner until complete. IMMEDIATELY implies the highest sense of urgency. Implementation of an action required to be completed IMMEDIATELY shall be given top priority over all other activities.

INDEPENDENTLY VERIFY/

The act of checking by qualified personnel at a separate occasion that a given operation, calculation, or analysis conforms to established criteria, as well as checking a component position, independently of activities related to establishing the components position.

MODES

MODES are used (1) to determine SL, Limiting Control Setting (LCS), LCO, and Administrative Control (AC) applicability; (2) to distinguish facility operational conditions; and (3) to provide an instant facility status report. Facility operational MODES are not defined for the tank farm TSRs.

(continued)
1.1 Definitions (continued)

OPERABLE/ A system, subsystem, train, component, or device shall be
OPERABILITY 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). Design Features are considered
OPERABLE when the required in-service inspections/tests are
satisfied. (Note: In-service inspections/tests are only required to
be met during the applicability of the Design Features.)

(DOE G 423.1-1) - annotated.

OR OR is used to denote alternative combinations or conditions,
meaning either one or the other.

See Section 1.2, “Logical Connectors.”

(DOE G 423.1-1)

PHYSICALLY CONNECTED is a configuration where waste
can flow between a source (i.e., WASTE TRANSFER PUMP,
242-A Evaporator vessel) and piping or a waste transfer-associated
structure.

PHYSICALLY CONNECTED piping includes waste transfer
primary piping systems, hose-in-hose transfer line (HIHTL)
systems, and interfacing water system piping (e.g., service water,
raw water) that are not physically disconnected (see below).

Piping is not PHYSICALLY CONNECTED if it is physically
disconnected as follows.

1. A blind flange is considered to physically disconnect piping
on the side of the blind flange that is downstream of the
source of pressurized waste.

(continued)

1.1-3
1.1 Definitions (continued)

2. Two safety-significant waste transfer system isolation valves, INDEPENDENTLY VERIFIED to be in the closed or block flow position, are considered to physically disconnect piping on the downstream side of the second valve that is downstream of the source of pressurized waste.

3. The inlet to a WASTE TRANSFER PUMP is considered to be physically disconnected from the WASTE TRANSFER PUMP if the inlet cannot be pressurized by the pump (e.g., a centrifugal pump located in a tank). (Note: The determination of whether the inlet to a WASTE TRANSFER PUMP can be pressurized shall consider reverse operation of the pump.)

Note: Instrumentation systems for monitoring waste transfer system pressure, flow, etc., that interface with PHYSICALLY CONNECTED piping (e.g., pressure transmitting capillaries, instrument cables) and power supply systems that interface with WASTE TRANSFER PUMPS (e.g., electric power cables, hydraulic power system lines) are not considered PHYSICALLY CONNECTED because they do not provide a pathway for a significant waste leak (see RPP-13033, Chapter 3.0, “Hazard and Accident Analyses,” Section 3.3.2.4.3, “Waste Transfer Leak”).

PHYSICALLY CONNECTED waste transfer-associated structures are those structures through which PHYSICALLY CONNECTED piping runs or terminates.

RECOVERY PLAN A RECOVERY PLAN identifies specific activities for restoring inoperable safety equipment to an OPERABLE status or restoring safe operating limits, when required by LCO ACTIONS or ACs. RECOVERY PLANS shall be approved by the U.S. Department of Energy (DOE), Office of River Protection (ORP). (Note: Following submittal of a RECOVERY PLAN to ORP, the activities identified in the RECOVERY PLAN shall be implemented. ORP approval is not required prior to implementation of the RECOVERY PLAN.)
1.1 Definitions (continued)

1. SPECIFIC A SAC provides a specific preventive or mitigative function for accident scenarios identified in the documented safety analysis (DSA) where the safety function has importance similar to, or the same as, the safety function of a safety structure, system, or component (see DOE-STD-1186-2004, Specific Administrative Controls). (Note: A SAC may be implemented as an LCO or a directed action AC.)

2. ADMINISTRATIVE CONTROL (SAC) UNDER A WASTE TRANSFER PUMP is UNDER ADMINISTRATIVE LOCK when the motive force (i.e., electrical power, steam, hydraulic power, air) to the pump is removed and secured. Securing of the motive force is accomplished through the use of an installed and engaged lock mechanism on the pump's motive force supply or an alternate enforcement method.

3. UNDER A WASTE TRANSFER PUMP is UNDER ADMINISTRATIVE LOCK when the electrical power to the heater is removed and secured. Securing of the electrical power is accomplished through the use of an installed and engaged lock mechanism on the heater's power supply or an alternate enforcement method.

4. An in-pit heater is UNDER ADMINISTRATIVE LOCK when the electrical power to the heater is removed and secured. Securing of the electrical power is accomplished through the use of an installed and engaged lock mechanism on the heater’s power supply or an alternate enforcement method.

5. Examples of alternate enforcement include stationing of an operator to maintain the motive force in a secure configuration, and physical disconnection of the motive force (e.g., disconnecting a power supply by lifting leads).

6. UNIT can mean any tank farm facility such as a tank farm, tank, waste transfer system, or waste handling and storage area or facility, as applicable. See Section 1.6.1 for a detailed listing of tank farm facilities.

7. VERIFY/VERIFICATION/VERIFIED The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, documents, or plant conditions conform to expected requirements. 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 Tank Operations Contractor procedures/documents.

8. VIOLATION See Section 5.4, “Technical Safety Requirement VIOLATIONS.”

9. (DOE G 423.1-1) - annotated.
1.1 Definitions (continued)

**WASTE TRANSFER PUMPS**

WASTE TRANSFER PUMPS are pumps that have a suction source of waste in a DST, SST, DST annulus, the 242-A Evaporator (i.e., P-B-2 and J-B-1), or 222-S Laboratory (i.e., WT-P-1). Sump pumps in SST/DST retrieval system aboveground manifold boxes; sump pumps in SST retrieval system waste transfer-associated structures that transfer waste directly back to the underlying tank; sump pumps in DST retrieval waste transfer-associated structures that transfer waste out of the waste transfer-associated structure; sump pumps in the replacement cross-site transfer system (RCSTS) Diversion Box 6241-A and Vent Station 6241-V; and sump pumps in the siphon standpipe station installed on each of the waste transfer lines that connect the 219-S Facility to DSTs 241-SY-101 and 241-SY-103 (SNL-5350 and SNL-5351) are also considered WASTE TRANSFER PUMPS if their suction source of waste in the associated waste transfer-associated structure is highly caustic (i.e., pH ≥ 12.5).

**Definitions Related to the 242-A Evaporator**

The 242-A Evaporator vessel (C-A-1) shall be assumed to contain waste except when the vessel is “empty of waste” (i.e., the 242-A Evaporator is in the Shutdown Mode). The 242-A Evaporator vessel does not contain waste if it only contains water, antifoaming agents, process condensate, inhibited water (e.g., water treated with hydroxide and/or nitrite used for corrosion control), etc., which may be added to support maintenance, testing, or startup activities.

“Empty of waste” is defined in HNF-15279, 242-A Evaporator Technical Safety Requirements, as follows:

“Empty of waste”: As applied to the C-A-1 vessel, it is the condition when dump valves HV-CA1-7 and HV-CA1-9 have been opened and as much waste as possible has been allowed to drain. Residual waste may remain on some surfaces. After draining, the dump valves may be closed.

---

1 242-A Evaporator pumps P-B-2 (slurry pump) or J-B-1 (pump room sump steam jet pump) are not WASTE TRANSFER PUMPS when they can only transfer water, antifoaming agent, process condensate, inhibited water (e.g., water treated with hydroxide and/or nitrite used for corrosion control), etc., in the 242-A Evaporator C-A-1 vessel or pump room sump.
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 (TSR) 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.
EXAMPLES
The following examples illustrate the use of logical connectors.

Example 1.2-1

ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. System inoperable.</td>
<td>A.1 Stop ______</td>
<td>x hours</td>
</tr>
<tr>
<td></td>
<td>AND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A.2 Place ______</td>
<td>y hours</td>
</tr>
</tbody>
</table>

In hypothetical Example 1.2-1 the logical connector \textit{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)

#### Example 1.2-2

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONDITION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. System inoperable.</td>
<td>A.1 Restore _______</td>
<td>s hours</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A.2 Provide _______</td>
<td>t hours</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A.3.1 VERIFY _______</td>
<td>u hours</td>
</tr>
<tr>
<td></td>
<td><strong>AND</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A.3.2.1 Reduce _______</td>
<td>v hours</td>
</tr>
<tr>
<td></td>
<td><strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A.3.2.2 Perform _______</td>
<td>w hours</td>
</tr>
</tbody>
</table>

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 (LCO) 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).

DESCRIPTION The Completion Time is the amount of time allowed for completing a Required Action. The Completion Time begins at the time of discovery of a situation (e.g., the time when equipment is determined to be inoperable or the time when a variable is discovered to be 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. (The Completion Time for each additional discovery begins as described above).
1.3 Completion Times (continued)

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

Example 1.3-1

ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Waste temperature outside limit.</td>
<td>B.1 Stop all transfers to and from affected tank.</td>
<td>6 hours</td>
</tr>
<tr>
<td></td>
<td>AND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.2 Restore waste temperature to within limit.</td>
<td>12 hours</td>
</tr>
</tbody>
</table>

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 the 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.
1.3 Completion Times (continued)

Example 1.3-2

<table>
<thead>
<tr>
<th>ACTION</th>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td>A. Isolation valve inoperable.</td>
<td>Restore valve to OPERABLE status.</td>
<td>4 hours</td>
</tr>
</tbody>
</table>

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.

Example 1.3-3

<table>
<thead>
<tr>
<th>ACTION</th>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td>A. Primary tank waste level outside limit.</td>
<td>Perform SR 3.X.X.X.</td>
<td>Once per 4 hours</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.2</td>
<td></td>
<td>Restore primary tank waste level to within limit.</td>
<td>7 days</td>
</tr>
</tbody>
</table>

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. 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.
### Example 1.3-4

#### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. System inoperable.</td>
<td><strong>A.1</strong> Perform SR 3.X.X.X.</td>
<td>4 hours <strong>AND</strong> Once per 8 hours thereafter</td>
</tr>
<tr>
<td></td>
<td><strong>A.2</strong> Restore system to OPERABLE status.</td>
<td>7 days</td>
</tr>
<tr>
<td>B. SR 3.X.X.X not met.</td>
<td><strong>B.1</strong> Stop all operations and activities in affected tank.</td>
<td>6 hours</td>
</tr>
</tbody>
</table>

In hypothetical Example 1.3-4, Required Action A.1 has two Completion Times. The 4-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. Each “Once per 8 hours thereafter” interval qualifies for the 25% extension per SR 3.0.2, “Frequencies.”

If, after Condition A is entered, SR 3.X.X.X performed per Required Action A.1 is not met, 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.
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 SRs (e.g., 182 days, 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., 8 hours, 14 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)
Table 1.4-1. Frequencies and Allowable Extensions.

<table>
<thead>
<tr>
<th>NOTATION</th>
<th>FREQUENCY</th>
<th>WITH 25% EXTENSION*</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 minutes</td>
<td>At least once per 60 minutes</td>
<td>75 minutes</td>
</tr>
<tr>
<td>180 minutes</td>
<td>At least once per 180 minutes</td>
<td>225 minutes</td>
</tr>
<tr>
<td>2 hours</td>
<td>At least once per 2 hours</td>
<td>2 hours</td>
</tr>
<tr>
<td>4 hours</td>
<td>At least once per 4 hours</td>
<td>5 hours</td>
</tr>
<tr>
<td>6 hours</td>
<td>At least once per 6 hours</td>
<td>7 hours</td>
</tr>
<tr>
<td>8 hours</td>
<td>At least once per 8 hours</td>
<td>10 hours</td>
</tr>
<tr>
<td>12 hours</td>
<td>At least once per 12 hours</td>
<td>15 hours</td>
</tr>
<tr>
<td>24 hours</td>
<td>At least once per 24 hours</td>
<td>30 hours</td>
</tr>
<tr>
<td>36 hours</td>
<td>At least once per 36 hours</td>
<td>45 hours</td>
</tr>
<tr>
<td>48 hours</td>
<td>At least once per 48 hours</td>
<td>60 hours</td>
</tr>
<tr>
<td>72 hours</td>
<td>At least once per 72 hours</td>
<td>90 hours</td>
</tr>
<tr>
<td>5 days</td>
<td>At least once per 5 days</td>
<td>6 days</td>
</tr>
<tr>
<td>7 days</td>
<td>At least once per 7 days</td>
<td>8 days</td>
</tr>
<tr>
<td>9 days</td>
<td>At least once per 9 days</td>
<td>11 days</td>
</tr>
<tr>
<td>10 days</td>
<td>At least once per 10 days</td>
<td>12 days</td>
</tr>
<tr>
<td>25 days</td>
<td>At least once per 25 days</td>
<td>31 days</td>
</tr>
<tr>
<td>30 days</td>
<td>At least once per 30 days</td>
<td>37 days</td>
</tr>
<tr>
<td>45 days</td>
<td>At least once per 45 days</td>
<td>56 days</td>
</tr>
<tr>
<td>121 days</td>
<td>At least once per 121 days</td>
<td>151 days</td>
</tr>
<tr>
<td>182 days</td>
<td>At least once per 182 days</td>
<td>227 days</td>
</tr>
<tr>
<td>276 days</td>
<td>At least once per 276 days</td>
<td>345 days</td>
</tr>
<tr>
<td>330 days</td>
<td>At least once per 330 days</td>
<td>412 days</td>
</tr>
<tr>
<td>365 days</td>
<td>At least once per 365 days</td>
<td>456 days</td>
</tr>
<tr>
<td>48 months</td>
<td>At least once per 48 months</td>
<td>Not allowed</td>
</tr>
<tr>
<td>20 years</td>
<td>At least once per 20 years</td>
<td>Not allowed</td>
</tr>
</tbody>
</table>

* 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.
1.4 Frequency (continued)

EXAMPLES

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

Example 1.4-1

SURVEILLANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform VERIFICATION.</td>
<td>24 hours</td>
</tr>
</tbody>
</table>

Hypothetical Example 1.4-1 contains the type of SR most often encountered in the Technical Safety Requirements (TSR). 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. Surveillances do not have to be performed on inoperable equipment or variables outside the specified limits. 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.

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)
### EXAMPLES

**Example 1.4-2**

<table>
<thead>
<tr>
<th>SURVEILLANCE REQUIREMENTS</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERIFY temperature is within limits.</td>
<td>Once within 8 hours after start of transfer AND 24 hours thereafter during transfer</td>
</tr>
</tbody>
</table>

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.
1.4 Frequency (continued)

EXAMPLES

Example 1.4-3

SURVEILLANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>-------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>NOTE-----------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Not required to be performed until 8 hours after start of transfer.</td>
<td>24 hours</td>
</tr>
<tr>
<td>VERIFY temperature is within limits.</td>
<td></td>
</tr>
</tbody>
</table>

The Surveillance shown in hypothetical Example 1.4-3 need only be performed during transfers. 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 MОDES, 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 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.

(continued)
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.

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 (LCO), Applicability, ACTIONS, and Surveillance Requirements (SR). 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 shall be OPERABLE.

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

Visual observation of the interior of the waste transfer-associated structure may be used as an alternative method of leak detection.

-------------------------------------------------------------------

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

Example 1.5-2

APPLICABILITY: DSTs at all times.

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

Waste temperature requirements apply to tanks in the 241-AY and 241-AZ tank farms.

-------------------------------------------------------------------

In hypothetical Example 1.5-2 the Note is placed after the Applicability.
## Example 1.5-3

**ACTIONS**

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. System inoperable.</td>
<td>A.1 Restore</td>
<td>x hours</td>
</tr>
<tr>
<td>OR</td>
<td>A.2 Provide</td>
<td>y hours</td>
</tr>
<tr>
<td>OR</td>
<td>A.3 Stop</td>
<td>z hours</td>
</tr>
</tbody>
</table>

**Transfer system draining and flushing may be performed.**

### Example 1.5-4

**SURVEILLANCE REQUIREMENTS**

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 3.X.X.X</td>
<td>Not required to be met until transfers are occurring.</td>
</tr>
</tbody>
</table>

**VERIFY** x days

In hypothetical Example 1.5-4 the Note is placed before the SR.
Section 1 USE AND APPLICATION

1.6 Tank Farm Facilities

1.6.1 This TSR document is applicable to all tank farm facilities classified as Hazard Category 2 or 3. There are no tank farm Hazard Category 1 facilities. Tank farm Hazard Category 2 and 3 facilities (UNITs) are identified below.

Single-Shell Tank (SST) Farms


SST Farm Tanks


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-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-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,
1.6 Tank Farm Facilities

U-112, U-201, U-202, U-203, and U-204.

Double-Shell Tank (DST) Farms

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

DST Farm Tanks

241-AN-101, AN-102, AN-103, AN-104, AN-105, AN-106, AN-107,
241-AY-101 and AY-102,
241-AZ-101 and AZ-102,
241-SY-101, SY-102, and SY-103.

Double-Contained Receiver Tanks (DCRTs)

200 West Area: 244-S and 244-TX.
200 East Area: 244-BX.

Catch Tanks

200 West Area: 241-S-304, 241-TX-302C, 241-U-301B, and
241-UX-302A.
241-AZ-151, 241-AZ-154, 241-ER-311, 244-A, and
204-AR-TK-1.
600 Area: 241-EW-151.

NOTE:
\[241-U-301B = 241-U-301\]
### 1.6 Tank Farm Facilities (continued)

#### Inactive Miscellaneous Underground Storage Tanks (IMUST)

The following IMUSTs are managed by the Tank Operations Contractor:

- **200 East Area:**
  - 209-E-TK-111
  - 241-AX-151-TK-D
  - 241-AX-151-TK-E
  - 241-AX-151CT
  - 241-AX-151-TK-F
  - 241-B-302B
  - 241-BX-302A
  - 241-BX-302B
  - 241-BX-302C
  - 241-C-301\(^2\)
  - 244-BXR-002
  - 244-BXR-003
  - 244-BXR-011

- **200 West Area:**
  - 231-W-151-001
  - 231-W-151-002
  - 240-S-302
  - 241-S-302A
  - 241-S-302B
  - 241-T-301B\(^4\)
  - 241-T-302A
  - 241-TX-302B
  - 241-TX-302B(R)
  - 241-TX-302XB\(^5\)
  - 241-TY-302A
  - 241-TY-302B
  - 241-TZ-8
  - 242-T-135
  - 242-TA-R1
  - 244-TXR-002
  - 244-TXR-003
  - 244-UR-001
  - 244-UR-002
  - 244-UR-003
  - 244-UR-004

#### NOTES:

1. \(^1\) 241-B-301 = 241-B-301B
2. \(^2\) 241-C-301 = 241-C-301C
3. \(^3\) 241-SX-302 = SX-304
4. \(^4\) 241-T-301B = 241-T-301
5. \(^5\) 241-TX-302XB = 241-TX-302X

**SST Retrievals Aboveground Tanks**

SST vacuum retrieval system slurry tank and water separator (inactive).

**Cribs, Ditches, and Ponds**

- 200-W-52 (216-T-7), 216-T-32
- 216-B-3A RAD, 216-B-3B RAD, 216-B-3C RAD, 216-C-8

(continued)
1.6 Tank Farm Facilities (continued)

1.6.1 Unplanned Release Sites

- 200-E-120, 200-W-93, UPR-200-E-72
- 200-E-131, 200-W-94, UPR-200-W-21
- 200-E-132, 200-W-95, 200-W-54
- 200-E-133, 200-W-96, UPR-200-W-38

- UPR-200-E-86, 200-E-121, UPR-200-W-29, UPR-200-W-82
- UPR-200-W-113, UPR-200-E-18, UPR-200-W-64, UPR-200-W-130
- UPR-200-W-135, UPR-200-E-42, UPR-200-W-6, UPR-200-W-131
- 200-E-29, UPR-200-W-97, UPR-200-W-14

1.6.2 Miscellaneous Inactive Processing Facilities

- 241-AX-IX Ion Exchanger, 241-C-801 Cesium Loadout Facility
- In-Tank Solidification System (ITS-1), 241-SX-402 Condenser Shielding Building

1.6.3 Waste Handling and Storage Areas or Facilities

- 204-AR Waste Unloading Facility; 244-AR Vault; 244-CR Vault; 242-T Evaporator;
- 242-S Evaporator (hot side); Vertical Storage Units; and 616 Facility (Resource Conservation and Recovery Act of 1976 less than 90-day waste storage pad and Intermediate Holding Area for low-level radioactive waste).

1.6.4 Waste Transfer Systems

- Includes WASTE TRANSFER PUMPS, waste transfer system piping, and waste transfer-associated structures for the following waste transfer systems: (Note: The ACTIVE status of the WASTE TRANSFER PUMPS is maintained current for determining TSR control Applicability in accordance with Tank Operations Contractor procedures.)

- The 200 East Area and 200 West Area DST transfer systems (including aboveground waste transfer systems), the 200 East Area and 200 West Area SST transfer systems (including aboveground waste transfer systems), the replacement cross-site transfer system, and transfer systems connecting to interfacing tank farm facilities (i.e., the 242-A Evaporator and the 222-S Laboratory).

1.6.2 Tank Farms Operational MODES

- Facility operational MODES are not defined for the tank farms TSRs. The operational conditions when the tank farm LCOs and associated SRs are required are specifically stated in the Applicability section of the LCOs. The tank farm ACs apply at all times unless otherwise specifically noted in the ACs.
Section 1    USE AND APPLICATION

1.7    Safety Limits (SL)

Safety Limits (SL) are limits on process variables (e.g., temperature, pressure) associated with those safety-class 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 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 RPP-13033, Chapter 3.0, “Hazard and Accident Analyses.”
Section 1  USE AND APPLICATION

1.8 Limiting Control Settings (LCS)

Limiting Control Settings (LCS) 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 RPP-13033, Chapter 3.0.
Section 1 USE AND APPLICATION

1.9 Limiting Conditions for Operation (LCO)

Limiting Conditions for Operation (LCO) are the lowest functional capability or performance level of safety structures, systems, and components (SSC) (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 other hazardous 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.

Consistent with DOE-STD-1186-2004, Specific Administrative Controls (SAC), SACs may also be included in the TSRs as LCOs (with the associated Surveillance Requirements [SR]).

The control selection process is discussed in RPP-13033, Chapter 3.0.
Section 1  USE AND APPLICATION

1.10  Surveillance Requirements (SR)

Surveillance Requirements (SR) are requirements relating to testing, calibration, or inspection of safety structures, systems, and components (SSC) 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 Safety Limits (SLs), Limiting Control Settings (LCSs), and Limiting Condition for Operations (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) engineering judgment, (b) available equipment reliability and operational history, (c) meantime between failures, (d) equipment degradation, (e) instrument and calibration accuracies, (f) industrial practice, (g) manufacturers’ recommendations, (h) safety analysis assumptions, (i) the risk of an inoperable safety SSC or a parameter not within limits, and (j) time to perform an SR.
Section 1 USE AND APPLICATION

1.11 Administrative Controls (AC)

Administrative Controls (AC) are the provisions relating to organization and management, procedures, recordkeeping, assessment, and reporting; the safety management programs; and the directed action SPECIFIC ADMINISTRATIVE CONTROLS (SAC) and AC Key Elements necessary to ensure safe operation of a facility. The ACs include administrative requirements that ensure Technical Safety Requirement (TSR) requirements are met in the operation of the facility, and the procedures that are followed should a TSR not be met. Also included in the ACs are commitments to maintain safety management programs (SMP). Details of the SMPs are described in the programmatic chapters of RPP-13033. SACs and AC Key Elements are derived from the hazard and accident analyses in RPP-13033, Chapter 3.0. SACs provide a specific preventive or mitigative function for accident scenarios identified in the documented safety analysis where the safety function has importance similar to, or the same as, the safety function of a safety structure, system, or component. AC Key Elements are selected as important contributors to defense-in-depth or to provide a support function to SACs.

The control selection process is discussed in RPP-13033, Chapter 3.0.
Section 1 USE AND APPLICATION

1.12 Design Features

Design Features means the design features of a nuclear facility specified in the TSRs that, if altered or modified, would have a significant effect on safe operation. Design Features are normally passive characteristics of the facility not subject to change by operations personnel, and do not require, or infrequently require, maintenance or surveillance.

The control selection process is discussed in RPP-13033, Chapter 3.0.
Section 1 USE AND APPLICATION

1.13 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
There are no SLs for tank farm facilities based on the selection criteria in Section 1.7, “Safety Limits (SL),” and the conclusions found in RPP-13033, *Tank Farms Documented Safety Analysis*, Chapter 3.0, “Hazard and Accident Analyses.” Because there are no SLs for tank farm facilities, there are also no LCSs based on the selection criteria in Section 1.8, “Limiting Control Settings (LCS).”
SECTION 3

OPERATING LIMITS

AND

SURVEILLANCE REQUIREMENTS
### 3.0 LIMITING CONDITION FOR OPERATION (LCO) 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 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 Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met, except as provided in LCO 3.0.5, “Return to Service,” and LCO 3.0.6, “Support System LCO Not 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 For ACTIONS not met (VIOLATION), proceed in accordance with AC 5.4.3, “Response to a Limiting Control Setting or Limiting Condition for Operation VIOLATION.” All foreseen Conditions are listed in the ACTIONS statements. Therefore, all ACTIONS are provided for all foreseen Conditions. |
| LCO 3.0.4 Entry into any MODE or other specified conditions in the Applicability of an LCO shall not be made unless the Surveillance Requirements (SR) associated with the LCO have been met. An exception is LCO 3.4, “DST Induced Gas Release Event Flammable Gas Control,” where a water addition, chemical addition, or waste transfer into a DST may start if the tank farm temperature is < 32°F (i.e., SR 3.4.4 is not met) with ACTION Condition C entered. |
| LCO 3.0.5 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 (Note: LCO 3.0.6 is not applicable at this time.)

LCO 3.0.7 If an emergency situation develops that is not treated in the Technical Emergency Safety Requirements (TSR), 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 to protect workers, the public, or the environment from imminent and significant harm. Such actions shall be approved by the Shift Manager.

If emergency actions are taken, verbal notifications shall be made to the U.S. Department of Energy (DOE), Richland Operations Office Manager and the Office of River Protection (ORP) Manager within 2 hours; and by written reports to the ORP Assistant Manager for Tank Farms within 24 hours, in accordance with occurrence reporting procedures.
3.0 SURVEILLANCE REQUIREMENT (SR) 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

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 have to be performed on inoperable equipment or variables outside specified limits.

SR 3.0.2

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 SR Frequencies specified as “once,” the above interval extension does not apply. Other exceptions where the interval extension does not apply to the SR Frequency are stated in the individual LCOs.

If a Completion Time requires periodic performance on a “once per . . .” basis, the above Frequency extension applies to each performance after the initial performance.
SR 3.0.3 If it is discovered that a Surveillance was not performed within its 
Delay of specified Frequency, then compliance with the requirement to declare the 
Required Actions 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. 
(Note: SR 3.0.3 does not affect the AC 5.4.1.c VIOLATION criteria that 
failure to perform an SR within the required time limit is a VIOLATION 
of the TSRs.) 

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.

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.

SR 3.0.4 Entry into any MODE or other specified conditions in the Applicability of 
MODE Changes an LCO shall not be made unless the Surveillance Requirements 
associated with the LCO have been met within their specified frequency 
period. This provision shall not prevent passage through or to MODES as 
necessary to comply with Required Actions. 

Exceptions to SR 3.0.4 may be stated in the individual SRs.
FLAMMABLE GAS CONTROLS

3.1 DST Primary Tank Ventilation Systems

LCO 3.1

A. One DST primary tank ventilation system train (the in-service train) shall be OPERABLE AND operating, except for outages (where the system is not OPERABLE OR not operating) not to exceed 24 hours.

AND

B. The other DST primary tank ventilation system train (the standby train) shall be OPERABLE, except for outages not to exceed 10 days.

APPLICABILITY: DST primary tank ventilation systems for the 241-AN, 241-AP, 241-AW, 241-AY/241-AZ (i.e., the 702-AZ ventilation system), and 241-SY tank farms at all times.
### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. In-service DST primary tank ventilation system train is not OPERABLE for ≥ 24 hours OR not operating for ≥ 24 hours.</td>
<td>A.1 Start up an OPERABLE DST primary tank ventilation system train.</td>
<td>8 hours</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A.2.1 Monitor the flammable gas concentration in the headspace of each tank in the affected tank farm.</td>
<td>60 hours AND</td>
</tr>
<tr>
<td></td>
<td>AND</td>
<td>Once per 72 hours thereafter</td>
</tr>
<tr>
<td></td>
<td>A.2.2 Submit a RECOVERY PLAN to the ORP.</td>
<td>10 days</td>
</tr>
<tr>
<td></td>
<td>AND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A.2.3 Start up an OPERABLE DST primary tank ventilation system train in accordance with the RECOVERY PLAN.</td>
<td>In accordance with the RECOVERY PLAN</td>
</tr>
</tbody>
</table>
### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Standby DST primary tank ventilation system train is not OPERABLE for ≥ 10 days.</td>
<td>B.1 Restore the standby DST primary tank ventilation system train to OPERABLE status.</td>
<td>21 days</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.2.1 Submit a RECOVERY PLAN to the ORP.</td>
<td>31 days</td>
</tr>
<tr>
<td></td>
<td>AND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.2.2 Restore the standby DST primary tank ventilation system train to OPERABLE status in accordance with the RECOVERY PLAN.</td>
<td>In accordance with the RECOVERY PLAN</td>
</tr>
</tbody>
</table>
# Ventilation Systems

## LCO 3.1

### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
</table>
| C. Concentration of flammable gas is > 25% of the LFL in the tank headspace. | C.1 Stop all activities in and directly above the affected tank, except for the following:  
- flammable gas sampling/monitoring;  
- deenergizing or removing equipment that does not meet ignition controls; and  
- actions to reduce the flammable gas concentration. | 8 hours |
| AND | C.2 Monitor the flammable gas concentration in the tank headspace. | 24 hours |
| AND | C.3 Stop all activities in GAS-TRAPPING systems or equipment connected to the affected tank headspace, except for flammable gas sampling/monitoring and actions to reduce the flammable gas concentration. | Prior to the concentration of flammable gas exceeding 60% of the LFL |
| AND | C.4 Apply ignition controls to all installed equipment and manned work activities involving the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace. | Prior to the concentration of flammable gas exceeding 60% of the LFL |

---

If Condition C is entered, Condition A in LCO 3.7, “DST Flammable Gas Monitoring Control,” is also entered.

---

NOTE

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
</table>
| C.1 Stop all activities in and directly above the affected tank, except for the following:  
- flammable gas sampling/monitoring;  
- deenergizing or removing equipment that does not meet ignition controls; and  
- actions to reduce the flammable gas concentration. | | 8 hours |
| AND | C.2 Monitor the flammable gas concentration in the tank headspace. | 24 hours |
| AND | C.3 Stop all activities in GAS-TRAPPING systems or equipment connected to the affected tank headspace, except for flammable gas sampling/monitoring and actions to reduce the flammable gas concentration. | Prior to the concentration of flammable gas exceeding 60% of the LFL |
| AND | C.4 Apply ignition controls to all installed equipment and manned work activities involving the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace. | Prior to the concentration of flammable gas exceeding 60% of the LFL |
### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Concentration of flammable gas is &gt; 60% of LFL in the tank headspace.</td>
<td>D.1 Submit a RECOVERY PLAN to the ORP.</td>
<td>10 days</td>
</tr>
<tr>
<td>AND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2 Reduce the tank headspace flammable gas concentration to ≤ 25% of the LFL in accordance with the RECOVERY PLAN.</td>
<td>In accordance with the RECOVERY PLAN</td>
<td></td>
</tr>
</tbody>
</table>

### SURVEILLANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**NOTE**

- SR 3.1.1 AND SR 3.1.2 VERIFY that the in-service DST primary tank ventilation system train is OPERABLE AND operating.

- SR 3.1.1 AND SR 3.1.3 VERIFY that the standby DST primary tank ventilation system train is OPERABLE.
<table>
<thead>
<tr>
<th>SURVEILLANCE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SURVEILLANCE</strong></td>
</tr>
<tr>
<td><strong>SR 3.1.1</strong></td>
</tr>
<tr>
<td>A. VERIFY the exhaust airflow from each tank in the tank farm is ≥ 40 ft³/min for each DST primary tank ventilation system train.</td>
</tr>
<tr>
<td>B. VERIFY the integrity (i.e., limited air in-leakage) of the DST primary tank ventilation system.</td>
</tr>
<tr>
<td><strong>SR 3.1.2</strong></td>
</tr>
<tr>
<td><strong>SR 3.1.3</strong></td>
</tr>
<tr>
<td>A. VERIFY the standby DST primary tank ventilation system train to VERIFY operation.</td>
</tr>
</tbody>
</table>
CROSS REFERENCES

<table>
<thead>
<tr>
<th>TITLE</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DST Flammable Gas Monitoring Control</td>
<td>LCO 3.7</td>
</tr>
<tr>
<td>2. DST and SST Time to Lower Flammability Limit</td>
<td>AC 5.9.1</td>
</tr>
<tr>
<td>3. Ignition Controls</td>
<td>AC 5.9.2</td>
</tr>
</tbody>
</table>
FLAMMABLE GAS CONTROLS

3.2 SST Steady-State Flammable Gas Control

LCO 3.2 The tank headspace flammable gas concentration shall be ≤ 25% of the lower flammability limit (LFL).

APPLICABILITY: All SSTs, except for SSTs in the 241-AX tank farm, at all times.
## ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
</table>
| A. Concentration of flammable gas is > 25% of the LFL in the tank headspace. | A.1 Stop all activities in and directly above the affected tank, except for the following:  
• flammable gas sampling/monitoring;  
• deenergizing or removing equipment that does not meet ignition controls; and  
• actions to reduce the flammable gas concentration. | 8 hours         |
| AND                                                | A.2 Monitor the flammable gas concentration in the tank headspace.                | 24 hours        |
| AND                                                | A.3 Stop all activities in GAS-TRAPPING systems or equipment connected to the affected tank headspace, except for flammable gas sampling/monitoring and actions to reduce the flammable gas concentration. | Prior to the concentration of flammable gas exceeding 60% of the LFL |
| AND                                                | A.4 Apply ignition controls to all installed equipment and manned work activities involving the affected tank headspace and GAS-TRAPPING systems and equipment connected to the affected tank headspace. | Prior to the concentration of flammable gas exceeding 60% of the LFL |
### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Concentration of flammable gas is &gt; 60% of LFL in the tank headspace.</td>
<td>B.1 Submit a RECOVERY PLAN to the ORP. AND B.2 Reduce the tank headspace flammable gas concentration to ( \leq 25% ) of the LFL in accordance with the RECOVERY PLAN.</td>
<td>10 days In accordance with the RECOVERY PLAN</td>
</tr>
</tbody>
</table>
SURVEILLANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 3.2.1</td>
<td>VERIFY the flammable gas concentration is ≤ 25% of the LFL in the tank headspace.</td>
</tr>
</tbody>
</table>

Table 3.2-1. SST Flammable Gas Concentration Surveillance Frequencies.

<table>
<thead>
<tr>
<th>Tank</th>
<th>Surveillance Frequency (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>241-A-105</td>
<td>182</td>
</tr>
<tr>
<td>241-B-202</td>
<td>121</td>
</tr>
<tr>
<td>241-B-203</td>
<td>30</td>
</tr>
<tr>
<td>241-B-204</td>
<td>30</td>
</tr>
<tr>
<td>241-T-201</td>
<td>121</td>
</tr>
<tr>
<td>241-BY-110</td>
<td>182</td>
</tr>
<tr>
<td>241-SX-103</td>
<td>121</td>
</tr>
<tr>
<td>241-SX-104</td>
<td>182</td>
</tr>
<tr>
<td>241-SX-105</td>
<td>121</td>
</tr>
<tr>
<td>241-SX-109</td>
<td>182</td>
</tr>
<tr>
<td>241-SX-111</td>
<td>182</td>
</tr>
<tr>
<td>241-SX-114</td>
<td>182</td>
</tr>
<tr>
<td>241-T-203</td>
<td>182</td>
</tr>
<tr>
<td>241-T-204</td>
<td>182</td>
</tr>
<tr>
<td>241-TX-117</td>
<td>182</td>
</tr>
<tr>
<td>241-U-103</td>
<td>182</td>
</tr>
<tr>
<td>Other SSTs</td>
<td>365</td>
</tr>
</tbody>
</table>

CROSS REFERENCES

<table>
<thead>
<tr>
<th>TITLE</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DST and SST Time to Lower Flammability Limit</td>
<td>AC 5.9.1</td>
</tr>
<tr>
<td>2. Ignition Controls</td>
<td>AC 5.9.2</td>
</tr>
</tbody>
</table>
FLAMMABLE GAS CONTROLS

3.3 Reserved for Future Use
FLAMMABLE GAS CONTROLS

3.4 DST Induced Gas Release Event Flammable Gas Control

LCO 3.4

A. One DST primary tank ventilation system train (the in-service train) shall be OPERABLE AND operating.

AND

B. The other DST primary tank ventilation system train (the standby train) shall be OPERABLE. No planned outages of the standby train are allowed.

AND

C. The tank farm temperature shall be > 32°F.

-------------NOTE-------------------
If the tank farm temperature is ≤ 32°F (i.e., SR 3.4.4 is not met), the water addition, chemical addition, or waste transfer into a DST may start with ACTION Condition C entered.

------------------------------------------

APPLICABILITY: During water additions, chemical additions, and waste transfers into DSTs when required by AC 5.8.1, “DST Induced Gas Release Event Evaluation.”

ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. In-service DST primary tank ventilation system train is not OPERABLE OR not operating.</td>
<td>A.1 Start up an OPERABLE DST primary tank ventilation system train.</td>
<td>4 hours</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.2 Stop the water addition, chemical addition, or waste transfer.</td>
<td></td>
<td>4 hours</td>
</tr>
</tbody>
</table>

3.4-1
<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Standby DST primary tank ventilation system train is not OPERABLE.</td>
<td>B.1 Restore the standby DST primary tank ventilation system train to OPERABLE status.</td>
<td>10 days</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.2 Stop the water addition, chemical addition, or waste transfer.</td>
<td></td>
<td>10 days</td>
</tr>
<tr>
<td>C. The tank farm temperature is ≤ 32°F.</td>
<td>C.1 Monitor the flammable gas concentration in the applicable tank headspace.</td>
<td>If the tank farm temperature is ≤ 32°F prior to starting a water addition, chemical addition, or waste transfer into a DST:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prior to starting the water addition, chemical addition, or waste transfer AND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Once per 4 hours thereafter OR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the tank farm temperature decreases to ≤ 32°F during a water addition, chemical addition, or waste transfer into a DST:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 hours AND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Once per 4 hours thereafter</td>
</tr>
</tbody>
</table>
### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Concentration of flammable gas is &gt; 25% of LFL in the tank headspace.</td>
<td>D.1 Stop the water addition, chemical addition, or waste transfer.</td>
<td>IMMEDIATELY</td>
</tr>
</tbody>
</table>

---

**NOTE:**

LCO 3.1 ACTION
Condition C for concentration of flammable gas is > 25% of the LFL in the tank headspace would be entered.

---

### SURVEILLANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
</table>

---

**NOTE:**

SR 3.4.1 AND SR 3.4.2 VERIFY that the in-service DST primary tank ventilation system train is OPERABLE AND operating.

SR 3.4.1 AND SR 3.4.3 VERIFY that the standby DST primary tank ventilation system train is OPERABLE.
<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 3.4.1</td>
<td>Prior to starting the water addition, chemical addition, or waste transfer into the DST AND Once per 30 days thereafter AND After the following changes in the applicable tank farm(s): • Opening or closing an inlet air-control station inlet isolation valve or bypass valve • Opening or closing a tank riser • Removing or installing a waste transfer-associated structure cover • Repositioning a 241-AN/241-AP/241-AW/241-SY tank outlet isolation valve or a 241-AY/241-AZ flow control valve • Reducing the exhaust fan flow control set point</td>
</tr>
</tbody>
</table>
**SURVEILLANCE REQUIREMENTS**

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 3.4.2 Verify the headspace of the applicable tank is &lt; 0 in. w.g. relative to atmospheric pressure.</td>
<td>2 hours</td>
</tr>
<tr>
<td>SR 3.4.3 Verify the standby DST primary tank ventilation system train safety-significant components are OPERABLE and the interfacing systems required for train operation are capable of performing their function.</td>
<td>10 days</td>
</tr>
<tr>
<td>SR 3.4.4 Verify the tank farm temperature is &gt; 32°F.</td>
<td>2 hours</td>
</tr>
</tbody>
</table>

**CROSS REFERENCES**

<table>
<thead>
<tr>
<th>TITLE</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DST Primary Tank Ventilation Systems</td>
<td>LCO 3.1</td>
</tr>
<tr>
<td>2. DST Induced Gas Release Event Evaluation</td>
<td>AC 5.8.1</td>
</tr>
</tbody>
</table>
FLAMMABLE GAS CONTROLS

3.5 DST Annulus Flammable Gas Control

LCO 3.5 The DST annulus waste level shall be ≤ 15 in.

APPLICABILITY: DST 241-AY-102 at all times.
<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
</table>
| A. DST annulus waste level is > 15 in. | A.1 Stop all activities in the affected DST annulus and directly above the affected DST, except for the following:  
• flammable gas sampling/monitoring;  
• deenergizing or removing equipment that does not meet ignition controls; and  
• actions to reduce the flammable gas concentration. | 8 hours         |
|                                 | A.2 Stop all activities in GAS-TRAPPING systems or equipment connected to the affected DST annulus, except for flammable gas sampling/monitoring and actions to reduce the flammable gas concentration. | 7 days without flammable gas monitoring OR Prior to the concentration of flammable gas exceeding 60% of the LFL |
|                                 | A.3 Apply ignition controls to all installed equipment and manned work activities involving the affected DST annulus headspace and GAS-TRAPPING systems or equipment connected to the DST annulus. | 7 days without flammable gas monitoring OR Prior to the concentration of flammable gas exceeding 60% of the LFL |
## ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. DST annulus waste level is &gt; 15 in. AND There is no flammable gas monitoring of the DST annulus headspace</td>
<td>B.1 Submit a RECOVERY PLAN to the ORP. AND B.2 Reduce the DST annulus headspace flammable gas concentration to ≤ 25% of the LFL in accordance with the RECOVERY PLAN.</td>
<td>19 days and In accordance with the RECOVERY PLAN</td>
</tr>
<tr>
<td>C. Concentration of flammable gas is &gt; 60% of the LFL in the DST annulus headspace.</td>
<td>C.1 Submit a RECOVERY PLAN to the ORP. AND C.2 Reduce the DST annulus headspace flammable gas concentration to ≤ 25% of the LFL in accordance with the RECOVERY PLAN.</td>
<td>10 days and In accordance with the RECOVERY PLAN</td>
</tr>
</tbody>
</table>

### SURVEILLANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>SURVEILLANCE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SURVEILLANCE</td>
</tr>
<tr>
<td>SR 3.5.1</td>
</tr>
</tbody>
</table>

### CROSS REFERENCES

<table>
<thead>
<tr>
<th>TITLE</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DST and SST Time to Lower Flammability Limit</td>
<td>AC 5.9.1</td>
</tr>
<tr>
<td>2. Ignition Controls</td>
<td>AC 5.9.2</td>
</tr>
</tbody>
</table>
The tank headspace flammable gas concentration shall be ≤ 25% of the LFL.

APPLICABILITY: DCRTs 244-BX, 244-S, and 244-TX at all times.
### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Concentration of flammable gas is &gt; 25% of the LFL in the tank headspace.</td>
<td>A.1 Stop all activities in and directly above the affected tank, except for the following: • flammable gas sampling/monitoring; • deenergizing or removing equipment that does not meet ignition controls; and • actions to reduce the flammable gas concentration.</td>
<td>8 hours</td>
</tr>
<tr>
<td></td>
<td>AND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A.2 Monitor the flammable gas concentration in the tank headspace.</td>
<td>24 hours</td>
</tr>
<tr>
<td></td>
<td>AND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A.3 Stop all activities in GAS-TRAPPING systems or equipment connected to the affected tank headspace, except for flammable gas sampling/monitoring and actions to reduce the flammable gas concentration.</td>
<td>Prior to the concentration of flammable gas exceeding 60% of the LFL</td>
</tr>
<tr>
<td></td>
<td>AND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A.4 Apply ignition controls to all installed equipment and manned work activities involving the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace.</td>
<td>Prior to the concentration of flammable gas exceeding 60% of the LFL</td>
</tr>
</tbody>
</table>
### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Concentration of flammable gas is &gt; 60% of the LFL in the tank headspace.</td>
<td>B.1 Submit a RECOVERY PLAN to the ORP.</td>
<td>10 days</td>
</tr>
<tr>
<td>AND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.2 Reduce the tank headspace flammable gas concentration to ≤ 25% of the LFL in accordance with the RECOVERY PLAN.</td>
<td>In accordance with the RECOVERY PLAN</td>
<td></td>
</tr>
</tbody>
</table>

### SURVEILLANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 3.6.1 VERIFY the flammable gas concentration is ≤ 25% of the LFL in the tank headspace.</td>
<td>10 days</td>
</tr>
</tbody>
</table>

### CROSS REFERENCES

<table>
<thead>
<tr>
<th>TITLE</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ignition Controls</td>
<td>AC 5.9.2</td>
</tr>
</tbody>
</table>

---

3.6-3
3.7 DST Flammable Gas Monitoring Control

LCO 3.7

The tank headspace flammable gas concentration shall be $\leq 25\%$ of the lower flammability limit (LFL).

APPLICABILITY: All DSTs at all times.
<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
</table>
| A. Concentration of flammable gas is > 25% of the LFL in the tank headspace. | A.1 Stop all activities in and directly above the affected tank, except for the following:  
  • flammable gas sampling/monitoring;  
  • deenergizing or removing equipment that does not meet ignition controls; and  
  • actions to reduce the flammable gas concentration. | 8 hours |
| AND | A.2 Monitor the flammable gas concentration in the tank headspace. | 24 hours |
| AND | A.3 Stop all activities in GAS-TRAPPING systems or equipment connected to the affected tank headspace, except for flammable gas sampling/monitoring and actions to reduce the flammable gas concentration. | Prior to the concentration of flammable gas exceeding 60% of the LFL |
| AND | A.4 Apply ignition controls to all installed equipment and manned work activities involving the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace. | Prior to the concentration of flammable gas exceeding 60% of the LFL |

**NOTE**

If Condition A is entered, ACTIONS in LCO 3.1, “DST Primary Tank Ventilation Systems,” are also required if LCO 3.1 is not met (i.e., in-service DST primary tank ventilation system train is not OPERABLE OR not operating for ≥ 24 hours).
<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Concentration of flammable gas is &gt; 60% of LFL in the tank headspace.</td>
<td>B.1 Submit a RECOVERY PLAN to the ORP. AND B.2 Reduce the tank headspace flammable gas concentration to ≤ 25% of the LFL in accordance with the RECOVERY PLAN.</td>
<td>10 days In accordance with the RECOVERY PLAN</td>
</tr>
</tbody>
</table>
SURVEILLANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 3.7.1 VERIFY the flammable gas concentration is ( \leq 25% ) of the LFL in the tank headspace.</td>
<td>In accordance with Table 3.7-1</td>
</tr>
</tbody>
</table>

Table 3.7-1. DST Flammable Gas Concentration Surveillance Frequencies.

<table>
<thead>
<tr>
<th>Tank</th>
<th>Surveillance Frequency (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>241-AN-101</td>
<td>9</td>
</tr>
<tr>
<td>241-AN-102</td>
<td>9</td>
</tr>
<tr>
<td>241-AN-103</td>
<td>9</td>
</tr>
<tr>
<td>241-AN-104</td>
<td>9</td>
</tr>
<tr>
<td>241-AN-105</td>
<td>9</td>
</tr>
<tr>
<td>241-AN-106</td>
<td>9</td>
</tr>
<tr>
<td>241-AN-107</td>
<td>9</td>
</tr>
<tr>
<td>241-AP-101</td>
<td>5</td>
</tr>
<tr>
<td>241-AP-102</td>
<td>5</td>
</tr>
<tr>
<td>241-AP-103</td>
<td>5</td>
</tr>
<tr>
<td>241-AP-104</td>
<td>5</td>
</tr>
<tr>
<td>241-AP-105</td>
<td>5</td>
</tr>
<tr>
<td>241-AP-106</td>
<td>5</td>
</tr>
<tr>
<td>241-AP-107</td>
<td>5</td>
</tr>
<tr>
<td>241-AP-108</td>
<td>5</td>
</tr>
<tr>
<td>241-AW-101</td>
<td>10</td>
</tr>
<tr>
<td>241-AW-102</td>
<td>10</td>
</tr>
<tr>
<td>241-AW-103</td>
<td>10</td>
</tr>
<tr>
<td>241-AW-104</td>
<td>10</td>
</tr>
<tr>
<td>241-AW-105</td>
<td>10</td>
</tr>
<tr>
<td>241-AW-106</td>
<td>10</td>
</tr>
<tr>
<td>241-AY-101</td>
<td>5</td>
</tr>
<tr>
<td>241-AY-102</td>
<td>5</td>
</tr>
<tr>
<td>241-AZ-101</td>
<td>5</td>
</tr>
<tr>
<td>241-AZ-102</td>
<td>5</td>
</tr>
<tr>
<td>241-SY-101</td>
<td>25</td>
</tr>
<tr>
<td>241-SY-102</td>
<td>25</td>
</tr>
<tr>
<td>241-SY-103</td>
<td>25</td>
</tr>
</tbody>
</table>
### CROSS REFERENCES

<table>
<thead>
<tr>
<th>TITLE</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DST Primary Tank Ventilation Systems</td>
<td>LCO 3.1</td>
</tr>
<tr>
<td>2. DST and SST Time to Lower Flammability Limit</td>
<td>AC 5.9.1</td>
</tr>
<tr>
<td>3. Ignition Controls</td>
<td>AC 5.9.2</td>
</tr>
</tbody>
</table>

1
3.9  Reserved for Future Use
3.10 Waste Transfer System Freeze Protection (Automation)

LCO 3.10 The waste transfer freeze protection safety instrumented system shall be OPERABLE.

APPLICABILITY: When the waste transfer freeze protection safety instrumented system is used to monitor the air temperature in a waste transfer-associated structure or an encasement for buried/bermed waste transfer primary piping that is PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK during the months of October, November, December, January, February, and March.

<p>| Waste Transfer Freeze Protection Safety Instrumented System Monitoring Locations |
|---------------------------------|----------------------------------|
| <strong>Tank Farm</strong>                   | <strong>Location</strong>                     |
| 241-AN                          | 241-AN-A Pit                     |
|                                 | 241-AN-B Pit                     |
| 241-AP                          | SN-622 Encasement               |
|                                 | 241-AP-02D Pit                  |
|                                 | 241-AP-VP Pit                   |
|                                 | SN-618 Encasement               |
| 241-AW                          | 241-AW-02A Pit                  |
|                                 | 241-AW-02E Pit                  |
|                                 | 241-AW-A Pit                    |
|                                 | 241-AW-B Pit                    |
| 241-AY/241-AZ                   | 241-AY-01A Pit                  |
|                                 | 241-AZ-VP Pit                   |
|                                 | 241-AZ-01A Pit                  |
|                                 | 241-AZ-02A Pit                  |</p>
<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Waste transfer freeze protection safety instrumented system low-temperature alarm is activated.</td>
<td>A.1 Place any ACTIVE WASTE TRANSFER PUMP that is PHYSICALLY CONNECTED to the monitored waste transfer-associated structure or buried/bermed waste transfer primary piping UNDER ADMINISTRATIVE LOCK.</td>
<td>11 hours</td>
</tr>
<tr>
<td>B. Waste transfer freeze protection safety instrumented system route-set alarm is activated.</td>
<td>B.1 Place any ACTIVE WASTE TRANSFER PUMP that is PHYSICALLY CONNECTED to the monitored waste transfer-associated structure or buried/bermed waste transfer primary piping UNDER ADMINISTRATIVE LOCK.</td>
<td>11 hours</td>
</tr>
<tr>
<td>C. Waste transfer freeze protection safety instrumented system is not OPERABLE.</td>
<td>C.1 Place any ACTIVE WASTE TRANSFER PUMP that is PHYSICALLY CONNECTED to the monitored waste transfer-associated structure or buried/bermed waste transfer primary piping UNDER ADMINISTRATIVE LOCK.</td>
<td>11 hours</td>
</tr>
</tbody>
</table>
### SURVEILLANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 3.10.1</td>
<td>VERIFY active waste transfer freeze protection safety instrumented system safety annunciators are OPERABLE.</td>
</tr>
<tr>
<td>SR 3.10.2</td>
<td>VERIFY active waste transfer freeze protection safety instrumented system safety annunciators correspond to the selected route. INDEPENDENT VERIFICATION is required.</td>
</tr>
<tr>
<td>SR 3.10.3</td>
<td>Perform waste transfer freeze protection safety instrumented system calibrations/calibration checks. INDEPENDENT VERIFICATION of as-found and as-left calibration check results is required.</td>
</tr>
</tbody>
</table>
### 3.11 DST Annulus High-Level Alarm (Automation)

**LCO 3.11** The DST annulus high-level safety instrumented alarm system shall be OPERABLE.

**APPLICABILITY:** All DSTs at all times.

**Exception:** 241-AY-102.

#### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. DST annulus high-level safety instrumented alarm system Central Control Room alarm reporting is not OPERABLE.</td>
<td>A.1 Restore the DST annulus high-level safety instrumented alarm system to OPERABLE status.</td>
<td>48 hours</td>
</tr>
<tr>
<td>OR</td>
<td>A.2.1.1 VERIFY high-level safety instrumented alarm system local LED indicator is OPERABLE</td>
<td>48 hours</td>
</tr>
<tr>
<td>AND</td>
<td>A.2.1.2 VERIFY annulus waste liquid level using annulus high-level safety instrumented alarm system local LED indicator.</td>
<td>Once per 48 hours thereafter</td>
</tr>
<tr>
<td>AND</td>
<td>A.2.2 Submit a RECOVERY PLAN to the ORP.</td>
<td>21 days</td>
</tr>
<tr>
<td>AND</td>
<td>A.2.3 Restore the DST annulus high-level safety instrumented alarm system to OPERABLE status.</td>
<td>In accordance with the RECOVERY PLAN</td>
</tr>
</tbody>
</table>
### ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. DST annulus high-level safety instrumented alarm system Central Control Room alarm reporting is not OPERABLE. AND DST annulus high-level safety instrumented alarm system local LED indicator is not OPERABLE.</td>
<td>B.1 Enter Condition C or D. AND B.2 Submit a RECOVERY PLAN to the ORP. AND B.3 Restore the DST annulus high level safety instrumented alarm system to OPERABLE status.</td>
<td>IMMEDIATELY 21 days In accordance with the RECOVERY PLAN</td>
</tr>
<tr>
<td>C. DST annulus waste level exceeds the DST annulus high-level alarm trip limit. OR DST annulus high-level safety instrumented alarm system is not OPERABLE. AND Flammable gas monitoring is available for the DST annulus headspace.</td>
<td>C.1 Monitor the flammable gas concentration in the affected DST annulus headspace. AND</td>
<td>36 hours Once per 48 hours thereafter</td>
</tr>
<tr>
<td>CONDITION</td>
<td>REQUIRED ACTION</td>
<td>COMPLETION TIME</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>D. DST annulus waste level exceeds the DST annulus high-level alarm trip limit. OR DST annulus high-level safety instrumented alarm system is not OPERABLE. AND Flammable gas monitoring is not available for the DST annulus headspace.</td>
<td>D.1 Stop all activities in the affected DST annulus and directly above the affected DST, except for: • actions to establish flammable gas monitoring, • deenergizing or removing equipment that does not meet ignition controls, • actions to reduce the flammable gas concentration, and • actions to restore DST annulus high-level safety instrumented alarm system OPERABILITY.</td>
<td>36 hours</td>
</tr>
<tr>
<td>D. DST annulus waste level exceeds the DST annulus high-level alarm trip limit. OR DST annulus high-level safety instrumented alarm system is not OPERABLE. AND Flammable gas monitoring is not available for the DST annulus headspace.</td>
<td>D.2 Stop all activities in GAS-TRAPPING systems or equipment connected to the affected DST annulus, except for flammable gas monitoring and actions to reduce the flammable gas concentration.</td>
<td>7 days</td>
</tr>
<tr>
<td>D. DST annulus waste level exceeds the DST annulus high-level alarm trip limit. OR DST annulus high-level safety instrumented alarm system is not OPERABLE. AND Flammable gas monitoring is not available for the DST annulus headspace.</td>
<td>D.3 Apply ignition controls to all installed equipment and manned work activities involving the affected DST annulus headspace and GAS-TRAPPING systems or equipment connected to the affected DST annulus.</td>
<td>7 days</td>
</tr>
<tr>
<td>D. DST annulus waste level exceeds the DST annulus high-level alarm trip limit. OR DST annulus high-level safety instrumented alarm system is not OPERABLE. AND Flammable gas monitoring is not available for the DST annulus headspace.</td>
<td>D.4 Monitor the flammable gas concentration in the affected DST annulus headspace. AND Once per 48 hours thereafter</td>
<td>21 days</td>
</tr>
<tr>
<td>CONDITION</td>
<td>REQUIRED ACTION</td>
<td>COMPLETION TIME</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>E.</td>
<td>E.1 Stop all activities in the affected DST annulus and directly above the affected DST, except for:</td>
<td>12 hours</td>
</tr>
<tr>
<td></td>
<td>• flammable gas monitoring,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• deenergizing or removing equipment that does not meet ignition controls, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• actions to reduce the flammable gas concentration.</td>
<td></td>
</tr>
<tr>
<td>AND</td>
<td>E.2 Monitor the flammable gas concentration in the affected DST annulus headspace.</td>
<td>24 hours</td>
</tr>
<tr>
<td>AND</td>
<td>E.3 Stop all activities in GAS-TRAPPING systems or equipment connected to the affected DST annulus, except for flammable gas monitoring and actions to reduce the flammable gas concentration.</td>
<td>Once per 24 hours thereafter</td>
</tr>
<tr>
<td>AND</td>
<td>E.4 Apply ignition controls to all installed equipment and manned work activities involving the affected DST annulus headspace and GAS-TRAPPING systems or equipment connected to the affected DST annulus.</td>
<td>Prior to the concentration of flammable gas exceeding 60% of the LFL</td>
</tr>
</tbody>
</table>
## ACTIONS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>REQUIRED ACTION</th>
<th>COMPLETION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>F. Concentration of flammable gas is &gt; 60% of the LFL in the DST annulus headspace.</td>
<td>F.1 Submit a RECOVERY PLAN to the ORP. AND F.2 Reduce the DST annulus headspace flammable gas concentration to ≤ 25% of the LFL in accordance with the RECOVERY PLAN.</td>
<td>10 days AND In accordance with the RECOVERY PLAN</td>
</tr>
</tbody>
</table>

## SURVEILLANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>SURVEILLANCE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 3.11.1</td>
<td>VERIFY DST annulus high-level safety instrumented alarm system safety annunciators are OPERABLE.</td>
</tr>
<tr>
<td>SR 3.11.2</td>
<td>Perform functional testing of DST annulus high-level safety instrumented alarm system high-liquid level switch, level switch heater, and high-liquid level switch fault detection capability.</td>
</tr>
<tr>
<td>SR 3.11.3</td>
<td>Perform simulant testing of DST annulus high-level safety instrumented alarm system high-liquid level switches. OR Replace DST annulus high-level safety instrumented alarm system liquid level element probes.</td>
</tr>
</tbody>
</table>
# CROSS REFERENCES

<table>
<thead>
<tr>
<th>TITLE</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>DST and SST Time to Lower Flammability Limit</td>
<td>AC 5.9.1</td>
</tr>
<tr>
<td>Ignition Controls</td>
<td>AC 5.9.2</td>
</tr>
</tbody>
</table>
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 Section 3, “Operating Limits and Surveillance Requirements.” SRs are numbered according to their respective LCOs (i.e., SR 3.1.1 is the first SR associated with LCO 3.1).
SECTION 5

ADMINISTRATIVE CONTROLS
5.0  ADMINISTRATIVE CONTROLS (AC)

5.1  Purpose

5.1.1  The purpose of the Administrative Controls (AC) is to specify the provisions relating to organization and management, procedures, recordkeeping, assessment, and reporting; the safety management programs; and directed action SPECIFIC ADMINISTRATIVE CONTROLS (SAC) and AC Key Elements necessary to ensure safe operation of the tank farm facilities.

5.1.2  Applicability

Unless otherwise noted, the ACs apply at all times to tank farm facilities and operations.
5.0 ADMINISTRATIVE CONTROLS (AC)

5.2 Contractor Responsibility

5.2.1 The Tank Operations Contractor (TOC), Washington River Protection Solutions LLC (WRPS), shall be responsible to the U.S. Department of Energy (DOE), Office of River Protection (ORP) for the safe operation of the ORP-owned tank farm facilities in accordance with the Technical Safety Requirements (TSR) as approved by the ORP Manager, or designee, including any modification by the ORP Manager. The TOC shall be responsible for maintaining the current ORP-approved TSRs as a controlled document.

The TSRs shall be kept current and reflect changes in tank farm facilities, operations, and hazards as they are analyzed in RPP-13033, Tank Farms Documented Safety Analysis (DSA).

5.2.1.1 SST Retrievals Manager, or Equivalent Position

The WRPS SST Retrievals Manager, or equivalent position, shall have overall responsibility for tank farm facilities and operations within SST Retrievals, and for ensuring that the requirements of the TSRs are met. The SST Retrievals Manager, or equivalent position, shall delegate in writing the succession to this responsibility, as appropriate.

5.2.1.2 Production Operations Manager, or Equivalent Position

The WRPS Production Operations Manager, or equivalent position, shall have overall responsibility for tank farm facilities and operations within Production Operations, and for ensuring that the requirements of the TSRs are met. The Production Operations Manager, or equivalent position, shall delegate in writing the succession to this responsibility, as appropriate.

5.2.1.3 Shift Manager

The WRPS 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. Requirements for the shift manager relative to maintaining the minimum shift complement and sharing arrangements with the 242-A Evaporator are described in AC 5.5, “Organization,” and in RPP-13033, Tank Farms Documented Safety Analysis, Chapter 5.0, “Derivation of Technical Safety Requirements,” and Section 5.4.2, “Minimum Staffing Levels.”
5.0 ADMINISTRATIVE CONTROLS (AC)

5.3 Compliance

5.3.1 The Washington River Protection Solutions LLC (WRPS) SST Retrievals Manager, or equivalent position, is responsible for ensuring that the requirements of the TSRs are met for tank farm facilities and operations within SST Retrievals.

The WRPS Production Operations Manager, or equivalent position, is responsible for ensuring that the requirements of the TSRs are met for tank farm facilities and operations within Production Operations.

Compliance shall be demonstrated by:

a. Operating within the Safety Limits (SL), Limiting Control Settings (LCS), Limiting Conditions for Operation (LCO), and the associated Surveillance Requirements (SR) 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.

f. Performing all in-service inspections/tests when required.
5.0 ADMINISTRATIVE CONTROLS (AC)

5.4 Technical Safety Requirement VIOLATIONS

5.4.1 VIOLATION Criteria

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

a. Exceeding an SL.

(Note: No SLs have been identified for the tank farm facilities.)

b. Failure to complete an ACTIONS statement within the required time limit following:

1. Exceeding an LCS.

(Note: No LCSs have been identified for the tank farm facilities because there are no SLs.)

2. Failure to meet an LCO.

Proceed in accordance with Section 5.4.3, “Response to a Limiting Control Setting or Limiting Condition for Operation VIOLATION,” if an LCO VIOLATION occurs.

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

(Note: Failure to perform an SR within the required time limit includes the allowable 25% extension in accordance with SR 3.0.2, “Frequencies.”)

Proceed in accordance with Section 5.4.4, “Response to a Surveillance Requirement VIOLATION,” if an SR VIOLATION occurs.

d. Failure to comply with a SPECIFIC ADMINISTRATIVE CONTROL (SAC) requirement (i.e., ACs 5.8.1 through 5.8.X).

Proceed in accordance with Section 5.4.5, “Response to an AC VIOLATION,” if an AC VIOLATION occurs.

(continued)
5.4 Technical Safety Requirement Violations (continued)

5.4.1 Violation Criteria (continued)

e. Failure to comply with an administrative or programmatic AC statement (i.e., ACs 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, and 5.7) or an AC Key Element requirement (i.e., ACs 5.9.1 through 5.9.X). To qualify as a TSR violation, the failure to meet the intent of an administrative or programmatic AC statement, or to comply with an AC Key Element requirement, would need to be significant enough to render the DSA summary invalid. A noncompliance within a specific procedure that implements an administrative or programmatic AC or an AC Key Element is not necessarily a TSR VIOLATION. An exception is that not meeting minimum staffing requirements (see Section 5.5.1.3) would be an AC TSR VIOLATION.

Proceed in accordance with Section 5.4.5, “Response to an AC VIOLATION,” if an AC VIOLATION occurs.

f. Failure to have VERIFIED the important attributes of a Design Feature when the Design Feature is first required to be applicable (see Section 6.0).

Proceed in accordance with Section 5.4.6, “Response to a Design Feature VIOLATION” if a Design Feature VIOLATION occurs.

g. Failure to perform a Design Feature in-service inspection/test within the required time limit.

Proceed in accordance with Section 5.4.6, “Response to a Design Feature Violation” if a Design Feature VIOLATION occurs.

5.4.2 Response to a Safety Limit VIOLATION

(Note: No SLs have been identified for the tank farm facilities.)
5.4 Technical Safety Requirement VIOLATIONS (continued)

5.4.3 Response to a Limiting Control Setting or Limiting Condition for Operation VIOLATION

(Note: No LCSs have been identified for the tank farm facilities because there are no SLs.)

Proceed as follows if an LCO VIOLATION occurs:

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

b. Notify ORP of the VIOLATION and prepare an occurrence report in accordance with the occurrence reporting program.

c. Perform and document an evaluation, if appropriate, of the LCO VIOLATION to determine if any damage may have occurred.

5.4.4 Response to a Surveillance Requirement VIOLATION

Proceed as follows if an SR VIOLATION occurs (i.e., failure to perform an SR within the required time limit, including the allowable 25% extension).

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), 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 5.4.3, “Response to a Limiting Control Setting or Limiting Condition for Operation VIOLATION.”

b. Notify ORP of the VIOLATION and prepare an occurrence report in accordance with the occurrence reporting program.
5.4 Technical Safety Requirement VIOLATIONS (continued)

5.4.5 Response to an AC VIOLATION

Proceed as follows if an AC VIOLATION occurs:

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

b. Notify ORP of the VIOLATION and prepare an occurrence report in accordance with the occurrence reporting program.

c. Perform and document an evaluation, if appropriate, of the AC VIOLATION to determine if any damage may have occurred.

5.4.6 Response to a Design Feature VIOLATION

Proceed as follows if a Design Feature VIOLATION occurs:

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

b. Notify ORP of the VIOLATION and prepare an occurrence report in accordance with the occurrence reporting program.

c. Perform and document an evaluation, if appropriate, of the Design Feature VIOLATION to determine if any damage may have occurred.
5.0 ADMINISTRATIVE CONTROLS (AC)

5.5 Organization

5.5.1 Lines of authority, responsibility, and communication shall be established and defined at all management levels through intermediate levels, including all safety and operating organization positions. These organizations 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 shall have sufficient organizational freedom to ensure their independence from operating pressures.

5.5.1.1 SST Retrievals Manager, or Equivalent Position

The Washington River Protection Solutions LLC (WRPS) SST Retrievals Manager, or equivalent position, shall have overall responsibility for tank farm facilities and operations within SST Retrievals, and for ensuring that the requirements of the TSRs are met. The SST Retrievals Manager, or equivalent position, shall delegate in writing the succession to this responsibility, as appropriate.

5.5.1.2 Production Operations Manager, or Equivalent Position

The WRPS Production Operations Manager, or equivalent position, shall have overall responsibility for tank farm facilities and operations within Production Operations, and for ensuring that the requirements of the TSRs are met. The Production Operations Manager, or equivalent position, shall delegate in writing the succession to this responsibility, as appropriate.

5.5.1.3 Minimum Operations Shift Complement

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

(continued)
5.5 Organization (continued)

5.5.1.3 The minimum shift complement for tank farm facilities is shown in Table 5.5-1. The minimum complement of personnel can be one (1) person less than the required number for a period of time not to exceed 4 hours. Allowing the temporary reduction in the minimum complement accommodates unexpected absences, provided immediate action is taken to restore the shift complement to within the minimum requirements specified in Table 5.5-1. See RPP-13033, *Tank Farms Documented Safety Analysis*, Chapter 5.0, “Derivation of Technical Safety Requirements,” Section 5.4.2, “Minimum Staffing Levels,” for additional information.

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

Table 5.5-1. Tank Farm Facilities Minimum Operations Shift Complement.

<table>
<thead>
<tr>
<th>POSITION</th>
<th>MINIMUM OPERATIONS SHIFT COMPLEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift Managers</td>
<td>1</td>
</tr>
<tr>
<td>Nuclear Operators</td>
<td>3</td>
</tr>
<tr>
<td>Radiological Control Technicians</td>
<td>1</td>
</tr>
</tbody>
</table>
| Emergency Operations Center     | Per *Hanford Emergency Management Plan (DOE/RL-94-02)*

Notes:

*aThis table applies to tank farm facilities described in Section 1.6.1.*

*bThe Shift Manager is allowed to be shared with the 242-A Evaporator (except when the 242-A Evaporator is in the Operation Mode) provided facility- or operation-specific training has been received. See HNF-15279, 242-A Evaporator Technical Safety Requirements, for the definition of the 242-A Evaporator Operational Modes.*

*cOne Nuclear Operator (except when the 242-A Evaporator is in the Operation or Limited Waste Mode) is allowed to be shared with the 242-A Evaporator provided facility- or operation-specific training has been received. See RPP-13033, *Tank Farms Documented Safety Analysis*, Chapter 15.0, “Emergency Preparedness Program,” for additional information.*

5.5.1.4 Control of Working Hours

Maximum daily working hours and maximum number of consecutive days on duty shall be defined for the minimum operations shift complement.
This Administrative Control (AC) provides the Tank Operations Contractor commitment to establish, maintain, and implement the safety management programs (SMP) as described in RPP-13033, *Tank Farms Documented Safety Analysis*, Chapters 7.0 through 17.0. SMPs are part of an Integrated Environment, Safety, and Health Management System (ISMS) to ensure the health and safety of the public and workers, and protection of the environment. This section satisfies Section 5.5.X.3 of DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*, which requires that facilities include a commitment to establish, maintain, and implement SMPs.

The SMPs apply to tank farm facilities and operations.

See RPP-13033, Chapter 5.0, “Derivation of Technical Safety Requirements,” Section 5.5.3.7, “Administrative Control 5.6 – Safety Management Programs,” for additional information.
5.0 ADMINISTRATIVE CONTROLS (AC)

5.7 Waste Leak Evaluation Program (Programmatic AC)

5.7.1 Requirement for Waste Leak Evaluation Program

This Administrative Control (AC) provides the Tank Operations Contractor (TOC) commitment to establish, implement, and maintain a waste leak evaluation program to identify and evaluate potential waste leaks or releases from tank farm facilities and operations.

5.7.2 Key Features

The waste leak evaluation program requires:

a. Technical evaluations of potential motive forces and leak paths that could result in waste leaks from waste transfer systems (i.e., waste leaks outside primary and secondary confinement)

b. Technical evaluations of the potential for waste releases outside of tanks from operations and equipment (i.e., potential energy sources) within tanks.

The technical evaluations are prepared in accordance with TOC engineering standards and procedures.

5.7.3 Applicability

AC 5.7.2.a applies to waste transfer primary piping systems and operations that could provide a motive force for a waste leak.

AC 5.7.2.b applies to operations and equipment within SSTs, DSTs, DCRTs, catch tanks, IMUSTs, 244-AR Vault tanks, and 244-CR Vault tanks, including tank risers, that could provide an energy source for a waste leak outside the tank.
5.0 ADMINISTRATIVE CONTROLS (AC)

5.8 Specific Administrative Controls

5.8.1 DST Induced Gas Release Event Evaluation (SAC)

This SPECIFIC ADMINISTRATIVE CONTROL (SAC) protects the facility worker from a flammable gas deflagration in a DST due to an operations induced gas release event (GRE). The SAC requires evaluations of waste transfers from DSTs and water additions, chemical additions, and waste transfers into DSTs to determine restrictions or required controls to prevent an induced GRE flammable gas deflagration.

The operations for which this SAC is applicable are specified within the SAC requirements. The SAC is not applicable to DSTs 241-AN-103, 241-AN-104, 241-AN-105, 241-AW-101, and 241-SY-103. In addition, the SAC requirement for waste transfers from DSTs (i.e., preventing induced GRE flammable gas hazards due to uncovering solids) is not applicable to DSTs that prior to the waste transfer contain insufficient retained gas to achieve 100% of the LFL.

The SAC requirements are:

1. Waste Transfers from DSTs

   An evaluation shall be performed and documented for waste transfers from DSTs to determine if an induced gas release due to uncovering solids in the sending DST is sufficient to achieve a flammable gas concentration of 100% of the LFL in the tank headspace assuming zero ventilation. If a flammable gas concentration of 100% of the LFL can be achieved, the volume of liquid waste transferred from the sending DST shall be limited to a volume that prevents achieving 100% of the LFL in the tank headspace.

(continued)
5.8.1 DST Induced Gas Release Event Evaluation (SAC) (continued)

2. Water Additions, Chemical Additions, and Waste Transfers into DSTs

An evaluation shall be performed and documented for the following water additions, chemical additions, and waste transfers into DSTs.

- Additions of > 20,000 gal of water when the resulting waste level in the receiving DST will be ≤ 422 in.
- Additions of > 10,000 gal of water when the resulting waste level in the receiving DST will be > 422 in.
- Additions of > 20,000 gal of sodium hydroxide or sodium nitrite when the resulting waste level in the receiving DST will be ≤ 422 in.
- Additions of > 10,000 gal of sodium hydroxide or sodium nitrite when the resulting waste level in the receiving DST will be > 422 in.
- Transfers of > 20,000 gal of waste when the resulting waste level in the receiving DST will be ≤ 422 in.
- Transfers of > 10,000 gal of waste when the resulting waste level in the receiving DST will be > 422 in.

The evaluation shall determine if an induced gas release due to the dissolution of soluble settled solids in the receiving DST is sufficient to achieve a flammable gas concentration of 100% of the LFL in the tank headspace assuming zero ventilation. If a flammable gas concentration of 100% of the LFL can be achieved, LCO 3.4, “DST Induced Gas Release Event Flammable Gas Control,” shall be implemented during the water addition, chemical addition, or waste transfer.

5.0 ADMINISTRATIVE CONTROLS (AC)

5.8 Specific Administrative Controls

5.8.2 Flammable Gas Controls (SAC)

This SPECIFIC ADMINISTRATIVE CONTROL (SAC) protects the facility worker from a flammable gas deflagration due to the accumulation and ignition of flammable gases generated by tank wastes.

The applicability of the SAC is to tanks, pits, vaults, waste transfer systems, and other equipment or systems that may contain flammable gases generated by tank wastes, including flammable gases generated by corrosion in a tank waste environment, and that have a configuration that can trap flammable gases and accumulate a potentially combustible concentration of these gases, and to manned work activities involving these tanks, pits, vaults, waste transfer systems, or GAS-TRAPPING equipment.

The SAC applies to:

- Active waste transfer systems (primary piping and encasements, and primary hose and encasement hose assemblies).
- Double-shell tank (DST) leak detection pits.
- GAS-TRAPPING systems or equipment installed within a DST, DST annulus, single-shell tank, double-contained receiver tank, or waste transfer-associated structure.
- The following inactive tanks, vaults, waste transfer systems, and GAS-TRAPPING systems or equipment contained within or connected to specified inactive tanks, vaults, and waste transfer systems.
  - Inactive Miscellaneous Underground Storage Tanks (IMUSTs):
    
    | IMUST ID | IMUST ID | IMUST ID | IMUST ID |
    |----------|----------|----------|----------|
    | 209-E-TK-111 | 241-AX-151-TK-D | 241-AX-151-CT | 241-B-301(B) |
    | 241-C-301(C) | 241-AX-151-TK-F | 241-BX-302B | 244-BXR-001 |
    | 241-W-151-001 | 241-BY-ITS2-TK-1 | 244-UR-002 | 244-BXR-003 |
    | 241-W-151-002 | 241-BY-ITS2-TK-2 | 240-S-302 | 244-BXR-011 |
    | 241-SX-302(304) | 241-S-302A | 242-TA-R1 | 241-Z-8 |
    | 241-TX-302B | 241-T-301(B) | 244-TXR-003 | 244-TXR-001 |
    | 241-TY-302A | 241-TX-302B(R) | 244-UR-003 | 244-UR-001 |
    | 242-T-135 | 241-TY-302B | 241-S-302B | 244-UR-004 |
    | 244-TXR-002 | 241-TX-302X(B) | 241-TX-302A |  |

(continued)
5.8.2 Flammable Gas Controls (SAC) (continued)

- IMUST Vaults.

- Inactive Catch Tanks:

  - 241-S-304 241-TX-302C 241-U-301(301B) 241-UX-302A
  - 241-AZ-151 241-AZ-154 241-ER-311 204-AR-TK-1
  - 244-A 241-EW-151.

- 244-CR Vault Tanks:

  - 244-CR-TK-001 244-CR-TK-002 244-CR-TK-003 244-CR-TK-011.

- 242-T Evaporator Tanks and Vessels:

  - 242-T-103 242-T-106.

- 242-S Evaporator Hot Side Tanks and Vessels.

- Miscellaneous Inactive Processing Facilities:

  - ITS-1 241-C-801 241-SX-401 241-SX-402.

- Inactive Waste Transfer Systems (primary piping and encasements, and primary hose and encasement hose assemblies).

- Inactive Vacuum Retrieval System Slurry Tank and Water Separator.

- Manned work activities involving tanks, pits, vaults, waste transfer systems, and GAS-TRAPPING systems or equipment contained within or connected to tanks, pits, vaults, waste transfer-associated structures, and waste transfer systems to which the SAC applies.

The SAC requirements are:

A. Installed Equipment

1. Installed equipment shall have been VERIFIED to meet ignition controls except for:

   a. Equipment that is de-energized.

   (continued)
5.8.2 Flammable Gas Controls (SAC) (continued)

b. Systems or equipment for which an approved evaluation has been completed that concludes the following:

i. Steady-state flammable gas generation cannot result in a flammable gas concentration of > 25% of the lower flammability limit (LFL) in the location of concern.

AND

ii. A spontaneous or induced release of flammable gas cannot occur, or cannot result in a flammable gas concentration of > 25% of the LFL in the location of concern.

2. If installed equipment is discovered in any inactive tank, vault, processing facility, IMUST, or inactive waste transfer system that does not meet required ignition controls, the equipment shall be IMMEDIATELY de-energized.

3. Ignition control requirements shall be determined in accordance with AC Key Element Ignition Controls (AC 5.9.2).

B. Manned Work Activities

1. a. Ignition controls shall be implemented for manned work activities involving any tank, pit, vault, waste transfer system, or GAS-TRAPPING equipment to which this SAC is applicable.

OR

1. b. Prior to manned work activities involving any tank, pit, vault, waste transfer system, or GAS-TRAPPING equipment to which this SAC is applicable, an approved evaluation shall have been VERIFIED to demonstrate that:

i. Steady-state flammable gas generation cannot result in a flammable gas concentration of > 25% of the LFL in the location of concern.

AND

ii. A spontaneous or induced release of flammable gas cannot occur, or cannot result in a flammable gas concentration of > 25% of the LFL in the location of concern.

(continued)
5.8.2 Flammable Gas Controls (SAC) (continued)

2. Ignition controls for a manned work activity may be discontinued where:

   a. Monitoring has VERIFIED that steady-state flammable gas concentration
      is \( \leq \) 25% of the LFL in the location of concern.

   AND

   b. An approved evaluation has been VERIFIED to demonstrate that a spontaneous
      or induced release of flammable gas cannot occur, or cannot result in a flammable
      gas concentration of > 25% of the LFL in the location of concern.

3. Ignition control requirements shall be determined in accordance with AC Key
   Element Ignition Controls (AC 5.9.2).

See RPP-13033, *Tank Farms Documented Safety Analysis*, Chapter 4.0, “Safety Structures,
Systems, and Components,” Section 4.5.6, “Flammable Gas Controls,” for additional
information.
5.0 ADMINISTRATIVE CONTROLS (AC)

5.8 Specific Administrative Controls

5.8.3 Reserved for Future Use
5.0 ADMINISTRATIVE CONTROLS (AC)

5.8 Specific Administrative Controls

5.8.4 Low-Level Radioactive, Mixed, and TRU Waste Packaging Flammable Gas Controls (SAC)

This SPECIFIC ADMINISTRATIVE CONTROL (SAC) protects the facility worker from a flammable gas deflagration due to hydrogen release and accumulation in low-level radioactive, mixed, and transuranic (TRU) waste packages by venting the packages prior to the concentration reaching 5% hydrogen by volume.

This SAC is applicable to closed, non-vented, low-level radioactive and mixed waste packages that are in the custody of the Tank Operations Contractor (TOC); and to closed TRU waste packages that are in the custody of the TOC.

The SAC requirements are:

1. When low-level radioactive or mixed waste is packaged in a non-vented waste package (i.e., drums or boxes without a safety-significant vent), the time that the waste package is closed shall be tracked until shipped (i.e., no longer in TOC custody).

2. When low-level radioactive or mixed waste is packaged in a non-vented waste package, the waste package shall be shipped or a safety-significant vent shall be installed prior to one half the time calculated for the hydrogen concentration in the waste package to reach 5% by volume.

3. Safety-significant vents shall be installed on all closed low-level radioactive or mixed waste packages containing equipment that was GAS-TRAPPING unless the flammable gas concentration inside the equipment is VERIFIED to be \( \leq 1\% \) of the LFL prior to closing the waste package.

4. Safety-significant vents shall be installed on all closed TRU waste packages.

This SPECIFIC ADMINISTRATIVE CONTROL (SAC) identifies the safety-significant support structures, systems, and components (SSC) and SACs required to protect the safety function of safety-significant SSCs from WASTE TRANSFER PUMP overpressure and flow transients (water hammer) during waste transfers. The protected safety-significant SSCs and their safety functions are:

- Waste transfer primary piping systems - safety function is to provide confinement of waste.
- HIHTL primary hose assemblies - safety function is to provide confinement of waste.
- Isolation valves for double valve isolation - safety function is to limit leakage of waste (through valve leakage).

The SAC is applicable to safety-significant waste transfer primary piping systems, HIHTL primary hose assemblies, and isolation valves for double valve isolation that are PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK or that are PHYSICALLY CONNECTED to the 242-A Evaporator vessel when the vessel contains waste. (See Section 1.1 for the definition of when the 242-A Evaporator vessel contains waste.) Additional applicability of the SAC is contained within the SAC requirements.

The SAC requirement is:

A documented evaluation shall:

1. Demonstrate that during waste transfers:
   a. WASTE TRANSFER PUMP overpressure conditions do not exceed the failure limits of PHYSICALLY CONNECTED safety-significant waste transfer primary piping systems, HIHTL primary hose assemblies, and isolation valves for double valve isolation.

   AND

(continued)
5.8.5 Waste Transfer System Overpressure and Flow Transient Protection (SAC) (continued)

b. Flow transient conditions do not exceed the failure limits of safety-significant SSCs on the planned waste transfer route. The planned waste transfer route includes safety-significant waste transfer primary piping systems, HIHTL primary hose assemblies, and isolation valves for double valve isolation that are pressurized by the WASTE TRANSFER PUMP, or the gravity head from the 242-A Evaporator vessel when the vessel contains waste, up to the first closed isolation valve. The isolation valve is not required to be safety significant with respect to through valve leakage.

OR

2. Identify the safety-significant support SSCs that are required to be OPERABLE and the SACs that are required to be applicable to protect the safety function of safety-significant waste transfer primary piping systems, HIHTL primary hose assemblies, and isolation valves for double valve isolation from WASTE TRANSFER PUMP overpressure and flow transient conditions during waste transfers.

This SPECIFIC ADMINISTRATIVE CONTROL (SAC) ensures that safety-significant isolation valves for double valve isolation are in the closed or block flow position when used to physically disconnect waste transfer primary piping systems, HIHTL primary hose assemblies, and interfacing water systems. In their closed or block flow position, safety-significant isolation valves limit waste leakage into the physically disconnected waste transfer primary piping systems, HIHTL primary hose assemblies, and interfacing water systems. By limiting waste leakage, this SAC addresses fine spray leaks, wetting spray/jet/stream leaks, and flammable gas deflagrations in waste transfer-associated structures or other facilities due to a misroute.

The SAC is applicable to safety-significant isolation valves for double valve isolation used to physically disconnect waste transfer primary piping systems, HIHTL primary hose assemblies, and interfacing water systems when ACTIVE WASTE TRANSFER PUMPS are not UNDER ADMINISTRATIVE LOCK, or when the 242-A Evaporator vessel contains waste. (See Section 1.1 for the definition of when the 242-A Evaporator vessel contains waste.)

The SAC requirements are:

1. Identify two safety-significant isolation valves required to physically disconnect waste transfer primary piping systems, HIHTL primary hose assemblies, and interfacing water systems.

2. Position the identified safety-significant isolation valves in the closed or block flow position, or VERIFY the correct position of the safety-significant isolation valves with attached tamper seals.

3. Provide INDEPENDENT VERIFICATION that the identified safety-significant isolation valves are in the closed or block flow position.

5.0 ADMINISTRATIVE CONTROLS (AC)

5.8 Specific Administrative Controls

5.8.7 Waste Transfer System Valve Closure Controls (SAC)

This SPECIFIC ADMINISTRATIVE CONTROL (SAC) prevents the loss of the safety function of safety-significant structures, systems, and components (SSC) from flow transients (i.e., water hammer) caused by closing manual waste transfer system valves during waste transfers. The protected safety-significant SSCs and their safety functions are:

- Waste transfer primary piping systems - safety function is to provide confinement of waste.
- HIHTL primary hose assemblies - safety function is to provide confinement of waste.
- Isolation valves for double valve isolation - safety function is to limit leakage of waste (through valve leakage).

The SAC is applicable when required by AC 5.8.5, “Waste Transfer System Overpressure and Flow Transient Protection.” Additional applicability of the SAC is contained within the SAC requirements.

The SAC requirements are:

For single-shell tank (SST) modified sluicing waste retrieval systems with two sluicers that are PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK, prior to closing a manual waste transfer system valve used to isolate a sluicer:

1. VERIFY the waste transfer system valve used to isolate the other sluicer is in the open position.

   AND

2. VERIFY based on visual observation inside the SST that waste is flowing through both sluicers.

5.8.8 Waste Transfer System Freeze Protection (SAC)

This SPECIFIC ADMINISTRATIVE CONTROL (SAC) prevents the loss of the safety function of safety-significant structures, systems, and components (SSC) from freezing during waste transfers. The protected safety-significant SSCs and their safety functions are:

- Waste transfer primary piping systems located in waste transfer-associated structures – safety function is to provide confinement of waste.
- Isolation valves for double valve isolation located in waste transfer-associated structures – safety function is to limit leakage of waste (through valve leakage).
- Buried/bermed waste transfer primary piping – safety function is to provide confinement of waste.

The SAC is applicable to waste transfer-associated structures and buried/bermed waste transfer primary piping that are PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK, with the exception of waste transfer-associated structures and buried/bermed waste transfer primary piping encasement monitored by the waste transfer freeze protection safety instrumented system under LCO 3.10.

The SAC is applicable in October, November, December, January, February, and March. Additional applicability of the SAC is contained within the SAC requirements.

The SAC requirements are:

A. Waste Transfer-Associated Structures

For PHYSICALLY CONNECTED waste transfer-associated structures, except for structures where a documented evaluation demonstrates there is no freezing hazard during the waste transfer for the PHYSICALLY CONNECTED safety-significant SSCs located in the structure.

1. Instrumentation shall be installed to monitor the air temperature in the waste transfer-associated structures. A documented evaluation shall determine the number and location of thermocouples required in the waste transfer-associated structures (i.e., the configuration of thermocouples in the structure), and the resulting temperature monitoring uncertainties.
5.8.8 Waste Transfer System Freeze Protection (SAC) (continued)

2. The air temperature in the waste transfer-associated structures shall be monitored, and the lowest temperature shall be VERIFIED to be > 32°F accounting for the accuracy of the temperature monitoring system and temperature monitoring uncertainty. The temperature monitoring uncertainty is dependent on the configuration of thermocouples in the structure. In addition, for waste transfer-associated structures where the configuration of thermocouples in the structure is dependent on limited in-leakage of air, VERIFY that the temperature difference between vertically adjacent thermocouples on installed temperature trees is ≤ 1.2°F, accounting for the uncertainty in the differential temperature measurement. OR VERIFY that the lowest air temperature in the structure is ≥ 50°F.* The monitoring frequency shall be prior to removing the administrative lock on the ACTIVE WASTE TRANSFER PUMP (OR within 8 hours after 00:00 October 1 if the administrative lock has already been removed prior to October 1 when the control becomes applicable each year) AND once per 8 hours thereafter. CONCURRENT VERIFICATION shall be provided for temperature monitoring.

*No accounting for the accuracy of the temperature monitoring system is required when VERIFYING that the lowest air temperature in the waste transfer-associated structure is ≥ 50°F.

3. If the above temperature requirement is not met in the waste transfer-associated structures, the WASTE TRANSFER PUMP shall be placed UNDER ADMINISTRATIVE LOCK within 3 hours.

B. Buried/Bermed Waste Transfer Primary Piping

For PHYSICALLY CONNECTED buried/bermed waste transfer primary piping, except for buried/bermed waste transfer primary piping where a documented evaluation demonstrates there is no freezing hazard.

1. Instrumentation shall be installed to monitor the air temperature in selected waste transfer primary piping encasements. A documented evaluation shall demonstrate that the air temperatures in the selected waste transfer primary piping system encasements represent the lowest air temperature in the encasements of PHYSICALLY CONNECTED buried/bermed waste transfer primary piping.
2. The waste transfer primary piping encasement air temperatures shall be monitored, and the lowest temperature shall be VERIFIED to be > 32°F accounting for the accuracy of the temperature monitoring system. The monitoring frequency shall be prior to removing the administrative lock on the ACTIVE WASTE TRANSFER PUMP (OR within 5 days after 00:00 October 1 if the administrative lock has already been removed prior to October 1 when the control becomes applicable each year) AND once per 5 days thereafter. CONCURRENT VERIFICATION shall be provided for temperature monitoring.

3. If the above temperature requirement is not met in the monitored waste transfer primary piping encasements, the WASTE TRANSFER PUMP shall be placed UNDER ADMINISTRATIVE LOCK within 8 hours.

The 25% extension permitted by SR 3.0.2, “Frequencies,” is applicable to the temperature monitoring frequencies in the above SAC requirements. Consistent with the BASES for SR 3.0.2, the 25% extension is not intended to be used repeatedly merely as an operational convenience to extend the frequencies beyond those specified.

5.0 ADMINISTRATIVE CONTROLS (AC)

5.8 Specific Administrative Controls

5.8.9 Reserved for Future Use
5.0 ADMINISTRATIVE CONTROLS (AC)

5.8 Specific Administrative Controls

5.8.10 Reserved for Future Use
5.0 ADMINISTRATIVE CONTROLS (AC)

5.8 Specific Administrative Controls

5.8.11 DST Leak Detection Pit Pumping Control (SAC)

This SPECIFIC ADMINISTRATIVE CONTROL (SAC) prevents the pumping of highly caustic waste from leak detection pits. Preventing the pumping of highly caustic waste from DST leak detection pits protects facility workers from waste leaks (i.e., chemical burns caused by wetting spray/jet/stream leaks). Waste leaks that pose a significant facility worker hazard are highly caustic (i.e., pH ≥ 12.5). The pumping of highly caustic waste from DST leak detection pits is not currently authorized, as required safety-significant SSCs and TSRs have not yet been selected. The safety function is provided by VERIFYING that the liquid to be pumped is not highly caustic. If the liquid to be pumped is not highly caustic (i.e., pH < 12.5), the pumping activity is allowed.

The SAC is applicable to pumping of DST leak detection pits.

The SAC requirements are:

Prior to pumping a DST leak detection pit perform pH testing to VERIFY the pH of the liquid to be pumped is < 12.5. CONCURRENT VERIFICATION shall be provided for the pH testing.

5.0 ADMINISTRATIVE CONTROLS (AC)

5.8 Specific Administrative Controls

5.8.12 In-Pit Heater High Temperature Protection (SAC)

This SPECIFIC ADMINISTRATIVE CONTROL (SAC) prevents the loss of the safety function of safety-significant structures, systems, and components (SSC) due to over-temperature conditions in waste transfer-associated structures during waste transfers. The protected safety-significant SSCs and their safety functions are:

- Waste transfer primary piping systems located in waste transfer-associated structures – safety function is to provide confinement of waste.
- Hose-in-hose transfer line (HIHTL) primary hose assemblies located in waste transfer-associated structures – safety function is to provide confinement of waste.
- Isolation valves for double valve isolation located in waste transfer-associated structures – safety function is to limit leakage of waste (through valve leakage).

The SAC is applicable to waste transfer-associated structures that have a 2500 watt resistive element forced air in-pit heater installed and waste transfer primary piping, HIHTL, or isolation valves for double valve isolation that are PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK. Additional applicability of the SAC is contained with the SAC requirements.

The SAC requirements are:

1. During the months of April, May, June, July, August, and September, the 2500 watt resistive element forced air in-pit heater shall be UNDER ADMINISTRATIVE LOCK.

   OR

   A documented evaluation shall demonstrate that the bulk air temperature and the impingement temperature in the waste transfer-associated structure does not exceed the design temperature of the safety SSCs.
5.8.12 In-Pit Heater High Temperature Protection (SAC) (continued)

2. Safety-significant SSCs (i.e., waste transfer primary piping, HIHTL primary hose assemblies, and isolation valves for double valve isolation) shall not be installed within the exclusion zone of the discharge of a 2500 watt resistive element forced air in-pit heater that is not UNDER ADMINISTRATIVE LOCK. The exclusion zone requirements are defined in TFC-ENG-STD-21, Hose-In-Hose Transfer Lines and TFC-ENG-STD-22, Piping, Jumpers, and Valves.

5.0 ADMINISTRATIVE CONTROLS (AC)

5.9 Administrative Control Key Elements

5.9.1 DST and SST Time to Lower Flammability Limit (AC Key Element)

This Key Element of an Administrative Control (AC) protects assumptions used to develop surveillance frequencies and action completion times in the following TSRs:

- LCO 3.1, “DST Primary Tank Ventilation Systems.”
- LCO 3.2, “SST Steady-State Flammable Gas Control.”
- LCO 3.5, “DST Annulus Flammable Gas Control.”
- LCO 3.6, “DCRT Steady-State Flammable Gas Control.”
- LCO 3.7, “DST Flammable Gas Monitoring Control.”
- LCO 3.11, “DST Annulus High-Level Alarm (Automation).”

The applicability of the AC Key Element is contained within the AC Key Element requirements.

The AC Key Element requirements are:

1. The time to LFL analysis for DSTs, SSTs, and DCRTs (including the time to LFL analysis for DST annuli) shall be VERIFIED or revised as follows.
   
   a. Prior to waste transfers to DSTs and SSTs.
   
   b. Prior to large water additions to DSTs and SSTs (i.e., > 10,000 gal to DSTs and 100-series SSTs; and > 1,000 gal to 200-series SSTs).
   
   c. Prior to chemical additions of sodium hydroxide or sodium nitrite to DSTs for waste chemistry management.
   
   d. Prior to chemical additions of sodium hydroxide to 100-series SSTs to support waste retrieval.
   
   e. Within 14 days (not to exceed 17 days) of discovering a DST waste temperature that exceeds the waste temperature assumed in the time to LFL analysis.
   
   f. Every two years.

2. DST waste temperature monitoring shall be performed weekly. (Note: Weekly is defined as at least once in the period from 00:00 hours on Monday through 23:59 hours on the following Sunday.)
5.9.1 DST and SST Time to Lower Flammability Limit (AC Key Element) (continued)

3. If an increase in a TSR surveillance frequency or a decrease in an action completion time is required based on a revised time to LFL analysis:

a. For planned activities (i.e., waste transfers, water additions, chemical additions), a TSR amendment is required prior to the planned activity OR the Tank Operations Contractor (TOC) may implement an increase TSR surveillance frequency or a decrease action completion time prior to the planned activity. If the TOC implements an increase in a TSR surveillance frequency or a decrease in an action completion time without an ORP approved TSR amendment, the TOC shall notify the U.S. Department of Energy, Office of River Protection (ORP) within 48 hours, and a TSR amendment shall be submitted to ORP within 60 days.

b. For continued operations, an increase in a TSR surveillance frequency or a decrease in an action completion time resulting from a DST temperature increase or the two-year update, the TOC shall implement the increase in the TSR surveillance frequency or the decrease in the action completion time IMMEDIATELY, the TOC shall notify ORP within 48 hours, and the TOC shall submit a TSR amendment to ORP within 60 days.

See RPP-13033, Tank Farms Documented Safety Analysis, Chapter 5.0, “Derivation of Technical Safety Requirements,” Section 5.5.3.1, “Administrative Control 5.9.1 – DST and SST Time to Lower Flammability Limit,” for additional information.
5.0 ADMINISTRATIVE CONTROLS (AC)

5.9 Administrative Control Key Elements

5.9.2 Ignition Controls (AC Key Element)

This Key Element of an Administrative Control (AC) establishes the basis for ignition control requirements, and the requirements for their implementation, to control potential flammable gas ignition sources. This AC Key Element is also an important contributor to defense-in-depth by applying ignition controls for the spontaneous gas release event (GRE) flammable gas hazard in double-shell tanks (DSTs) 241-AN-103, 241-AN-104, 241-AN-105, 241-AW-101, and 241-SY-103.

The applicability of the AC Key Element is contained within the Key Element requirements.

The AC Key Element requirements are:

1. Ignition control requirements shall be established consistent with applicable codes and standards, including National Fire Protection Association (NFPA) requirements. The Tank Operations Contractor (TOC) Chief Engineer, or delegate, shall be the approval authority for equivalency to the established ignition control requirements.

2. Ignition controls are required by the following Technical Safety Requirements (TSRs).

   LCO 3.1, “DST Primary Tank Ventilation Systems.”
   LCO 3.2, “SST Steady-State Flammable Gas Control.”
   LCO 3.5, “DST Annulus Flammable Gas Control.”
   LCO 3.6, “DCRT Steady-State Flammable Gas Control.”
   LCO 3.7, “DST Flammable Gas Monitoring Control.”
   LCO 3.11, “DST Annulus High-Level Alarm (Automation).”
   AC 5.8.2, “Flammable Gas Controls.”
   AC 5.9.2, “Ignition Controls” (Key Element 5.9.2.3).

For installed equipment and manned work activities required to meet ignition controls by the above TSRs, an evaluation shall be performed to:

a. Determine the applicable ignition control requirements.

b. Determine that the installed equipment or manned work activity complies with the applicable ignition control requirements or provides equivalent safety to the ignition control requirements.

(continued)
3. Ignition controls shall be applied at all times in the tank headspace and within GAS-TRAPPING systems or equipment directly above the tank headspace for DSTs 241-AN-103, 241-AN-104, 241-AN-105, 241-AW-101, and 241-SY-103.

5.0 ADMINISTRATIVE CONTROLS (AC)

5.9 Administrative Control Key Elements

5.9.3 Waste Transfer-Associated Structure Cover Installation and Door Closure (AC Key Element)

This Key Element of an Administrative Control (AC) is an important contributor to defense-in-depth by providing secondary confinement of waste leaks into waste transfer-associated structures.

The applicability of the AC Key Element is contained within the Key Element requirements.

The AC Key Element requirements are:

1. Waste transfer-associated structure covers shall be installed when the waste transfer-associated structures are PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK.

2. The RCSTS Diversion Box 6241-A entry door shall be closed when the RCSTS Diversion Box 6241-A is PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK.

3. The RCSTS Vent Station 6241-V entry door shall be closed when the Vent Station 6241-V is PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK.

4. Waste transfer-associated structure covers shall be installed when the waste transfer-associated structures are PHYSICALLY CONNECTED to the 242-A Evaporator vessel when the vessel contains waste. (See Section 1.1. for the definition of when the 242-A Evaporator vessel contains waste.)

5.0 ADMINISTRATIVE CONTROLS (AC)

5.9 Administrative Control Key Elements

5.9.4 Waste Characteristics Controls (AC Key Element)

This Key Element of an Administrative Control (AC) protects assumptions on waste characteristics used to estimate accident consequences by ensuring that unit-liter doses (ULD), unit sum-of-fractions (USOF), $^{90}$Sr concentrations, and $^{137}$Cs concentrations are within the values used in RPP-13033, *Tank Farms Documented Safety Analysis* (DSA), Chapter 3.0, “Hazard and Accident Analyses.” The Key Element also protects assumptions on waste characteristics used to develop controls for flammable gas deflagrations due to gas release events (GRE) by preventing the formation of waste gel in DSTs and SSTs.

The applicability of the AC Key Element is contained within the AC Key Element requirements.

The AC Key Element requirements are:

1. The Best-Basis Inventory (BBI) shall be reviewed and, if necessary, updated at least annually (i.e., at least every 365 days) to incorporate new information on DST and SST waste characteristics and conditions.

2. ULDs, USOFs, and $^{90}$Sr and $^{137}$Cs concentrations for DST and SST waste shall be updated at least annually (i.e., at least every 365 days) to incorporate BBI data revisions. The updated ULDs and USOFs shall be evaluated for required changes to the DSA safety analysis. (Note: The updated $^{90}$Sr and $^{137}$Cs concentrations are only required to be evaluated when the waste is transferred [see Requirement 5].)

3. U.S. Department of Energy published changes to Protective Action Criteria (PAC) shall be incorporated into the toxicological source term methodology and the USOFs updated at least annually (i.e., at least every 365 days). The updated USOFs shall be evaluated for required changes to the DSA safety analysis.

4. Prior to the following activities, the resulting ULDs and USOFs in the affected tanks shall be estimated and evaluated for required changes to the DSA safety analysis.
   a. Waste transfers to DSTs and SSTs.
   b. Chemical additions of sodium hydroxide or sodium nitrite to DSTs for waste chemistry management.
   c. Chemical additions of sodium hydroxide to 100-series SSTs to support waste retrieval.

(continued)
5.9.4 Waste Characteristics Controls (AC Key Element) (continued)

5. Prior to waste transfers to DSTs, waste transfers to SSTs, and waste transfers to and from the 242-A Evaporator, the ULDs, USOFs, and \(^{90}\text{Sr}\) and \(^{137}\text{Cs}\) concentrations of the waste to be transferred shall be evaluated for required changes to the DSA safety analysis.

6. Prior to the following activities, an evaluation shall be performed and documented that identifies any requirements to prevent the formation of waste gel in a DST or SST, and any identified requirements shall be implemented in the waste retrieval or transfer operating procedures for the activities.

   a. Waste transfers to DSTs and SSTs.

   b. Chemical additions of sodium hydroxide or sodium nitrite to DSTs for waste chemistry management.

   c. Chemical additions of sodium hydroxide to 100-series SSTs to support waste retrieval.

5.0 ADMINISTRATIVE CONTROLS (AC)

5.9 Administrative Control Key Elements

5.9.5 Nuclear Criticality Safety (AC Key Element)

This Key Element of an Administrative Control (AC) ensures that fissile materials operations will be evaluated and documented to demonstrate that those operations will be sub-critical for all normal and credible abnormal conditions and to ensure that criticality safety controls will be implemented.

The applicability of the AC Key Element is contained within the AC Key Element requirements.

The AC Key Element requirements are:

1. Before the start of a new operation with fissile material, or before an existing operation is changed, it shall be determined and documented in a criticality safety evaluation report (CSER) that the entire process will be sub-critical under both normal and credible abnormal conditions.

2. All criticality safety controls, as identified in CSER shall be implemented to ensure the safety of tank farm operations, including waste transfers and retrieval operations.

5.0 ADMINISTRATIVE CONTROLS (AC)

5.9 Administrative Control Key Elements

5.9.6 Emergency Preparedness (AC Key Element)

This Key Element of an Administrative Control (AC) establishes emergency preparedness requirements to reduce the risk from:

- Seismic induced flammable gas accidents in double-shell tanks (DST), and
- Waste transfer leaks.

The applicability of the AC Key Element is contained within the AC Key Element requirements.

The AC Key Element requirements are:

1. Emergency response planning shall include response procedures for the evacuation of personnel from the DST 241-AN, 241-AP, 241-AW, 241-AY, 241-AZ, and 241-SY tank farms following seismic events that could cause induced flammable gas accidents.

2. Emergency response planning shall include response procedures for the termination of waste transfers, except a 242-A Evaporator C-A-1 vessel dump, and the evacuation of personnel from tank farms with ongoing waste transfers following seismic events that could cause waste transfer leaks.

3. Emergency response planning shall include response procedures for the termination of waste transfers following the detection of waste transfer leaks, except for waste transfer valve stem leakage.

6.0 DESIGN FEATURES

The purpose of this section is to describe passive safety-significant systems, structures, and components (SSCs) that are identified as Design Features. Design Features are passive design features that, if altered or modified, would have a significant effect on safe operation and that are not covered elsewhere in the TSRs. For each Design Feature, the applicability of the Design Feature and the in-service inspections/tests required for the Design Feature to be OPERABLE are provided. Also provided is a summary description of the Design Feature and its important attributes (i.e., safety function and functional/performance requirements). Additional description of the Design Features is provided in RPP-13033, *Tank Farms Documented Safety Analysis*, Chapter 4.0, “Safety Structures, Systems, and Components.”
6.0 DESIGN FEATURES

6.1 Waste Transfer Primary Piping Systems

APPLICABILITY: Waste transfer primary piping systems are required to be OPERABLE:

1. When PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK, except for sump pumps in SST/DST retrieval system aboveground manifold boxes, sump pumps in DST retrieval waste transfer-associated structures that transfer waste out of the waste transfer-associated structure, and sump pumps in the replacement cross-site transfer system (RCSTS) Diversion Box 6241-A and Vent Station 6241-V.

2. When PHYSICALLY CONNECTED to the 242-A Evaporator vessel when the vessel contains waste. (See Section 1.1 for the definition of when the 242-A Evaporator vessel contains waste).

3. When a compressed air source is connected to the waste transfer primary piping system’s encasement for pneumatic testing of the encasement (i.e., the primary piping within the encasement), except when the operability of the associated safety-significant waste transfer primary piping system is indeterminate and safety-significant compressed air system pressure relieving devices are being used as required by Section 6.7.
IN-SERVICE INSPECTIONS/TESTS

6.1.1 Waste transfer primary piping system ethylene-propylene-diene monomer (EPDM) non-metallic flexible hoses shall be within their shelf life and service life.

-----------------------------------------------NOTE--------------------------------------------------------------
The waste transfer primary piping system EPDM non-metallic flexible hoses shelf life and service life are based on the design life and operating conditions of the waste transfer primary piping systems (see RPP-13033, Chapter 4.0, Section 4.4.1, “Waste Transfer Primary Piping Systems”).

---------------------------------------------------------------------------------------------------------------------

6.1.2 Waste transfer primary piping system connections (e.g., plutonium-uranium extraction [PUREX] head/nozzle connections, Chemjoint connections, process blank/nozzle connections) on the planned waste transfer route shall be leak tested. Connections that are leak tested during fabrication or installation (e.g., system hydrostatic leak test) do not require additional connection leak testing unless the connection is unmade and remade.

The planned waste transfer route includes the waste transfer primary piping systems that are pressurized by the WASTE TRANSFER PUMP, or the gravity head from the 242-A Evaporator vessel when the vessel contains waste, up to the first closed isolation valve. The isolation valve is not required to be safety significant with respect to through valve leakage. An exception is that leak testing of waste transfer primary piping system connections on the discharge side of pressure relieving devices is not required.

Leak testing of the waste transfer primary piping connections shall be performed by visual observation. The connection leak testing shall be performed with water at the interfacing water system pressure except when (a) there is no waste transfer system valve downstream of the connection, or (b) closing the valve with water flowing causes a flow transient (water hammer) that could damage safety-significant waste transfer system SSCs. If there is no valve downstream of the connection or closing the valve causes an unacceptable water hammer, leak testing is allowed with water flowing through the connection. If leak testing with water is not practical (i.e., no available water source), leak testing may be performed at the beginning of the initial waste transfer through the connection. Leakage observed at the waste transfer primary piping system connections during the leak test shall be eliminated. Subsequent leak testing of waste transfer primary piping system connections is not required unless the connection is unmade and remade (e.g., the jumper is disconnected and re-installed or repositioned).

(continued)
IN-SERVICE INSPECTIONS/TESTS

6.1.3 Scheduled integrity assessments shall be performed as required to meet regulatory requirements as documented in the environmental management program and required by *Washington Administrative Code* (WAC) 173-303, “Dangerous Waste Regulations.” The required schedules or intervals are as described in the integrity assessments.

6.1.4 Inspections for waste leaks shall be performed as follows.

A. For waste transfer-associated structures PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK, VERIFY the waste level is ≤ 10% of the structure volume:

- Within 2 days after removing the administrative lock from the ACTIVE WASTE TRANSFER PUMP.

AND

- Once per 2 days thereafter until the administrative lock is installed on the ACTIVE WASTE TRANSFER PUMP.

AND

- Once within 2 days after installing the administrative lock on the ACTIVE WASTE TRANSFER PUMP.

B. For waste transfer-associated structures PHYSICALLY CONNECTED to the 242-A Evaporator vessel when the vessel contains waste, VERIFY the waste level is ≤ 10% of the structure volume:

- Once every 2 days when the vessel contains waste.

AND

- Once within 2 days after the vessel is “empty of waste.”

(See Section 1.1 for the definitions of when the 242-A Evaporator vessel contains waste and when the 242-A Evaporator vessel is “empty of waste”).

6.1-3
SUMMARY DESCRIPTION AND IMPORTANT ATTRIBUTES

Safety-significant waste transfer primary piping systems provide the primary confinement boundary during waste transfers. The safety-significant waste transfer primary piping systems include the following:

- The boundary of safety-significant waste transfer primary piping systems is at the interface with the DST or SST riser (i.e., primary piping systems that are outside of the DST or SST riser).

- For WASTE TRANSFER PUMPS where the pump motor is outside the DST or SST (i.e., in the pump pit above the tank), the primary piping systems only include the pump discharge components.

- The boundary of safety-significant waste transfer primary piping systems for waste transfers to and from the 242-A Evaporator is at the exterior wall of the 242-A Evaporator Building.

- For the two waste transfer lines from the 222-S Laboratory (SNL-5350 and SNL-5351), the boundary of the safety-significant waste transfer primary piping systems is at the exterior wall of the 219-S Building.

- The boundary of safety-significant waste transfer primary piping systems for waste transfers to the Waste Treatment Plant (WTP) is at the current termination point to WTP.

The boundary of safety-significant waste transfer primary piping systems includes the primary piping systems on the planned waste transfer route and PHYSICALLY CONNECTED piping systems. PHYSICALLY CONNECTED piping systems include other primary piping systems and water systems that interface with primary piping systems (e.g., service water systems, raw water systems).
1 SUMMARY DESCRIPTION AND IMPORTANT ATTRIBUTES

Exceptions:

- Sump pump systems in:
  - SST/DST retrieval system aboveground manifold boxes
  - SST retrieval system waste transfer-associated structures that transfer waste directly back to the underlying tank
  - DST retrieval system waste transfer-associated structures that transfer waste out of the waste transfer-associated structure
  - The RCSTS Diversion Box 6241-A and Vent Station 6241-V
  - The siphon standpipe stations of SNL-5350 and SNL-5351.

For the sump pump systems in SST/DST retrieval system aboveground manifold boxes and the RCSTS Diversion Box 6241-A and Vent Station 6241-V, the boundary of the safety-significant waste transfer primary piping system only extends to the downstream side of the second isolation valve that isolates the waste transfer primary piping system from the sump pump system.

- The vent line on the primary piping in the RCSTS Vent Station 6241-V. For the vent line in the RCSTS Vent Station 6241-V, the boundary of the safety-significant waste transfer primary piping system only extends to the downstream side of the second isolation valve that isolates the waste transfer primary piping system from the vent line.

The safety function of waste transfer primary piping systems is to provide confinement of waste. The functional requirement of the waste transfer primary piping systems is to prevent leaks. Waste transfer valve stem leakage, however, is an anticipated condition and is allowed.

See RPP-13033, Chapter 4.0, Section 4.4.1, for additional information.
6.0 DESIGN FEATURES

6.2 Hose-in-Hose Transfer Line (HIHTL) Systems

APPLICABILITY: HIHTL systems are required to be OPERABLE:

1. When PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK, except for sump pumps in SST/DST retrieval system aboveground manifold boxes.

2. When PHYSICALLY CONNECTED to the 242-A Evaporator vessel when the vessel contains waste. (See Section 1.1 for the definition of when the 242-A Evaporator vessel contains waste.)

IN-SERVICE INSPECTIONS/TESTS

6.2.1 HIHTL systems shall be within their shelf life and service life.

-----------------------------------------------NOTE--------------------------------------------------------------
The HIHTL system shelf life and service life are based on the design life and operating conditions of the HIHTL systems (see RPP-13033, Chapter 4.0, Section 4.4.2, “Hose-in-Hose Transfer Line Systems”).
---------------------------------------------------------------------------------------------------------------------

6.2.2 HIHTL primary hose assembly connections (i.e., end and intermediate connections) on the planned waste transfer route shall be leak tested. Connections that are leak tested during installation (e.g., system hydrostatic leak test) do not require additional connection leak testing unless the connection is unmade and remade. The planned waste transfer route includes HIHTL primary hose assemblies that are pressurized by the WASTE TRANSFER PUMP up to the first closed isolation valve. The isolation valve is not required to be safety significant with respect to through valve leakage.

Leak testing of the HIHTL primary hose assembly connections shall be performed by visual observation. The connection leak testing shall be performed with water at the interfacing water system pressure except when (a) there is no waste transfer system valve downstream of the connection, or (b) closing the valve with water flowing causes a flow transient (water hammer) that could damage safety-significant waste transfer system structures, systems, or components (SSC). If there is no valve downstream of the connection or closing the valve causes an unacceptable water hammer, leak testing is allowed with water flowing through the connection. If leak testing with water is not practical (i.e., no available water source), leak testing may be performed at the beginning of the initial waste transfer through the connection. Leakage observed at the HIHTL primary hose assembly connections during the leak test shall be eliminated. Subsequent leak testing of HIHTL primary hose assembly connections is not required unless the connection is unmade and remade.
SUMMARY DESCRIPTION AND IMPORTANT ATTRIBUTES

HIHTL systems are used to transfer waste where permanently installed, functional, and reliable lines are not available. HIHTL systems span between waste transfer-associated structures. The HIHTL systems consist of the HIHTL primary hose assemblies and the HIHTL encasement hose assemblies.

The HIHTL primary hose assemblies include the primary hose and the end and intermediate connections including gaskets and fasteners. The safety function of the HIHTL primary hose assemblies is to provide confinement of waste. The functional requirement of the HIHTL primary hose assemblies is to prevent leaks.

The HIHTL encasement hose assemblies include the encasement hose and connections not contained within waste transfer-associated structures. The HIHTL encasement hose assemblies provide an important contribution to defense-in-depth by providing secondary confinement of leaks in the HIHTL primary hose assemblies.

See RPP-13033, Chapter 4.0, Section 4.4.2, for additional information.
6.0 DESIGN FEATURES

6.3 Isolation Valves for Double Valve Isolation

APPLICABILITY: Isolation valves for double valve isolation are required to be OPERABLE when used to physically disconnect waste transfer primary piping systems, HIHTL primary hose assemblies, and interfacing water systems from an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK, or the 242-A Evaporator vessel when the vessel contains waste. (See Section 1.1 for the definition of when the 242-A Evaporator vessel contains waste).

IN-SERVICE INSPECTIONS/TESTS

6.3.1 For T-handle operated isolation valves where the valve stop disk is not integral with the funnel, the valve stop pins shall be inspected annually (i.e., every 365 days) to VERIFY that when the valve stop disk is positioned against the valve stop pin, the valve is in the closed or block flow position.

6.3.2 For isolation valves where the valve stop disk is integral with the valve funnel, the valve stop disk and valve stop pin shall be inspected every 2 years to VERIFY that when the valve stop disk is in contact with or close proximity to the valve stop pin, the valve is in the closed or block flow position.

6.3.3 For isolation valves positioned with a reference pointer and indicating disk, the reference pointer and indicating disk shall be inspected annually (i.e., every 365 days) to VERIFY that when the reference pointer is aligned with the indicator disk, the valve is in the closed or block flow position.
SUMMARY DESCRIPTION AND IMPORTANT ATTRIBUTES

Waste is transferred from one location to another through an interconnected network of waste transfer system piping. Isolation valves are arranged such that closing or repositioning valves can isolate the planned waste transfer route from other portions of the waste transfer system.

Controls to prevent or mitigate waste transfer leak accidents are required for PHYSICALLY CONNECTED piping and waste transfer-associated structures. Two closed safety-significant isolation valves are used to physically disconnect piping (and the associated waste transfer-associated structures) and interfacing water systems. (Note: The isolation valves that isolate the sump pump systems in the replacement cross-site transfer system (RCSTS) Diversion Box 6241-A and Vent Station 6241-V, and the isolation valves that isolate the vent line in the RCSTS Vent Station 6241-V, are not safety significant).

Safety-significant isolation valves include the valve body, the valve ball, the valve seats, and the components that are used to ensure correct valve positioning. The safety function of safety-significant isolation valves is to limit the leakage of waste (through valve leakage). The functional/performance requirement is that the through valve leakage (i.e., leak rate) is ≤ 0.1 gal/min.

See RPP-13033, Chapter 4.0, Section 4.4.3, “Isolation Valves for Double Valve Isolation,” for additional information.
6.0 DESIGN FEATURES

6.4 Extended Reach Sluicer System Hydraulic System Pressure Reducing Devices

APPLICABILITY: The ERSS hydraulic system pressure reducing devices are required to be OPERABLE when the ERSS is PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK.

IN-SERVICE INSPECTIONS/TESTS

6.4.1 The ERSS hydraulic system pressure reducing device inline filters shall be within their shelf/service life.

---------------------------------------------------------------------------------------------------------------------

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

The ERSS hydraulic system pressure reducing device inline filter shelf/service life is based on the design life and operating conditions of the inline filters (see RPP-13033, Chapter 4.0, Section 4.4.4, “Extended Reach Sluicer System Hydraulic System Pressure Reducing Devices”).

---------------------------------------------------------------------------------------------------------------------

SUMMARY DESCRIPTION AND IMPORTANT ATTRIBUTES

The ERSS hydraulic system pressure reducing devices include the ERSS boom extension pressure reducing valves, the hose reel retraction pressure reducing valves, and the inline filters. The safety function of the ERSS hydraulic system pressure reducing devices is to prevent the loss of the safety function of ERSS process hoses. The functional requirement is that the ERSS hydraulic system pressure reducing valves have set pressures that limit the hydraulic system pressure to the hydraulic cylinders that extend and retract the sluicer boom and to the hydraulic motor that controls the hose reel. Limiting the hydraulic pressure prevents the hydraulic cylinders and hydraulic motor from applying tension loads (forces) that exceed the tension load applied during burst testing of the safety-significant ERSS process hoses. The functional requirement of the inline filters is to prevent plugging/fouling of the safety-significant ERSS hydraulic system pressure reducing valves.

See RPP-13033, Chapter 4.0, Section 4.4.4, for additional information.
1  6.0  DESIGN FEATURES
2
3  6.5  Reserved for Future Use
4
5
6.0 DESIGN FEATURES

6.6 242-A Evaporator Slurry Line Vacuum Breaker PSV-CA1-4

APPLICABILITY: The 242-A Evaporator slurry line vacuum breaker PSV-CA1-4 is required to be OPERABLE when the 242-A Evaporator vessel contains waste. (See Section 1.1 for the definition of when the 242-A Evaporator vessel contains waste).

IN-SERVICE INSPECTIONS/TESTS

6.6.1 The 242-A Evaporator slurry line vacuum breaker, PSV-CA1-4, shall be within its service life.

NOTE: The 242-A Evaporator slurry line vacuum breaker PSV-CA1-4 service life is based on the operating conditions of the vacuum breaker (see RPP-13033, Chapter 4.0, “Safety Structures, Systems, and Components,” Section 4.4.6, “242-A Evaporator Slurry Line Vacuum Breaker PSV-CA1-4”).

SUMMARY DESCRIPTION AND IMPORTANT ATTRIBUTES

The 242-A Evaporator slurry line vacuum breaker PSV-CA1-4 consists of a check valve/vacuum breaker. The safety function of the 242-A Evaporator slurry line vacuum breaker PSV-CA1-4, is to prevent the loss of the safety function of safety-significant SSCs from flow transients (i.e., water hammers) caused by vapor bubble collapse. The functional requirement of the 242-A Evaporator slurry line vacuum breaker PSV-CA1-4, is to prevent water hammers due to vapor bubble formation and collapse by maintaining the pressure in the transfer line greater than the vapor pressure of waste or water. The cracking pressure of vacuum breaker PSV-CA1-4 shall be \( \leq 9.1 \text{ lb./in}^2 \) differential.

See RPP-13033, Chapter 4.0, Section 4.4.6, for additional information.
6.0 DESIGN FEATURES

6.7 Compressed Air System Pressure Relieving Devices

APPLICABILITY: Compressed air system pressure relieving devices are required to be OPERABLE:

1. When a compressed air system is used to air blow a HIHTL primary hose assembly.

2. When a compressed air system is used for pneumatic testing of the encasements of waste transfer primary piping systems and the operability of the associated safety-significant waste transfer primary piping system is indeterminate.

IN-SERVICE INSPECTIONS/TESTS

6.7.1 Within 24 months of installation (first time connected to an air compressor/air source) and every 24 months thereafter, the compressed air system pressure relief valve shall be:

A. Tested to VERIFY the set pressure is \( \leq 172 \text{ lb/in}^2 \) gauge.

OR

B. Replaced.

SUMMARY DESCRIPTION AND IMPORTANT ATTRIBUTES

Compressed air system pressure relieving devices include the pressure relieving device, and the inlet and any discharge piping of the pressure relieving device. The safety function of the compressed air system pressure relieving devices is to limit compressed air system pressure. Limiting compressed air system pressure mitigates the consequences of an air blow accident. The functional/performance requirement is that the compressed air system pressure relieving devices are sized and have a set pressure that limits compressed air pressure to \( \leq 190 \text{ lb/in}^2 \) gauge. In accordance with the ASME code, a set pressure of \( \leq 172 \text{ lb/in}^2 \) gauge is required for the compressed air system pressure relieving devices to meet the functional/performance requirement. Compressed air system pressure relieving devices are sized (i.e., flow capacity) based on the performance of the specific air compressor.

See RPP-13033, Chapter 4.0, Section 4.4.7, “Compressed Air System Pressure Relieving Devices,” for additional information.
6.0  DESIGN FEATURES

6.8  Low-Level Radioactive, Mixed, and TRU Waste Packaging Vents

APPLICABILITY: See AC 5.8.4, “Low-Level Radioactive, Mixed, and TRU Waste Packaging Flammable Gas Controls.”

IN-SERVICE INSPECTIONS/TESTS

None

SUMMARY DESCRIPTION AND IMPORTANT ATTRIBUTES

Low-level radioactive, mixed, and transuranic (TRU) waste packaging vents limit the accumulation of flammable gases in the waste packages. The list of approved waste packaging vents is provided in HNF-EP-0063, Hanford Site Solid Waste Acceptance Criteria, Appendix H, “Approved Vents.”

See RPP-13033, Chapter 4.0, Section 4.4.8, “Low-Level Radioactive, Mixed, and TRU Waste Packaging Vents,” for additional information.
6.9 Waste Transfer Freeze Protection Temperature Monitoring Systems

APPLICABILITY: Waste transfer freeze protection temperature monitoring systems are required to be OPERABLE when identified as required by AC 5.8.8, “Waste Transfer System Freeze Protection.”

IN-SERVICE INSPECTIONS/TESTS

6.9.1 Waste transfer freeze protection temperature monitoring systems shall be tested (i.e., resistance check) every 48 months to VERIFY there are no short circuits in the thermocouples and thermocouple extension wires.

6.9.2 Waste transfer freeze protection temperature monitoring system thermocouples and thermocouple extension wires shall be within their service life.

NOTE: The waste transfer freeze protection temperature monitoring system thermocouple and thermocouple extension wire service life is based on the design life and operating conditions of the waste transfer freeze protection temperature monitoring systems (see RPP-13033, Chapter 4.0, Section 4.4.9, “Waste Transfer Freeze Protection Temperature Monitoring Systems”).

SUMMARY DESCRIPTION AND IMPORTANT ATTRIBUTES

Waste transfer freeze protection temperature monitoring systems include the thermocouples, thermocouple extension wires, and connecting hardware; and may additionally include terminals, multi-switches, output leads, and the terminals/multi-switch enclosures. The safety function of safety-significant waste transfer freeze protection temperature monitoring systems is to monitor the air temperature in waste transfer-associated structures and in waste transfer primary piping encasements to support AC 5.8.8, “Waste Transfer System Freeze Protection.” The functional/performance requirement is to provide temperature measurements that are required to protect safety-significant SSCs from freezing.

See RPP-13033, Chapter 4.0, Section 4.4.9, for additional information.
SECTION 7

REFERENCES
REFERENCES

The following references are for the Preface, Section 1, Section 2, Section 5, and Section 6.
The references for Appendix A, “BASES” are included within that appendix.


HNF-SD-WM-TSR-006 REV 8

Appendix A

BASES

APPENDIX A

BASES
This Appendix provides summary statements of the reasons for the selection of the Operating Limits and associated Surveillance Requirements (SR). The BASES show how the numeric values, Conditions, ACTIONS statements, and SRs fulfill the purpose derived from the safety documentation. The BASES describe how the limit(s), the Applicability, the Condition(s), and the SRs 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 (SL)

There are no SLs for tank farm facilities based on the selection criteria in Section 1.7, “Safety Limits (SL),” and the conclusions found in RPP-13033, *Tank Farms Documented Safety Analysis*, Chapter 3.0, “Hazard and Accident Analyses.” Because there are no SLs for tank farm facilities, there are also no LCSs based on the selection criteria in Section 1.8, “Limiting Control Settings (LCS).”
LCO Applicability
B 3.0

<table>
<thead>
<tr>
<th>B 3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASES</td>
</tr>
</tbody>
</table>

| 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 statement within each individual LCO as the requirement for when the LCO is required to be met (i.e., when the UNIT is in the MODE 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 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 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.

(continued)
Bases

LCO 3.0.2 Action Met 
(continued)

Completing the Required Actions is not required when an LCO is met or is no longer applicable, 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 no longer exist. 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. Additionally, if intentional entry into ACTIONS would result in redundant equipment being inoperable, alternatives should be used instead. Doing so limits the time both subsystems/trains of a safety function are inoperable and limits the time conditions exist which may 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 equipment remains removed from service or bypassed and the Surveillance Requirement has not been completed.

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 another 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

For ACTIONS not met (VIOLATION), proceed in accordance with AC 5.4.3, “Response to a Limiting Control Setting or Limiting Condition for Operation VIOLATION.” All foreseen Conditions are listed in the ACTIONS statements. Therefore, all ACTIONS are provided for all foreseen Conditions.

Bases

A 3.0-2
LCO 3.0.4 MODE Changes

LCO 3.0.4 establishes limitations for MODE changes when an LCO is not met. It precludes placing the UNIT or process area in a different MODE when the requirements of an LCO for that MODE have not been met. An exception is LCO 3.4, “DST Induced Gas Release Event Flammable Gas Control,” which allows a water addition, chemical addition, or waste transfer into a double-shell tank (DST) to start if the LCO is not met (i.e., the tank farm temperature is ≤ 32°F).

LCO 3.0.5 Return to Service

LCO 3.0.5 establishes the allowance for 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,” (e.g., to not comply with the applicable Required Action[s]) to allow the performance of required testing to demonstrate either:

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

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

LCO 3.0.6 Support System

(Note: LCO 3.0.6 is not applicable at this time.)
<table>
<thead>
<tr>
<th>BASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCO 3.0.7</td>
</tr>
</tbody>
</table>

Bases
A 3.0-4
B 3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

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 3.0.1 establishes the requirement that SRs must be met during the
SR Met  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.

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 and
performed in accordance with SR 3.0.2, “Frequencies,” prior to returning
equipment to OPERABLE status.

(continued)
SR 3.0.1 Upon completion of maintenance, appropriate post-maintenance testing is required to declare equipment OPERABLE. This includes ensuring applicable SRs are not failed and their most recent performance is 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 establishes the requirements for meeting the specified Frequencies 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 Surveillance 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 verification of conformance with the SRs. Exceptions to SR 3.0.2 for which the 25% extension of the interval specified in the Surveillance Frequency does not apply are SR Frequencies specified as “once.” In addition, the 25% extension of the interval specified in the Surveillance Frequency does not apply where the requirements of regulations take precedence over the TSRs (i.e., the TSRs cannot extend a test interval specified in the regulations). These latter exceptions are stated in the individual LCOs.
SR 3.0.2

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

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 or up to the limit of the specified Frequency, whichever is less, 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. (Note: SR 3.0.3 does not affect the AC 5.4.1.c VIOLATION criteria that failure to perform an SR within the required time limit is a VIOLATION of the TSRs.)

This delay period provides adequate time 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 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 requirements.
SR 3.0.3 - Delay of Required Actions

When a Surveillance with a Frequency based not on time intervals, but upon specified UNIT conditions, operating situations, or requirements of regulations, is discovered to not have been performed when specified, SR 3.0.3 allows for the full delay period of 24 hours to perform the Surveillance (unless the stated Surveillance Frequency is less).

SR 3.0.3 provides a time limit for, and allowances for the performance 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.

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 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability statement. The purpose of this requirement is to ensure that system and component OPERABILITY requirements, or parameter limits, are met before they apply. Unless otherwise stated, the required SRs must have been performed within their specified frequency prior to a change in MODE. 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 Required Actions.

The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 should not be necessary. The specific time frames and conditions necessary for meeting the SRs are specified in the Frequency, in the Surveillance, or both. This SR 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. If exceptions are required, they are stated in the individual SRs.

The SRs are annotated consistent with the requirements of Section 1.4, “Frequency,” of this TSR.
B 3.1 DST Primary Tank Ventilation Systems

Bases

A 3.1-1
Bases

APPLICABLE SAFETY ANALYSES

DST primary tank ventilation systems are required for Flammable Gas Accidents.

Hazards associated with flammable gas accumulation and ignition are described in RPP-13033, Chapter 3.0, “Hazard and Accident Analyses,” Section 3.3.2.4.1, “Flammable Gas Accidents.” A number of flammable gas accident scenarios are described and the resulting consequences are estimated. The accident analysis for DSTs analyzed headspace deflagrations due to a steady-state accumulation of flammable gas and an operations induced GRE. Based on the results of the analysis, these scenarios present a significant facility worker hazard due to overpressure or physical impact from SSC failure (missiles) or from toxicological exposure exceeding Protective Action Criteria (PAC-3). Safety-significant DST primary tank ventilation systems are identified as a preventive control. The safety function of the DST primary tank ventilation systems is to maintain the concentration of flammable gases below the LFL in the DST headspace for steady-state releases and induced gas releases following water additions, chemical additions, and waste transfers into DSTs. Maintaining the flammable gas concentration below the LFL protects the facility worker from a flammable gas deflagration in a DST. This LCO ensures the DST primary tank ventilation systems are OPERABLE and operating to prevent flammable gas hazards from steady-state releases and induced gas releases following water additions, chemical additions, and waste transfers into DSTs.
The LCO requires that one DST primary tank ventilation system train (the in-service train) shall be OPERABLE AND operating, except for outages not to exceed 24 hours. The LCO also requires that the other DST primary tank ventilation system train (the standby train) shall be OPERABLE, except for outages not to exceed 10 days. The active ventilation provided by the in-service DST primary tank ventilation system train maintains the flammable gas in the tank headspace ≤ 25% of the LFL for steady-state releases and induced gas releases following water additions, chemical additions, and waste transfers into DSTs. The standby DST primary tank ventilation train ensures that a backup system is available to continue active ventilation in the event the in-service train stops operating and can not be restarted.

The LCO 3.1.A exception for outages not to exceed 24 hours for the in-service DST primary tank ventilation system train avoids the requirement to enter the LCO ACTIONS if the in-service train stops operating but the in-service train can be restarted or the standby train can be started within 24 hours. The 24 hour exception includes planned and unplanned outages. The 24 hour time allowed with no DST primary tank ventilation is much less than the time for the flammable gas concentration to increase by 25% of the LFL.

The LCO 3.1.B exception for outages not to exceed 10 days for the standby DST primary tank ventilation system train avoids the requirement to enter the LCO ACTIONS when the standby train is not OPERABLE but the train can be restored to OPERABLE status within 10 days. The 10 day exception includes planned and unplanned outages. The 10 day time allowed with no standby DST primary tank ventilation train stops operating and cannot be restarted.

RPP-5926, Steady-State Flammable Gas Release Rate Calculation and Lower Flammability Level Evaluation for Hanford Tank Waste, conservatively calculates the flammable gas concentration in DSTs from steady-state releases and the slow, continuing induced gas releases following water additions, chemical additions, and waste transfers into DSTs from the dissolution of soluble settled solids in the tank. The minimum ventilation rate necessary to maintain the flammable gas concentration below 25% of the LFL is calculated in RPP-5926 and ranges
Bases

**BASES**

LCO (continued) from approximately 1 to < 8 ft³/min for the 28 DSTs. The BASES for the Surveillance Requirements discuss how this minimum ventilation rate is ensured for the DST primary tank ventilation systems.

The flammable gas concentration is required to be ≤ 25% of the LFL. This control point of ≤ 25% of the LFL has been established based on National Fire Protection Association (NFPA) standards. Specifically, NFPA 69, *Standard on Explosion Prevention Systems*, states that, relative to the design and operational requirements of systems used for combustion concentration reduction, the combustible concentration shall be maintained at or below 25% of the LFL.

**APPLICABILITY** LCO 3.1 applies to DST primary tank ventilation systems for the 241-AN, 241-AP, 241-AW, 241-AY/241-AZ, and 241-SY tank farms at all times for the flammable gas accident. The DSTs contain waste capable of generating and releasing flammable gas and are postulated to reach 100% of the LFL under a zero airflow condition. Therefore, active DST primary tank ventilation is required to prevent the accumulation of flammable gases in the tank headspace from steady-state releases and induced gas releases following water additions, chemical additions, and waste transfers into DSTs.
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 Control Setting or Limiting Condition for Operation VIOLATION.”

A.1

If the in-service DST primary tank ventilation system train is not OPERABLE OR not operating for ≥ 24 hours (i.e., LCO 3.1.A is not met), Required Action A.1 is to start up an OPERABLE DST primary tank ventilation system train within 8 hours (i.e., either restart an OPERABLE in-service train or switch over and start up an OPERABLE standby train). The start up of an OPERABLE DST primary tank ventilation system train restores active DST primary tank ventilation and prevents the flammable gas hazard. The Completion Time of 8 hours when added to the Surveillance Requirement (SR) 3.1.2 Frequency of 36 hours and the allowed 24 hour outage time in LCO 3.1.A is less than or equal to the minimum time for the flammable gas concentration to increase by 25% of the LFL calculated using the methodology in RPP-5926. (Note: If Required Action A.1 is met by switch over and start up of an OPERABLE standby train because the in-service train is not OPERABLE, the in-service train becomes the standby train and is subject to LCO 3.1.B.)
If the in-service DST primary tank ventilation system train is not OPERABLE OR not operating for ≥ 24 hours (i.e., LCO 3.1.A is not met) and an OPERABLE DST primary tank ventilation system train is not started up in accordance with Required Action A.1, the flammable gas concentration in the headspace of each tank in the affected tank farm shall be monitored within 60 hours and once per 72 hours thereafter. With no active DST primary tank ventilation, the flammable gas concentration in the tank headspace of the affected DSTs may exceed the LFL due to steady-state releases and induced gas releases following water additions, chemical additions, and waste transfers into DSTs. Flammable gas monitoring ensures that safe conditions are maintained within the tank headspace (i.e., that the flammable gas concentration is ≤ 25% of the LFL). If the flammable gas concentration exceeds 25% of the LFL, Condition C is entered and additional ACTIONS are required.

Flammable gas monitoring is required in the tank headspace or in a location where the flammable gas monitoring method ensures a representative measurement of the tank headspace flammable gas concentration. The tank headspace is the space inside the tank above the waste surface and includes ventilation ducts up to the suction side mixing point when a DST primary tank ventilation system is operating. (Note: Operating experience shows that even with no active DST primary tank ventilation, passive ventilation should be sufficient to maintain the flammable gas concentration below 25% of the LFL for steady-state releases and slow, continuing induced gas releases following water additions, chemical additions, and waste transfers into DSTs.)

The Required Action A.2.1 Completion Time of 60 hours for the initial flammable gas measurement is based on the minimum time for the flammable gas concentration to increase by 25% of the LFL. That is, the initial Completion Time of 60 hours when added to the SR 3.1.2 Frequency of 36 hours and the 24 hour outage time allowed in LCO 3.1.A is less than or equal to the minimum time for the flammable gas concentration to increase by 25% of the LFL calculated using the methodology in RPP-5926. The Required Action A.2.1 Completion Time for flammable gas monitoring once per 72 hours thereafter ensures that safe conditions are maintained within the tank headspace until active DST primary tank ventilation is restored.
BASES

ACTIONS

(continued)

A.2.2

If the in-service DST primary tank ventilation system train is not OPERABLE OR not operating for ≥ 24 hours (i.e., LCO 3.1.A is not met) and an OPERABLE DST primary tank ventilation system train is not started up in accordance with Required Action A.1, a RECOVERY PLAN shall be submitted to U.S. Department of Energy, Office of River Protection (ORP). The RECOVERY PLAN will identify the actions that will be taken to start up an OPERABLE DST primary tank ventilation system train. The Completion Time of 10 days provides sufficient time to identify the actions and schedule to start up an OPERABLE DST primary tank ventilation system. The 10 day Completion Time is not based on the time to LFL since actions for flammable gas monitoring (Required Action A.2.1) and, if necessary, actions to control ignition sources and minimize activities near the affected DSTs prior to reaching 100% of the LFL (ACTIONS for Condition C) protect the facility worker from a flammable gas deflagration. (Note: Tank Operations Contractor actions to start up an OPERABLE DST primary tank ventilation system train may continue during preparation of a RECOVERY PLAN. However, following submittal of the RECOVERY PLAN, actions to start up an OPERABLE DST primary tank ventilation system train shall be in accordance with the RECOVERY PLAN.)

A.2.3

Actions to start up an OPERABLE DST primary tank ventilation system train are performed in accordance with the RECOVERY PLAN.

B.1

If a standby DST primary tank ventilation system train is not OPERABLE for ≥ 10 days (i.e., LCO 3.1.B is not met), the standby DST primary tank ventilation system train shall be restored to OPERABLE status within 21 days. The Completion Time of 21 days is based on operating experience and allows sufficient time for performance of atypical activities because outages for preventive and corrective maintenance are normally managed within the 10 days outage time allowed by LCO 3.1.B. The 21 day Completion Time poses only a limited risk that a standby train is not OPERABLE when an in-service DST primary tank ventilation system train stops operating and cannot be restarted. (Note: Even in the event that the standby DST primary tank ventilation system train is not

(continued)
BASES

ACTIONS (continued)
OPERABLE when an in-service DST primary tank ventilation system train stops operating and cannot be restarted, flammable gas monitoring ([Required Action A.2.1] and, if necessary, actions to control ignition sources and minimize activities near the affected DSTs prior to reaching 100% of the LFL [ACTIONS for Condition C] protect the facility worker from a flammable gas deflagration.)

B.2.1

If a standby DST primary tank ventilation system train is not OPERABLE for ≥ 10 days (i.e., LCO 3.1.B is not met) and a standby DST primary tank ventilation system train is not restored to OPERABLE status in accordance with Required Action B.1, a RECOVERY PLAN is submitted to ORP. The RECOVERY PLAN will identify the actions that will be taken to restore the standby DST primary tank ventilation system train to OPERABLE status. The Completion Time of 31 days provides 10 days following the Completion Time for Required Action B.1 and is sufficient time to identify the planned actions. The 31 days is not directly tied to the time to LFL because even in the event that the standby DST primary tank ventilation system train is not OPERABLE when an in-service DST primary tank ventilation system train stops operating and cannot be restarted, flammable gas monitoring (Required Action A.2.1) and, if necessary, actions to control ignition sources and minimize activities near the affected DSTs prior to reaching 100% of the LFL (ACTIONS for Condition C) protect the facility worker from a flammable gas deflagration. (Note: Tank Operations Contractor actions to restore the standby DST primary tank ventilation system train to OPERABLE status may continue during preparation of a RECOVERY PLAN. However, following submittal of the RECOVERY PLAN, actions to restore the standby DST primary tank ventilation system train to OPERABLE status shall be in accordance with the RECOVERY PLAN.)

B.2.2

Actions to restore a standby DST primary tank ventilation system to OPERABLE status are performed in accordance with the RECOVERY PLAN.
C. The NOTE identifies that if Condition C is entered, Condition A in LCO 3.7, “DST Flammable Gas Monitoring Control,” is also entered. In addition, the NOTE clarifies that after entering Condition C, the Required Actions are applicable until the concentration of flammable gas in the affected tank is VERIFIED to be \( \leq 25\% \) of the LFL.

C.1

If the concentration of flammable gas is \( > 25\% \) of the LFL, all activities in and directly above the affected tank shall be stopped, except for the following:

- flammable gas sampling/monitoring;
- deenergizing or removing equipment that does not meet ignition controls; and
- actions to reduce the flammable gas concentration.

Affected activities shall be stopped within 8 hours of when it was discovered that the flammable gas concentration was \( > 25\% \) of the LFL. Stopping activities in and directly above the affected tank includes activities in the tank headspace, activities directly above the tank structure, and activities that disturb the waste. Stopping activities in and directly above the affected tank minimizes activities that can induce gas releases from the waste or that could be an ignition source, and restricts the presence of workers except when performing actions to control a potential flammable gas hazard. The exception for flammable gas sampling/monitoring; deenergizing or removing equipment that does not meet ignition controls; and actions to reduce flammable gas concentration (i.e., restore active ventilation) is provided to accommodate actions necessary to ascertain and control a potential flammable gas hazard. These actions involve workers and may be performed in or directly above the tank including within the tank, tank risers, pits, etc. Actions taken to deenergize or remove equipment that does not meet ignition controls shall be completed prior to the flammable gas concentration exceeding 60% of the LFL in accordance with Required Action C.4. The Completion Time is based on time to LFL calculations in RPP-5926 and operational experience, and allows sufficient time to stop work activities in a safe, orderly manner.
BASES

C.2

If the concentration of flammable gas is > 25% of the LFL, the flammable gas concentration in the tank headspace shall be monitored within 24 hours and once per 24 hours thereafter. The 24 hour and once per 24 hour thereafter Completion Times are conservative based on the time to LFL calculations in RPP-5926.

C.3

If the concentration of flammable gas is > 25% of the LFL, all activities in GAS-TRAPPING systems or equipment connected to the affected tank headspace, except for flammable gas sampling/monitoring and actions to reduce the flammable gas concentration, shall be stopped prior to exceeding 60% of the LFL. Stopping activities in GAS-TRAPPING systems or equipment minimizes activities that can produce an ignition source and restricts the presence of workers where potential flammable gas hazards may exist. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) allows time to take actions to reduce the flammable gas concentration and sufficient time to identify the full scope of activities in GAS-TRAPPING systems or equipment that will require suspension, and to suspend these activities in a controlled manner.

C.4

If the concentration of flammable gas is > 25% of the LFL, ignition controls shall be applied to equipment in the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace and to manned work activities involving the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) allows time to perform the evaluation required to identify installed equipment that does not meet ignition control requirements and to deenergize or remove this equipment in a safe, orderly manner. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) also allows sufficient time to perform the evaluations required to identify and apply ignition controls to any manned work activities that are not suspended.
A 3.1-11

Bases

DST Primary Tank Ventilation Systems

B 3.1

If the concentration of flammable gas is > 60% of the LFL, a RECOVERY PLAN is submitted to ORP. The RECOVERY PLAN will identify the actions that will be taken to reduce the flammable gas concentration to ≤ 25% of the LFL. A Completion Time of 10 days from when it was discovered that the flammable gas concentration was > 60% provides sufficient time to identify the planned actions. The 10 days is not based on the time to LFL since the actions to control ignition sources and minimize the activities near the DST have already been completed. (Note: Tank Operations Contractor actions to reduce the flammable gas concentration to ≤ 25% of the LFL may continue during preparation of a RECOVERY PLAN. However, following submittal of the RECOVERY PLAN, actions to reduce the flammable gas concentration to < 25% of the LFL shall be in accordance with the RECOVERY PLAN.)

D.2

Actions to reduce the flammable gas concentration to ≤ 25% of the LFL are performed in accordance with the RECOVERY PLAN.

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, “Response to a Surveillance Requirement VIOLATION.”

The NOTE for the Surveillance Requirements identifies the basis for determining when a DST primary tank ventilation system is OPERABLE and operating. SR 3.1.1 AND SR 3.1.2 VERIFY that the in-service DST primary tank ventilation system train is OPERABLE AND operating. SR 3.1.1 AND SR 3.1.3 VERIFY that the standby DST primary tank ventilation system train is OPERABLE.
Bases
A 3.1-12
Bases

A 3.1-13

(4) Engineering judgment on expected variations in the tank exhaust airflow due to tank farm operations between surveillances. The exhaust airflow from a DST will vary with changes to the inlet airflow paths of tanks connected to a DST primary tank ventilation system. For example, opening or closing an inlet air-control station inlet isolation valve or bypass valve; opening or closing a tank riser; or removing or installing a waste transfer-associated structure cover will affect all of the DST exhaust flows within the tank farm. The exhaust airflow from a DST will also vary with changes to the exhaust stack airflow control set point which are required to maintain tank vacuum within a prescribed range (i.e., to prevent fugitive emissions and to prevent excessive vacuum that could damage the tank).

(5) Engineering judgment on expected variations in tank exhaust airflow due to changes in temperature and wind speed.

The 365 day Surveillance Frequency is acceptable based on the large margin established in the required tank exhaust airflow, and consideration of the difficulty and occupational hazards involved with performing manual exhaust airflow measurements (i.e., radiation exposure [ALARA] and entry into confined spaces).

In addition to VERIFYING the tank exhaust airflow is > 40 ft³/min every 365 days, the exhaust airflow shall be IMMEDIATELY VERIFIED after repositioning a 241-AN/241-AP/241-AW/241-SY tank outlet isolation valve or a 241-AY/241-AZ flow control valve. The 241-AN/241-AP/241-AW/241-SY tank outlet isolation valves are used for balancing the 241-AN, 241-AP, 241-AW, and 241-SY tank farm ventilation systems. The 241-AY/241-AZ flow control valves are used for controlling the ventilation system exhaust flows from the 241-AY and 241-AZ tank farm tanks. The Surveillance Frequency of IMMEDIATELY expresses that VERIFYING the tank exhaust airflow is ≥ 40 ft³/min after a 241-AN/241-AP/241-AW/241-SY tank outlet isolation valve or a 241-AY/241-AZ flow control valve is repositioned shall be performed without delay and continuously pursued in a controlled manner until complete with the highest priority.

(continued)
The measurement of tank exhaust airflow is performed manually in accordance with the requirements of ANSI/ASHRAE Standard 111-2008, *Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems*. (Note: Because high humidity may preclude manual measurement of DST exhaust flow in 241-AY/241-AZ tank farms, the measurement of tank exhaust airflow may be performed using the existing flow instrumentation.)

SR 3.1.1.B

The DST primary tank ventilation system integrity (i.e., limited air in-leakage) shall be VERIFIED every 365 days. SR 3.1.1.B to VERIFY DST primary tank ventilation system integrity is inherently met by SR 3.1.1.A when the measurements to VERIFY the tank exhaust airflow is \( \geq 40 \text{ ft}^3/\text{min} \) encompass planned system operating configurations (e.g., different alignments of the 241-AN, 241-AP, and 241-AW primary tank ventilation system de-entrainers/demisters, different operating configurations of the 241-AY/241-AZ tank farm recirculation loops, different alignments of the 241-AY/241-AZ exhaust fans). That is, if a segment of the DST primary tank ventilation system is isolated (e.g., a 241-AN de-entrainer) during the SR 3.1.1.A measurements of tank exhaust airflow, the isolated segment’s integrity (i.e., limited air in-leakage) is not VERIFIED and, therefore, the DST primary tank ventilation system shall not be operated in this untested configuration.

SR 3.1.1.B VERIFIES the DST primary tank ventilation system integrity (i.e., limited air in-leakage) from the flow measurement location to the exhaust fan. VERIFYING DST primary tank ventilation system integrity is not required from the tank to the flow measurement location (i.e., testing is not possible) or downstream of the exhaust fan (i.e., air leakage does not affect the tank exhaust airflow).

See SR 3.1.1.A for the 365 day Surveillance Frequency basis.
The headspace in each tank in the tank farm shall be VERIFIED to be < 0 in. w.g. relative to atmospheric pressure every 36 hours. VERIFICATION of negative pressure provides an indication that the DST primary tank ventilation system is operating.

The Surveillance Frequency of 36 hours is based on the minimum time for the flammable gas concentration to increase by 25% of the LFL and on engineering judgment that considers margin for future DST operations (e.g., waste transfers) and human factors (e.g., the same Surveillance Frequency for all DSTs). The SR 3.1.2 Frequency of 36 hours when added to the allowed 24 hour outage time in LCO 3.1.A and the A.1 Completion Time of 8 hours or the A.2 Completion Time of 60 hours is less than or equal to the minimum time for the flammable gas concentration to increase by 25% of the LFL calculated using the methodology in RPP-5926.

The analysis of the minimum time for the flammable gas concentration to increase by 25% of the LFL in the RPP-5926 methodology assumes:

1. A zero airflow condition, which eliminates the need to define and control barometric breathing paths,
2. A 10,000-gal water addition, which eliminates the need to reanalyze small water additions such as those associated with flushing equipment, and
3. A conservative initial tank waste temperature, which eliminates the need to reanalyze should small increases in tank waste temperature occur over time.

In addition to the calculated steady-state releases, the RPP-5926 analysis methodology includes a hydrogen release of 9.6 ft³/day to bound slow, continuing induced gas releases from the dissolution of soluble settled solids following water additions, chemical additions, and waste transfers into DSTs.

Note: The time to 25% of the LFL is protected by AC 5.9.1, “DST and SST Time to Lower Flammability Limit.”
BASES

SURVEILLANCE REQUIREMENTS (continued)

Because the SR 3.1.2 Frequency, the LCO 3.1.A outage time, and the A.1 and A.2 Completion Times are based on not exceeding the minimum time for the flammable gas concentration to increase by 25% of the LFL, the flammable gas concentration could theoretically exceed 25% of the LFL prior to initiating the ACTIONS for Condition C (i.e., stopping activities and deenergizing or removing ignition sources) if the starting tank headspace flammable gas concentration is above 0% of the LFL. For example, if the tank headspace flammable gas concentration at the start of the surveillance interval is 5% of the LFL, the first flammable gas reading following loss of active ventilation could theoretically be 30% of the LFL. This is acceptable based on:

1. The conservatively calculated time for the flammable gas concentration to increase by 25% of the LFL (e.g., zero airflow)

2. The DST headspace flammable gas concentration is normally at or near 0% of the LFL with operation of the DST primary tank ventilation system (and should be well below 25% of the LFL with passive ventilation when active ventilation is lost)

3. The margin of safety provided by the 25% of the LFL control point.

Even if a flammable gas concentration is discovered above 25% of the LFL (the worst case is < 50% of the LFL), there is sufficient time (weeks to months) to take the required actions to prevent a flammable gas deflagration.

SR 3.1.3.A

The standby DST primary tank ventilation system train safety-significant components shall be VERIFIED to be OPERABLE and the interfacing systems required for train operation shall be VERIFIED to be capable of performing their function every 10 days. The in-service inspections/tests, functional tests, instrument calibration, and preventive maintenance necessary to meet the Surveillance Requirement are identified in a checklist derived in the system evaluation in DSA Section 4.4.10. VERIFICATION that the DST primary tank ventilation system standby train checklist requirements are met ensures that the standby train can be started up if the in-service DST primary tank ventilation system train stops operating and can not be restarted.

(continued)
Bases
A 3.1-17
B 3.2  SST Steady-State Flammable Gas Control

BASES

BACKGROUND

This LCO ensures the concentration of flammable gases from steady-state releases are maintained below the lower flammability limit (LFL) in the SST headspace.

Flammable gas has been identified as a potential hazard in tank farm facilities, including SSTs. Flammable gases (primarily hydrogen) are generated by the tank waste due to radiolysis, thermolysis, and corrosion. Flammable gases generated in waste are continuously released into tank headspaces. In the absence of adequate passive ventilation, the steady-state concentration of these gases can potentially exceed the LFL.

The steady-state flammable gas hazard control strategy relies on flammable gas monitoring to confirm that sufficient ventilation is available to maintain the flammable gas concentration below the LFL in the SST headspace. Flammable gas sampling or monitoring is required in the tank headspace or in a location where the flammable gas sampling or monitoring method ensures a representative measurement of the tank headspace flammable gas concentration.

APPLICABLE

The SST Steady-State Flammable Gas Control is required for Flammable Gas Accidents.

ANALYSIS

Hazards associated with flammable gas accumulation and ignition are described in RPP-13033, *Tank Farms Documented Safety Analysis*, Chapter 3.0, “Hazard and Accident Analyses,” Section 3.3.2.4.1, “Flammable Gas Accidents.” A number of flammable gas accident scenarios are described and the resulting consequences are estimated. The accident analysis for SSTs analyzed a headspace deflagration due to a steady-state accumulation of flammable gas. Based on the results of the analysis, the scenario presents a significant facility worker hazard due to overpressure or physical impact from SSC failure (missiles) or from toxicological exposure exceeding PAC-3. The SST Steady-State Flammable Gas Control is identified as a preventive control. The safety function of this control is to protect the facility worker from a flammable gas deflagration due to steady-state flammable gas releases in a SST by monitoring the flammable gas concentration and taking action to reduce the flammable gas concentration or control potential ignition sources prior to the flammable gas concentration exceeding the LFL.
The LCO is the tank headspace flammable gas concentration shall be ≤ 25% of the LFL. Flammable gas monitoring is performed to VERIFY the flammable gas concentration is ≤ 25% of the LFL and, therefore, that sufficient ventilation is available to prevent the accumulation of flammable gases in the tank headspace above this control point. The tank headspace is the space inside the tank above the waste surface and includes ventilation ducts up to the suction side mixing point when an active ventilation system is operating.

Extensive flammable gas monitoring data on SSTs demonstrate that passive ventilation (and/or diffusion) sufficient to prevent steady-state flammable gas hazards is inherent in the normal operation and configuration of the SSTs. RPP-5926, *Steady-State Flammable Gas Release Rate Calculation and Lower Flammability Level Evaluation for Hanford Tank Waste*, calculates the steady-state flammable gas concentration in SSTs and shows that small ventilation rates (i.e., < 1 ft³/min) are adequate to prevent the flammable gas concentration from reaching 25% of the LFL and that very small ventilation rates (i.e., < 0.2 ft³/min) are adequate to prevent the flammable gas concentration from reaching 100% of the LFL. Therefore, to prevent steady-state flammable gas hazards in SSTs, the selected control is flammable gas monitoring to directly VERIFY that the flammable gas concentration in the tank headspace is ≤ 25% of the LFL, which confirms that sufficient ventilation is available to control the steady-state generation of flammable gas in the SST.

The flammable gas concentration is required to be ≤ 25% of the LFL. This control point of ≤ 25% of the LFL has been established based on National Fire Protection Association (NFPA) standards. Specifically, NFPA 69, *Standard on Explosion Prevention Systems*, states that, relative to the design and operational requirements of systems used for combustion concentration reduction, the combustible concentration shall be maintained at or below 25% of the LFL.
APPLICABILITY

LCO 3.2 applies at all times to all SSTs, except for SSTs in the 241-AX tank farm, for the flammable gas representative accident. For the applicable SSTs, the tanks contain waste capable of generating flammable gas and are postulated to reach 100% of the LFL under a zero airflow condition. Therefore, flammable gas monitoring is required to confirm sufficient ventilation is available to prevent the steady-state accumulation of flammable gases in the tank headspace. LCO 3.2 does not apply to SSTs in the 241-AX tank farm because, as shown in RPP-5926, diffusion through the concrete dome of these SSTs prevents the flammable gas concentration from reaching 100% of the LFL even under a zero airflow condition.

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 Control Setting or Limiting Condition for Operation VIOLATION.”

A.1

If the concentration of flammable gas is > 25% of the LFL, all activities in and directly above the affected tank shall be stopped, except for the following:

- flammable gas sampling/monitoring;
- deenergizing or removing equipment that does not meet ignition controls; and
- actions to reduce the flammable gas concentration.

Affected activities shall be stopped within 8 hours of when it was discovered that the flammable gas concentration was > 25% of the LFL. Stopping activities in and directly above the affected tank includes activities in the tank headspace, activities directly above the tank structure, and activities that disturb the waste. Stopping activities in and directly above the affected tank minimizes activities that can induce gas releases from the waste or that could be an ignition source, and restricts the presence of workers except when performing actions to control a potential flammable gas hazard. The exception for flammable gas sampling/monitoring; deenergizing or removing equipment that does not
BASES

3 ACTIONS (continued) meet ignition controls; and actions to reduce flammable gas concentration (e.g., opening the HEPA breather filter isolation valve if closed) is provided to accommodate actions necessary to ascertain and control a potential flammable gas hazard. These actions involve workers and may be performed in or directly above the tank including within the tank, tank risers, pits, etc. Actions taken to deenergize or remove equipment that does not meet ignition controls shall be completed prior to the flammable gas concentration exceeding 60% of the LFL in accordance with Required Action A.4. The Completion Time is based on time to LFL calculations in RPP-5926 and operational experience, and allows sufficient time to stop work activities in a safe, orderly manner.

A.2

If the concentration of flammable gas is > 25% of the LFL, the flammable gas concentration in the tank headspace shall be monitored within 24 hours and once per 24 hours thereafter. The 24 hour and once per 24 hour thereafter Completion Times are conservative based on the time to LFL calculations in RPP-5926.

A.3

If the concentration of flammable gas is > 25% of the LFL, all activities in GAS-TRAPPING systems or equipment connected to the affected tank headspace, except for flammable gas sampling/monitoring and actions to reduce the flammable gas concentration, shall be stopped prior to exceeding 60% of the LFL. Stopping activities in GAS-TRAPPING systems or equipment minimizes activities that can produce an ignition source and restricts the presence of workers where potential flammable gas hazards may exist. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) allows time to take actions to reduce the flammable gas concentration and sufficient time to identify the full scope of activities in GAS-TRAPPING systems or equipment that will require suspension, and to suspend these activities in a controlled manner.

(continued)
If the concentration of flammable gas is > 25% of the LFL, ignition controls shall be applied to equipment in the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace and to manned work activities involving the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) allows time to take actions to reduce the flammable gas concentration and sufficient time to perform the evaluation required to identify installed equipment that does not meet ignition control requirements and to deenergize or remove this equipment in a safe, orderly manner. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) also allows sufficient time to perform the evaluations required to identify and apply ignition controls to any manned work activities that are not suspended.

B.1

If the concentration of flammable gas is > 60% of the LFL, a RECOVERY PLAN is submitted to U.S. Department of Energy, Office of River Protection. The RECOVERY PLAN will identify the actions that will be taken to reduce the flammable gas concentration to ≤ 25% of the LFL. A Completion Time of 10 days from when it was discovered that the flammable gas concentration was > 60% provides sufficient time to identify the planned actions. The 10 days is not directly tied to the time to LFL since the actions to control ignition sources and minimize the activities near the SST have already been completed. (Note: Tank Operations Contractor actions to reduce the flammable gas concentration to ≤ 25% of the LFL may continue during preparation of a RECOVERY PLAN. However, following submittal of the RECOVERY PLAN, actions to reduce the flammable gas concentration to ≤ 25% of the LFL shall be in accordance with the RECOVERY PLAN.)

B.2

Actions to reduce the flammable gas concentration to ≤ 25% of the LFL are performed in accordance with the RECOVERY PLAN.
Bases

A 3.2-6
Bases
A 3.2-7

REFERENCES


1  B 3.3  Reserved for Future Use
B 3.4 DST Induced Gas Release Event Flammable Gas Control

BASES

BACKGROUND This LCO ensures the DST primary tank ventilation systems are OPERABLE and operating to prevent flammable gas hazards from induced gas release events (GRE) during water additions, chemical additions, and waste transfers into DSTs. (Note: The LCO is only applicable when there is a potential induced GRE flammable gas hazard during water additions, chemical additions, and waste transfers into DSTs due to the dissolution of soluble settled solids in the tank – see AC 5.8.1, “DST Induced Gas Release Event Evaluation.”)

Flammable gas has been identified as a potential hazard in tank farm facilities, including DSTs. Flammable gases (primarily hydrogen) are generated by the tank waste due to radiolysis, thermolysis, and corrosion. Flammable gases can reach high concentrations in DSTs by two mechanisms. First, flammable gases generated in waste are continuously released into tank headspaces. In the absence of adequate ventilation, the steady-state concentration of these gases can potentially exceed the lower flammability limit (LFL). Second, a fraction of the gas generated by the waste can be retained within the waste matrix. This retained gas can be released in a spontaneous or induced GRE, thereby, increasing the flammable gas concentration in a tank headspace to above the LFL.

There are different control strategies for steady-state and GRE flammable gas hazards in DSTs. The control strategy for induced GREs during water additions, chemical additions, and waste transfers into DSTs relies on AC 5.8.1, “DST Induced Gas Release Event Evaluation,” and, if AC 5.8.1 determines there is a potential induced GRE flammable gas hazard, safety-significant DST primary tank ventilation systems to maintain the flammable gas concentration below the LFL in the tank headspace. For steady-state flammable gas releases and slow, continuing induced gas releases following water additions, chemical additions, and waste transfers into DSTs, the control strategy relies on safety-significant DST primary tank ventilation systems to maintain the flammable gas concentration below the LFL in the DST headspace (see LCO 3.1, “DST Primary Tank Ventilation Systems”). The spontaneous GRE flammable gas hazard control strategy relies on the controls in AC Key Element 5.9.2, “Ignition Controls.” For induced GRE flammable gas hazards due to waste transfers from DSTs, the control strategy relies on AC 5.8.1.

(continued)
Bases
A 3.4-2

DST Induced Gas Release Event
Flammable Gas Control

**Bases**

**APPLICABLE SAFETY ANALYSIS**

The DST Induced Gas Release Event Flammable Gas Control is required for Flammable Gas Accidents.

Hazards associated with flammable gas accumulation and ignition are described in RPP-13033, Chapter 3.0, “Hazard and Accident Analyses,” Section 3.3.2.4.1, “Flammable Gas Accidents.” A number of flammable gas accident scenarios are described and the resulting consequences are estimated. The accident analysis for DSTs analyzed a headspace deflagration due to an operations induced GRE. Based on the results of the analysis, the scenario presents a significant facility worker hazard due to overpressure or physical impact from SSC failure (missiles) or from toxicological exposure exceeding PAC-3. Safety-significant DST primary tank ventilation systems are identified as a preventive control. The safety function of the DST primary tank ventilation systems is to maintain the concentration of flammable gases below the LFL in the DST headspace for induced GREs during water additions, chemical additions, and waste transfers into DSTs. Maintaining the flammable gas concentration below the LFL protects the facility worker from a flammable gas deflagration in a DST. This LCO ensures the DST primary tank ventilation systems are OPERABLE and operating to prevent flammable gas hazards from induced GREs during water additions, chemical additions, and waste transfers into DSTs when required by AC 5.8.1.
BASSES

LCO The LCO requires that one DST primary tank ventilation system train (the in-service train) shall be OPERABLE AND operating, that the other DST primary tank ventilation system train (the standby train) shall be OPERABLE, and that the tank farm temperature is > 32°F. The active ventilation provided by the in-service DST primary tank ventilation system train maintains the flammable gas concentration ≤ 25% of the LFL for induced GREs during water additions, chemical additions, and waste transfers into DSTs. The standby DST primary tank ventilation system train ensures that a backup system is available to continue active ventilation in the event the in-service train stops operating and can not be restarted. When LCO 3.4 is applicable, no planned outages of the standby train are allowed. The requirement that the tank farm temperature is > 32°F addresses the potential for ice to restrict tank inlet airflow, and thus reduce tank exhaust airflow below the 99 ft³/min required to maintain the tank headspace flammable gas concentration < 25% of the LFL (see Surveillance Requirement [SR] 3.4.1). This failure mode would not be detected by the Surveillance Requirement to VERIFY the tank headspace is < 0 in. w.g. relative to atmospheric pressure (SR 3.4.2). The NOTE clarifies that if the tank farm temperature is < 32°F (i.e., SR 3.4.4 is not met), the water addition, chemical addition, or waste transfer into a DST may start with ACTION Condition C entered. This is an exception to the LCO 3.0.4, “MODE Changes,” General Rule of Applicability that would otherwise prevent starting a water addition, chemical addition, or waste transfer into a DST if SR 3.4.4 is not met.

RPP-RPT-47933, Flammable Gas Release Rate from Double-Shell Tank Solids Dissolution, conservatively calculates the minimum ventilation rate necessary to maintain the flammable gas concentration below 25% of the LFL for induced GREs during water additions, chemical additions, and waste transfers into DSTs. The BASSES for the Surveillance Requirements discuss how this minimum ventilation rate is ensured for the DST primary tank ventilation systems.

The flammable gas concentration is required to be ≤ 25% of the LFL. This control point of ≤ 25% of the LFL has been established based on National Fire Protection Association (NFPA) standards. Specifically, NFPA 69, Standard on Explosion Prevention Systems, states that, relative to the design and operational requirements of systems used for combustion concentration reduction, the combustible concentration shall be maintained at or below 25% of the LFL.
Bases
A 3.4-4

APPLICABILITY LCO 3.4 applies during water additions, chemical additions, and waste transfers into DSTs when required by AC 5.8.1, “DST Induced Gas Release Event Evaluation.” If the AC 5.8.1 evaluation determines an induced gas release due to the dissolution of soluble settled solids in the receiving DST is sufficient to achieve a flammable gas concentration of 100% of the LFL in the tank headspace assuming zero ventilation, active DST primary tank ventilation is required to prevent the accumulation of flammable gases in the tank headspace during the water addition, chemical addition, or waste transfer into the DST. (Note: The slow, continuing induced gas releases following water additions, chemical additions, and waste transfers into DSTs are addressed by LCO 3.1.)

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 Control Setting or Limiting Condition for Operation VIOLATION.”

A.

If the in-service DST primary tank ventilation system train is not OPERABLE OR not operating (i.e., LCO 3.4.A is not met), either Required Action A.1 OR Required Action A.2 is required.

A.1

If the in-service DST primary tank ventilation system train is not OPERABLE OR not operating (i.e., LCO 3.4.A is not met), Required Action A.1 is to start up an OPERABLE DST primary tank ventilation system train within 4 hours (i.e., either restart an OPERABLE in-service train or switch over and start up an OPERABLE standby train). The start up of an OPERABLE DST primary tank ventilation system train restores active DST primary tank ventilation and prevents the flammable gas hazard. The Completion Time of 4 hours when added to the Surveillance Requirement (SR) 3.4.2 Frequency of 2 hours is less than or equal to the minimum time for the flammable gas concentration to increase by 25% of the LFL calculated in RPP-RPT-47933 (i.e., 6 hours). (Note: If Required Action A.1 is met by switch over and startup of an OPERABLE standby train because the in-service train is not OPERABLE, the in-service train becomes the standby train and is subject to LCO ‘3.4.B.’)
If the in-service DST primary tank ventilation system train is not
OPERABLE OR not operating (i.e., LCO 3.4.A is not met), the water
addition, chemical addition, or waste transfer shall be stopped within
4 hours. Stopping the water addition, chemical addition, or waste transfer
limits the induced GRE gas release rate from the dissolution of soluble
settled solids. After stopping the water addition, chemical addition, or
waste transfer, the ACTIONS of LCO 3.1 address the induced gas release
following the water addition, chemical addition, or waste transfer into the
DST. The Required Action A.2 Completion Time of 4 hours is based on
the minimum time for the flammable gas concentration to increase by 25%
of the LFL calculated in RPP-RPT-47933 (i.e., 6 hours). That is, the
Completion Time of 4 hours when added to the SR 3.4.2 Frequency of
2 hours is ≤ 6 hours.

B.

If the standby DST primary tank ventilation system train is not
OPERABLE (i.e., LCO 3.4.B is not met), either Required Action B.1 OR
Required Action B.2 is required.

B.1

If the standby DST primary tank ventilation system train is not
OPERABLE (i.e., LCO 3.4.B is not met), the standby DST primary tank
ventilation system train shall be restored to OPERABLE status within
10 days. Restoring the standby DST primary tank ventilation system train
ensures a backup system is available to continue active ventilation in the
event the in-service train stops operating and cannot be restarted. The
Completion Time of 10 days is based on (1) operating experience that
most corrective maintenance can be performed in less than 10 days, and
(2) the limited risk that a standby train is not OPERABLE when an
in-service DST primary tank ventilation system train stops operating and
cannot be restarted.
If the standby DST primary tank ventilation system train is not OPERABLE (i.e., LCO 3.4.B is not met), the water addition, chemical addition, or waste transfer shall be stopped within 10 days. Stopping the water addition, chemical addition, or waste transfer eliminates the risk that active ventilation could not be provided if the in-service DST primary tank ventilation system train stops operating and cannot be restarted. The Completion Time of 10 days is based on limiting the risk that a standby train is not available to back up the in-service DST primary tank ventilation system train during the water addition, chemical addition, or waste transfer into the DST.

If the tank farm temperature is \(< 32^\circ\text{F}\) (i.e., LCO 3.4.C is not met), Required Action C.1 is to monitor the flammable gas concentration in the applicable tank headspace. If the tank farm temperature is \(\leq 32^\circ\text{F}\), there is a potential for ice to restrict tank inlet airflow, and thus reduce tank exhaust airflow, without being detected by the SR 3.4.2 Surveillance Requirement to VERIFY the tank headspace is \(< 0\) in. w.g. relative to atmospheric pressure. The flammable gas concentration in the tank headspace of the DST may then exceed the LFL due to induced GREs during the water addition, chemical addition, or waste transfer into the DST. Flammable gas monitoring ensures that safe conditions are maintained within the tank headspace (i.e., that the flammable gas concentration is \(\leq 25\%\) of the LFL). If the flammable gas concentration exceeds 25\% of the LFL, Condition D is entered and additional ACTIONS are required.

Flammable gas monitoring is required in the tank headspace or in a location where the flammable gas monitoring method ensures a representative measurement of the tank headspace flammable gas concentration. The tank headspace is the space inside the tank above the waste surface and includes ventilation ducts up to the suction side mixing point when a DST primary tank ventilation system is operating.
The Required Action C.1 Completion Time is dependent on how the Required Action is entered. If Required Action C.1 is entered because the tank farm temperature is ≤ 32°F prior to starting a water addition, chemical addition, or waste transfer into a DST, the Completion Time is prior to starting the water addition, chemical addition, or waste transfer and once per 4 hours thereafter. Monitoring the flammable gas concentration in the applicable tank headspace prior to starting the water addition, chemical addition, or waste transfer and once per 4 hours thereafter ensures that safe conditions are maintained within the tank headspace until the temperature warms to > 32°F.

If Required Action C.1 is entered because the tank farm temperature decreases to ≤ 32°F during the water addition, chemical addition, or waste transfer into a DST, the Completion Time is 4 hours and once per 4 hours thereafter. The 4 hour Completion Time for the initial flammable gas measurement in the applicable tank headspace is based on the minimum time for the flammable gas concentration to increase by 25% of the LFL. That is, the initial Completion Time of 4 hours when added to the SR 3.4.4 Frequency of 2 hours is less than or equal to the minimum time for the flammable gas concentration to increase by 25% of the LFL calculated in RPP-RPT-47933 (i.e., 6 hours). The Completion Time of once per 4 hours thereafter to monitor the flammable gas concentration ensures that safe conditions are maintained within the tank headspace until the temperature warms to > 32°F.

D.1

If the concentration of flammable gas is > 25% of the LFL, the water addition, chemical addition, or waste transfer shall be stopped IMMEDIATELY. Stopping the water addition, chemical addition, or waste transfer limits the induced GRE gas release rate from the dissolution of soluble settled solids. The Completion Time of IMMEDIATELY expresses the highest sense of urgency to commence the Required Action without delay and continuously pursue the Required Action in a controlled manner until complete. (Note: If the concentration of flammable gas is > 25% of the LFL, LCO 3.1 ACTION Condition C is entered.)
Bases
A 3.4-8
Bases

A 3.4-9
Thus, the required tank exhaust airflow is ≥ 99 ft³/min (58 ft³/min + 34 ft³/min + 7 ft³/min).

The Surveillance Frequency of prior to starting the water addition, chemical addition, or waste transfer into the DST and once per 30 days thereafter is based on engineering judgment to address potential slow, cumulative changes to the tank exhaust airflow that may occur over time (e.g., increases in air in-leakage, HEPA filter loading). The Surveillance Frequency also requires RE-VERIFYING the tank exhaust airflow after the specifically identified changes that could significantly affect exhaust airflow. The NOTE clarifies that if any of the identified changes occurs after VERIFYING the tank exhaust airflow, the exhaust airflow shall be RE-VERIFIED to be ≥ 99 ft³/min prior to starting the water addition, chemical addition, or waste transfer into the DST. The NOTE also clarifies that if an activity changes but then restores the tank farm configuration or exhaust fan flow control set point prior to starting the water addition, chemical addition, or waste transfer, RE-VERIFICATION of the exhaust airflow is not required. In addition, the NOTE clarifies that the identified changes shall not be performed during the water addition, chemical addition, or waste transfer. Based on engineering judgment other changes to tank farm configuration (e.g., taping of waste transfer-associated structure covers) could result in only minor effects on the tank exhaust airflow and do not require RE-VERIFICATION of the exhaust airflow.

The measurement of tank exhaust airflow is performed manually in accordance with the requirements of ANSI/ASHRAE Standard 111-2008, Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems, except after repositioning a 241-AY/241-AZ flow control valve. After repositioning a 241-AY/241-AZ flow control valve, the measurement of tank exhaust airflow may be performed using the existing flow instrumentation.

The headspace in the tank shall be VERIFIED to be < 0 in. w.g. relative to atmospheric pressure every 2 hours. VERIFICATION of negative pressure provides an indication that the DST primary tank ventilation system is operating.
SURVEILLANCE REQUIREMENTS (continued)

The Surveillance Frequency of 2 hours is based on the minimum time for the flammable gas concentration to increase by 25% of the LFL calculated in RPP-RPT-47933 (i.e., 6 hours). That is, the SR 3.4.2 Frequency of 2 hours when added to the A.1 or A.2 Completion Time of 4 hours is ≤ 6 hours.

SR 3.4.3

The standby DST primary tank ventilation system train safety-significant components shall be VERIFIED to be OPERABLE and the interfacing systems required for train operation shall be VERIFIED to be capable of performing their function every 10 days. The in-service inspections/tests, functional tests, instrument calibration, and preventive maintenance necessary to meet the Surveillance Requirement are identified in a checklist derived in the system evaluation in DSA Section 4.4.10. VERIFICATION that the DST primary tank ventilation system standby train checklist requirements are met ensures that the standby train can be started up if the in-service DST primary tank ventilation system train stops operating and cannot be restarted.

The Surveillance Frequency of 10 days is based on operating experience and engineering judgment.

SR 3.4.4

The tank farm temperature shall be VERIFIED to be > 32°F every 2 hours. VERIFICATION that the outside temperature in the tank farm is > 32°F ensures there is no ice that could restrict tank inlet airflow, and thus reduce tank exhaust airflow below the flow required to maintain the tank headspace flammable gas concentration ≤ 25% of the LFL (see SR 3.4.1). This failure mode would not be detected by the Surveillance Requirement to VERIFY the tank headspace is < 0 in. w.g. relative to atmospheric pressure (SR 3.4.2).

The Surveillance Frequency of 2 hours is based on the minimum time for the flammable gas concentration to increase by 25% of the LFL calculated in RPP-RPT-47933 (i.e., 6 hours). That is, the SR 3.4.4 Frequency of 2 hours when added to the C.1 Completion Time of 4 hours is ≤ 6 hours.
Bases

A 3.4-12
B 3.5 DST Annulus Flammable Gas Control

BASES

BACKGROUND
This LCO ensures the concentration of flammable gases from steady-state releases are maintained below the lower flammability limit (LFL) in the DST annulus headspace.

Flammable gas has been identified as a potential hazard in the tank farm facilities, including DST annuli if waste is present. Flammable gases (primarily hydrogen) are generated by the tank waste due to radiolysis, thermolysis, and corrosion. In the absence of adequate ventilation, the steady-state concentration of these gases can potentially exceed the LFL.

The DST annulus steady-state flammable gas hazard control strategy relies on detecting a significant quantity of waste in the DST annulus and, if a significant quantity of waste is detected, taking action to prevent a flammable gas deflagration.

APPLICABLE
The DST Annulus Flammable Gas Control is required for Flammable Gas Accidents.

ANALYSIS
Hazards associated with flammable gas accumulation and ignition are described in RPP-13033, *Tank Farms Documented Safety Analysis*, Chapter 3.0, “Hazard and Accident Analyses,” Section 3.3.2.4.1, “Flammable Gas Accidents.” A number of flammable gas accident scenarios are described and the resulting consequences are estimated. The accident analysis for DST annuli analyzed a deflagration due to a steady-state accumulation of flammable gas from a primary tank waste leak or from a waste leak into the annulus of DST 241-AY-101, 241-AY-102, 241-AZ-101, or 241-AZ-102 from a side fill line if a waste transfer overfills the DST. Based on the results of the analysis, the scenario presents a significant facility worker hazard due to overpressure or physical impact from SSC failure (missiles) or from toxicological exposure exceeding PAC-3. The DST Annulus Flammable Gas Control is identified as a preventive control. The safety function of this control is to protect the facility worker from a flammable gas deflagration in a DST annulus caused by steady-state flammable gas releases from waste in the DST annulus. The safety function is provided by monitoring the DST annulus waste level and taking action to control the flammable gas concentration or control potential ignition sources if a significant quantity of waste is detected in the DST annulus.
LCO

The LCO is that the DST annulus waste level shall be ≤ 15 in. Level monitoring is performed to VERIFY the waste level is ≤ 15 in.

At a DST annulus waste level of 15 in. (about 17,730 gal of waste), it would take longer than one year for the flammable gas concentration to reach the LFL assuming zero ventilation (RPP-8050, Lower Flammable Limit Calculations for Catch Tanks, DST Annuli, Waste Transfer-Associated Structures, and Double-Contained Receiver Tanks in the Tank Farms at the Hanford Site). Therefore, small leaks (i.e., ≤ 17,730 gal) into the DST annulus do not pose a significant flammable gas hazard in the DST annulus. (Note: To meet environmental requirements, waste leaks ≤ 17,730 gal would be detected by the annulus leak detectors.)

APPLICABILITY

LCO 3.5 applies to DST 241-AY-102 at all times.

The safety-significant DST annulus high-level safety instrumented alarm system, covered by LCO 3.11, “DST Annulus High-Level Alarm (Automation),” provides notification of high-liquid levels in the DST annulus for all DSTs with the exception of 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 Control Setting or Limiting Condition for Operation VIOLATION.”

A.1

If the DST annulus waste level is > 15 in., all activities in the affected DST annulus and directly above the affected DST shall be stopped, except for the following:

- flammable gas sampling/monitoring;
- deenergizing or removing equipment that does not meet ignition controls; and
- actions to reduce the flammable gas concentration.
AFFECTED ACTIVITIES SHALL BE STOPPED WITHIN 8 HOURS OF WHEN IT WAS
DISCOVERED THAT THE WASTE LEVEL WAS > 15 IN. STOPPING ACTIVITIES IN THE
DST ANNULUS AND DIRECTLY ABOVE THE DST INCLUDES ACTIVITIES IN THE DST
ANNULUS HEADSPACE, ACTIVITIES DIRECTLY ABOVE THE DST PRIMARY TANK AND
ANNULUS STRUCTURES, AND ACTIVITIES THAT DISTURB WASTE IN THE DSA ANNULUS.
STOPPING ACTIVITIES IN THE DST ANNULUS AND DIRECTLY ABOVE THE DST
MINIMIZES ACTIVITIES THAT CAN INDUCE GAS RELEASES FROM THE WASTE OR THAT
COULD BE AN ILLUMINATION SOURCE, AND RESTRICTS THE PRESENCE OF WORKERS EXCEPT
WHEN PERFORMING ACTIONS TO CONTROL A POTENTIAL FLAMMABLE GAS HAZARD. THE
EXCEPTIONS FOR FLAMMABLE GAS SAMPLING/MONITORING; DEENERGIZING OR
REMOVING EQUIPMENT THAT DOES NOT MEET ILLUMINATION CONTROLS; AND ACTIONS TO
REDUCE FLAMMABLE GAS CONCENTRATION (E.G., VENTILATION, WASTE REMOVAL) IS
PROVIDED TO ACCOMMODATE ACTIONS NECESSARY TO ASCERTAIN AND CONTROL A
POTENTIAL FLAMMABLE GAS HAZARD. THESE ACTIONS INVOLVE WORKERS AND MAY
BE PERFORMED IN THE DST ANNULUS OR DIRECTLY ABOVE THE DST INCLUDING
WITHIN THE PRIMARY TANK, ANNULUS, RISERS, PITS, ETC. THE COMPLETION TIME IS
BASED ON TIME TO LFL CALCULATIONS IN RPP-8050 AND OPERATIONAL
EXPERIENCE, AND ALLOWS SUFFICIENT TIME TO STOP WORK ACTIVITIES IN A SAFE,
ORDERLY MANNER. THAT IS, THE COMPLETION TIME OF 8 HOURS, WHEN ADDED TO
THE 48 HOUR SURVEILLANCE FREQUENCY FOR WASTE LEVEL MONITORING (SR 3.5.1),
is LESS THAN OR EQUAL TO THE CONSERVATIVELY CALCULATED TIME FOR THE
FLAMMABLE GAS CONCENTRATION IN THE DST ANNULUS TO REACH 25% OF THE LFL.

A.2

IF THE DST ANNULUS WASTE LEVEL IS > 15 IN., ALL ACTIVITIES IN GAS-
TRAPPING SYSTEMS OR EQUIPMENT CONNECTED TO THE AFFECTED DST ANNULUS,
EXCEPT FOR FLAMMABLE GAS MONITORING/SAMPLING AND ACTIONS TO REDUCE THE
FLAMMABLE GAS CONCENTRATION, SHALL BE STOPPED WITHIN 7 DAYS, WITHOUT
FLAMMABLE GAS MONITORING, OR PRIOR TO THE FLAMMABLE GAS CONCENTRATION
EXCEEDING 60% OF THE LFL. STOPPING ACTIVITIES IN GAS-TRAPPING
SYSTEMS OR EQUIPMENT MINIMIZES ACTIVITIES THAT CAN PRODUCE AN ILLUMINATION
SOURCE AND RESTRICTS THE PRESENCE OF WORKERS WHERE POTENTIAL FLAMMABLE
GAS HAZARDS MAY EXIST.
Without flammable gas monitoring, the Completion Time is within 7 days of detecting the waste level in the DST annulus is > 15 in. The 7 day Completion Time, when added to the 48 hour Surveillance Frequency for waste level monitoring (SR 3.5.1), is less than or equal to the conservatively calculated time for the flammable gas concentration in the DST annulus to reach 60% of the LFL using the methodology in RPP-8050. If flammable gas monitoring of the DST annulus headspace is performed, the Completion Time is prior to exceeding a flammable gas concentration of 60% of the LFL. Flammable gas sampling or monitoring is required in the DST annulus headspace or in a location where the flammable gas sampling or monitoring method ensures a representative measurement of the DST annulus headspace flammable gas concentration. Either Completion Time allows time to take actions to reduce the flammable gas concentration and sufficient time to perform the evaluations required to identify installed equipment that does not meet ignition control requirements and to de-energize or remove this equipment in a safe, orderly manner. Either Completion Time also allows sufficient time to perform the evaluations required to identify and apply ignition controls to any manned work activities that are not suspended.

A.3

If the DST annulus waste level is > 15 in., ignition controls shall be applied to equipment in the affected DST annulus headspace and GAS-TRAPPING systems or equipment connected to the affected DST annulus and to manned work activities involving the affected DST annulus headspace and GAS-TRAPPING systems or equipment connected to the affected DST annulus within 7 days, without flammable gas monitoring, or prior to the flammable gas concentration reaching 60% of the LFL.

Without flammable gas monitoring, the Completion Time is within 7 days of detecting the waste level in the DST annulus is > 15 in. The 7 day Completion Time, when added to the 48 hour Surveillance Frequency for waste level monitoring (SR 3.5.1), is less than or equal to the conservatively calculated time for the flammable gas concentration in the DST annulus to reach 60% of the LFL using the methodology in RPP-8050. If flammable gas monitoring of the DST annulus headspace is performed, the Completion Time is prior to exceeding a flammable gas concentration of 60% of the LFL. Either Completion Time allows time to take actions to reduce the flammable gas concentration and sufficient time to perform the evaluations required to identify installed equipment that does not meet ignition control requirements and to de-energize or remove this equipment in a safe, orderly manner. Either Completion Time also allows sufficient time to perform the evaluations required to identify and apply ignition controls to any manned work activities that are not suspended.
If the DST annulus waste level is > 15 in. AND there is no flammable gas monitoring of the DST annulus headspace, a RECOVERY PLAN is submitted to U.S. Department of Energy, Office of River Protection (ORP) within 19 days. The RECOVERY PLAN will identify the actions that will be taken to reduce the flammable gas concentration to ≤ 25% of the LFL. The 19 day completion time is 10 days following the calculated time for the flammable gas concentration in the DST annulus to reach 60% of the LFL (i.e., 9 days - see A.3), and provides sufficient time to identify the planned actions. The 19 days is not directly tied to the time to LFL since the actions to control ignition sources and minimize the activities near the DST have already been completed. (Note: Tank Operations Contractor actions to reduce the flammable gas concentration to ≤ 25% of the LFL may continue during preparation of a RECOVERY PLAN. However, following submittal of the RECOVERY PLAN, actions to reduce the flammable gas concentration to ≤ 25% of the LFL shall be in accordance with the RECOVERY PLAN.)

B.2

Actions to reduce the flammable gas concentration to ≤ 25% of the LFL are performed in accordance with the RECOVERY PLAN.

C.1

If the concentration of flammable gas is > 60% of the LFL, a RECOVERY PLAN is submitted to ORP within 10 days. The RECOVERY PLAN will identify the actions that will be taken to reduce the flammable gas concentration to ≤ 25% of the LFL. A Completion Time of 10 days from when it was discovered that the flammable gas concentration was > 60% provides sufficient time to identify the planned actions. The 10 days is not directly tied to the time to LFL since the actions to control ignition sources and minimize the activities near the DST have already been completed. (Note: Tank Operations Contractor actions to reduce the flammable gas concentration to ≤ 25% of the LFL may continue during preparation of a RECOVERY PLAN. However, following submittal of the RECOVERY PLAN, actions to reduce the flammable gas concentration to ≤ 25% of the LFL shall be in accordance with the RECOVERY PLAN.)
Bases
A 3.5-6

---

Actions to reduce the flammable gas concentration to ≤ 25% of the LFL are performed in accordance with the RECOVERY PLAN.

Surveillance
Failure to meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is 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, “Response to a Surveillance Requirement VIOLATION.”

SR 3.5.1

The DST annulus waste level shall be VERIFIED to be ≤ 15 in. A direct measurement confirms that there is ≤ 15 in. of waste in the DST annulus.

The Surveillance Frequency of 48 hours is based on the minimum time for the flammable gas concentration to reach 25% of the LFL calculated using the methodology in RPP-8050 and on engineering judgment that considers margin for future DST operations (e.g., waste transfers) and human factors (e.g., the same Surveillance Frequency for all DSTs). The analysis of the minimum time for the flammable gas concentration to reach 25% of the LFL in RPP-8050 assumes:

1. The waste level equalizes between the DST primary tank and the DST annulus.

2. The initial DST primary tank waste level includes a 10,000-gal water addition, which eliminates the need to reanalyze small water additions to the DST primary tank such as those associated with flushing equipment.

3. A conservative initial DST primary tank waste temperature, which eliminates the need to reanalyze should small increases in DST primary tank waste temperature occur over time.
SURVEILLANCE REQUIREMENTS (continued)

(4) A zero airflow condition in the DST annulus, which eliminates the need to define and control barometric breathing paths.

Note: The time to 25% of the LFL is protected by AC 5.9.1, “DST and SST Time to Lower Flammability Limit.”

The 48 hour Surveillance Frequency is also conservative for an undetected leak into the annulus from the side fill lines of DSTs 241-AY-101, 241-AY-102, 241-AZ-101, and 241-AZ-102 if a waste transfer overfills these DSTs.

REFERENCES


B 3.6 DCRT Steady-State Flammable Gas Control

BASES

BACKGROUND This LCO ensures the concentration of flammable gases from steady-state releases are maintained below the lower flammability limit (LFL) in the DCRT 244-BX, 244-S, and 244-TX headspace.

Flammable gas has been identified as a potential hazard in tank farm facilities, including DCRTs 244-BX, 244-S, and 244-TX. Flammable gases (primarily hydrogen) are generated by the tank waste due to radiolysis, thermolysis, and corrosion. Flammable gases generated in waste are continuously released into tank headspaces. In the absence of adequate passive ventilation, the steady-state concentration of these gases can potentially exceed the LFL.

The steady-state flammable gas hazard control strategy in DCRTs relies on flammable gas monitoring to confirm that the flammable gas concentration remains below the LFL in the DCRT headspace. Flammable gas sampling or monitoring is required in the tank headspace or in a location where the flammable gas sampling or monitoring method ensures a representative measurement of the tank headspace flammable gas concentration.

APPLICABLE The DCRT Steady-State Flammable Gas Control is required for Flammable Gas Accidents.

ANALYSIS Hazards associated with flammable gas accumulation and ignition are described in RPP-13033, *Tank Farms Documented Safety Analysis*, Chapter 3.0, “Hazard and Accident Analyses,” Section 3.3.2.4.1, “Flammable Gas Accidents.” A number of flammable gas accident scenarios are described and the resulting consequences are estimated. The accident analysis for DCRTs analyzed a headspace deflagration due to a steady-state accumulation of flammable gas. Based on the results of the analysis, the scenario presents a significant facility worker hazard due to overpressure or physical impact from SSC failure (missiles) or from toxicological exposure exceeding PAC-3. The DCRT Steady-State Flammable Gas Control is identified as a preventive control. The safety function of this control is to protect the facility worker from a flammable gas deflagration due to steady-state flammable gas releases in a DCRT by monitoring the flammable gas concentration and taking action to reduce the flammable gas concentration or control potential ignition sources prior to the flammable gas concentration exceeding the LFL.
**BASES**

**LCO**

The LCO is the tank headspace flammable gas concentration shall be ≤25% of the LFL.

The tank headspace is the space inside the tank above the waste surface and includes ventilation ducts up to the suction side mixing point when an active ventilation system is operating.

RPP-8050, *Lower Flammability Limit Calculations for Catch Tanks, DST Annuli, Waste Transfer-Associated Structures, and Double-Contained Receiver Tanks in Tank Farms at the Hanford Site*, calculates the steady-state flammable gas concentration in DCRTs 244-BX, 244-S, and 244-TX assuming barometric breathing, and the times to LFL at various fill fractions. These calculations show that for all three DCRTs, the tank headspace cannot reach 25% of the LFL assuming barometric breathing, and that the steady-state equilibrium flammable gas concentration is less than 100% of the LFL except for fill fractions in excess of twice the current tank levels. The DCRTs have been physically isolated, and historical level monitoring data indicates that tank levels are stable. Therefore, to prevent steady-state flammable gas hazards in the DCRTs, the selected control is flammable gas monitoring to directly VERIFY that the flammable gas concentration in the tank headspace is ≤25% of the LFL. (Note: Changes in DCRT waste levels would be detected by level monitoring, which is required to meet environmental requirements.)

The flammable gas concentration is required to be ≤25% of the LFL. This control point of ≤25% of the LFL has been established based on National Fire Protection Association (NFPA) standards. Specifically, NFPA 69, *Standard on Explosion Prevention Systems*, states that, relative to the design and operational requirements of systems used for combustion concentration reduction, the combustible concentration shall be maintained at or below 25% of the LFL.

**APPLICABILITY**

LCO 3.6 applies to DCRTs 244-BX, 244-S, and 244-TX at all times for the flammable gas accident. DCRTs 244-BX, 244-S, and 244-TX contain waste capable of generating flammable gas and are postulated to reach 100% of the LFL under a zero airflow condition. Therefore, flammable gas monitoring is required to confirm that the flammable gas concentration in the DCRT headspace is ≤25% of the LFL.
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 Control Setting or Limiting Condition for Operation VIOLATION.”

A.1

If the concentration of flammable gas is > 25% of the LFL, all activities in and directly above the affected tank shall be stopped, except for the following:

- flammable gas sampling/monitoring;
- deenergizing or removing equipment that does not meet ignition controls; and
- actions to reduce the flammable gas concentration.

Affected activities shall be stopped within 8 hours of when it was discovered that the flammable gas concentration was > 25% of the LFL. Stopping activities in and directly above the affected tank includes activities in the tank headspace, activities directly above the tank structure, and activities that disturb the waste. Stopping activities in and directly above the affected tank minimizes activities that can induce gas releases from the waste or that could be an ignition source, and restricts the presence of workers except when performing actions to control a potential flammable gas hazard. The exception for flammable gas sampling/monitoring; deenergizing or removing equipment that does not meet ignition controls; and actions to reduce flammable gas concentration is provided to accommodate actions necessary to ascertain and control a potential flammable gas hazard. These actions involve workers and may be performed in or directly above the tank including within the tank, tank risers, pits, etc. Actions taken to deenergize or remove equipment that does not meet ignition controls shall be completed prior to the flammable gas concentration exceeding 60% of the LFL in accordance with Required Action A.4. The Completion Time is based on time to LFL calculations in RPP-8050 and operational experience, and allows sufficient time to stop work activities in a safe, orderly manner.
If the concentration of flammable gas is > 25% of the LFL, the flammable gas concentration in the tank headspace shall be monitored within 24 hours and once per 24 hours thereafter. The 24 hour and once per 24 hour thereafter Completion Times are conservative based on the time to LFL calculations in RPP-8050.

If the concentration of flammable gas is > 25% of the LFL, all activities in GAS-TRAPPING systems or equipment connected to the affected tank headspace, except for flammable gas sampling/monitoring and actions to reduce the flammable gas concentration, shall be stopped prior to exceeding 60% of the LFL. Stopping activities in GAS-TRAPPING systems or equipment minimizes activities that can produce an ignition source and restricts the presence of workers where potential flammable gas hazards may exist. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) allows time to take actions to reduce the flammable gas concentration and sufficient time to identify the full scope of activities in GAS-TRAPPING systems or equipment that will require suspension, and to suspend these activities in a controlled manner.

If the concentration of flammable gas is > 25% of the LFL, ignition controls shall be applied to equipment in the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace and to manned work activities involving the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) allows time to take actions to reduce the flammable gas concentration and sufficient time to perform the evaluations required to identify installed equipment that does not meet ignition control requirements and to deenergize or remove this equipment in a safe, orderly manner. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) also allows sufficient time to perform the evaluations required to identify and apply ignition controls to any manned work activities that are not suspended.
if the concentration of flammable gas is > 60% of the LFL, a
RECOVERY PLAN is submitted to U.S. Department of Energy, Office of
River Protection. The RECOVERY PLAN will identify the actions that
will be taken to reduce the flammable gas concentration to ≤ 25% of the
LFL. A Completion Time of 10 days from when it was discovered that
the flammable gas concentration was > 60% provides sufficient time to
identify the planned actions. The 10 days is not directly tied to the time to
LFL since the actions to control ignition sources and minimize the
activities near the DCRT have already been completed. (Note: Tank
Operations Contractor actions to reduce the flammable gas concentration
to ≤ 25% of the LFL may continue during preparation of a RECOVERY
PLAN. However, following submittal of the RECOVERY PLAN, actions
to reduce the flammable gas concentration to ≤ 25% of the LFL shall be in
accordance with the RECOVERY PLAN.)

Actions to reduce the flammable gas concentration to ≤ 25% of the LFL
are performed in accordance with the RECOVERY PLAN.

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,
“Response to a Surveillance Requirement VIOLATION.”
The flammable gas concentration shall be VERIFIED to be \( \leq 25\% \) of the LFL in the tank headspace every 10 days. A direct measurement of the parameter confirms that sufficient ventilation is available to prevent the steady-state flammable gas hazard and that the safety function is met.

The Surveillance Frequency of 10 days was based on the minimum time for the flammable gas concentration to increase by 25% of the LFL calculated in RPP-8050 conservatively assuming zero ventilation and a waste fill fraction of 0.90. The 0.90 fill fraction is conservative because it is significantly above the existing waste levels in the DCRTs, which have been removed from service (i.e., no further waste additions are allowed), physically isolated to prevent waste leaks into the DCRTs, and stabilized to limit water intrusion (i.e., rain water, snow melt).

Because the Surveillance Frequencies are based on the minimum time for the flammable gas concentration to increase by 25% of the LFL, the flammable gas concentration could theoretically exceed 25% of the LFL between surveillances if the starting tank headspace flammable gas concentration is above 0% of the LFL. For example, if the tank headspace flammable gas concentration at the start of the surveillance interval is 5% of the LFL, the next flammable gas reading could theoretically be 30% of the LFL. This is acceptable based on:

1. The conservatively calculated time for the flammable gas concentration to increase by 25% of the LFL (e.g., zero airflow, 0.90 fill fraction);

2. The DCRT headspace flammable gas concentration is expected to be very low due to passive ventilation inherent in the normal operation and configuration of the DCRTs; and

3. The margin of safety provided by the 25% of the LFL control point.
BASES

REFERENCES


B 3.7 DST Flammable Gas Monitoring Control

Bases

BACKGROUND This LCO ensures the concentration of flammable gases from steady-state releases and induced gas releases following water additions, chemical additions, and waste transfers into DSTs are maintained below the lower flammability limit (LFL) in the DST headspace. (Note: The induced gas releases following water additions, chemical additions, and waste transfers into DSTs result from the slow, continuing dissolution of soluble settled solids in the tank.) The U.S. Department of Energy, Office of River Protection (ORP) directed retaining this LCO to supplement the safety-significant DST primary tank ventilation systems for these flammable gas hazards (see LCO 3.1) until a planned improvement for safety-significant instrumentation to monitor the exhaust airflow from each DST is completed (Samuelson 2012).

APPLICABLE The DST Flammable Gas Monitoring Control is required for Flammable Gas Accidents.

ANALYSES Hazards associated with flammable gas accumulation and ignition are described in RPP-13033, *Tank Farms Documented Safety Analysis*, Chapter 3.0, “Hazard and Accident Analyses,” Section 3.3.2.4.1, “Flammable Gas Accidents.” A number of flammable gas accident scenarios are described and the resulting consequences are estimated. The accident analysis for DSTs analyzed headspace deflagrations due to a steady-state accumulation of flammable gas and an operations induced gas release event (GRE). Based on the results of the analysis, these scenarios present a significant facility worker hazard due overpressure or physical impact from SSC failure (missiles) or from toxicological exposure exceeding PAC-3. The DST Flammable Gas Monitoring Control is a preventive control that ORP directed be retained to supplement safety-significant DST primary tank ventilation systems (Samuelson 2012). The safety function of this control is to protect the facility worker from a flammable gas deflagration due to steady-state flammable gas releases in a DST and induced gas releases following water additions, chemical additions, and waste transfers into DSTs by monitoring the flammable gas concentration and taking action to reduce the flammable gas concentration or control potential ignition sources prior to the flammable gas concentration exceeding the LFL.
LCO

The LCO is the tank headspace flammable gas concentration shall be \( \leq 25\% \) of the LFL. Flammable gas monitoring is performed to VERIFY the flammable gas concentration is \( \leq 25\% \) of the LFL in the tank headspace and, therefore, that sufficient ventilation is available to prevent the accumulation of flammable gases in the tank headspace above this control point. The tank headspace is the space inside the tank above the waste surface and includes ventilation ducts up to the suction side mixing point when an active ventilation system is operating. Flammable gas sampling or monitoring is required in the tank headspace or in a location where the flammable gas sampling or monitoring method ensures a representative measurement of the tank headspace flammable gas concentration.

ORP directed retaining this control for flammable gas monitoring to directly verify that the flammable gas concentration in the tank headspace is \( \leq 25\% \) of the LFL, which confirms that sufficient ventilation is available to control the steady-state generation of flammable gas in the DST and the slow, continuing induced gas releases following water additions, chemical additions, and waste transfers into DSTs. Flammable gas monitoring provides additional protection and assurance that unexpected, off-normal conditions that could result in flammable gas concentrations > 25% of the LFL are detected and required actions taken to prevent flammable gas accidents.

The flammable gas concentration is required to be \( \leq 25\% \) of the LFL. This control point of \( \leq 25\% \) of the LFL has been established based on National Fire Protection Association (NFPA) standards. Specifically, NFPA 69, *Standard on Explosion Prevention Systems*, states that, relative to the design and operational requirements of systems used for combustion concentration reduction, the combustible concentration shall be maintained at or below 25% of the LFL.
BASES

APPLICABILITY  LCO 3.1 applies to all DSTs at all times for the flammable gas accident. These tanks contain waste capable of generating flammable gas and are postulated to reach 100% of the LFL under a zero airflow condition. Therefore, flammable gas monitoring is required to confirm sufficient ventilation is available to prevent the accumulation of flammable gases in the tank headspace from steady-state releases and induced gas releases following water additions, chemical additions, and waste transfers into DSTs.

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 Control Setting or Limiting Condition for Operation VIOLATION.”

A. The NOTE identifies that if Condition A is entered, ACTIONS in LCO 3.1, “DST Primary Tank Ventilation Systems,” are also required if LCO 3.1 is not met (i.e., in-service DST primary tank ventilation system train is not OPERABLE OR not operating for > 24 hours).

A.1  If the concentration of flammable gas is > 25% of the LFL, all activities in and directly above the affected tank shall be stopped, except for the following:

- flammable gas sampling/monitoring;
- deenergizing or removing equipment that does not meet ignition controls; and
- actions to reduce the flammable gas concentration.

Affected activities shall be stopped within 8 hours of when it was discovered that the flammable gas concentration was > 25% of the LFL. Stopping activities in and directly above the affected tank includes activities in the tank headspace, activities directly above the tank structure, and activities that disturb the waste. Stopping activities in and directly above the affected tank minimizes activities that can induce gas releases from the waste or that could be an ignition source, and restricts the presence of workers except when performing actions to control a potential...
**BASES**

**ACTIONS** (continued)

flammable gas hazard. The exception for flammable gas sampling/monitoring; deenergizing or removing equipment that does not meet ignition controls; and actions to reduce flammable gas concentration is provided to accommodate actions necessary to ascertain and control a potential flammable gas hazard. These actions involve workers and may be performed in or directly above the tank including within the tank, tank risers, pits, etc. Actions taken to deenergize or remove equipment that does not meet ignition controls shall be completed prior to the flammable gas concentration exceeding 60% of the LFL in accordance with Required Action A.4. The Completion Time is based on time to LFL calculations in RPP-5926, *Steady-State Flammable Gas Release Rate Calculation and Lower Flammability Level Evaluation for Hanford Tank Waste*, and operational experience, and allows sufficient time to stop work activities in a safe, orderly manner.

**A.2**

If the concentration of flammable gas is > 25% of the LFL, the flammable gas concentration in the tank headspace shall be monitored within 24 hours and once per 24 hours thereafter. The 24 hour and once per 24 hour thereafter Completion Times are conservative based on the time to LFL calculations in RPP-5926.

**A.3**

If the concentration of flammable gas is > 25% of the LFL, all activities in GAS-TRAPPING systems or equipment connected to the affected tank headspace, except for flammable gas sampling/monitoring and actions to reduce the flammable gas concentration, shall be stopped prior to exceeding 60% of the LFL. Stopping activities in GAS-TRAPPING systems or equipment minimizes activities that can produce an ignition source and restricts the presence of workers where potential flammable gas hazards may exist. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) allows time to take actions to reduce the flammable gas concentration and sufficient time to identify the full scope of activities in GAS-TRAPPING systems or equipment that will require suspension, and to suspend these activities in a controlled manner.

(continued)
If the concentration of flammable gas is > 25% of the LFL, **ignition controls** shall be applied to equipment in the affected tank headspace and GAS-TRAPPING systems or equipment connected to the affected tank headspace and to manned work activities involving the affected tank headspace. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) allows time to take actions to reduce the flammable gas concentration and sufficient time to **perform the evaluation required to identify installed equipment** that does not meet ignition control requirements and to deenergize or remove this equipment in a safe, orderly manner. The Completion Time (prior to exceeding a flammable gas concentration of 60% of the LFL) also allows sufficient time to perform the evaluations required to identify and apply ignition controls to any manned work activities that are not suspended.

**B.1**

If the concentration of flammable gas is > 60% of the LFL, a **RECOVERY PLAN** is submitted to ORP. The RECOVERY PLAN will identify the actions that will be taken to reduce the flammable gas concentration to ≤ 25% of the LFL. A Completion Time of 10 days from when it was discovered that the flammable gas concentration was > 60% provides sufficient time to identify the planned actions. The 10 days is not directly tied to the time to LFL since the actions to control ignition sources and minimize the activities near the DST have already been completed. (Note: Tank Operations Contractor actions to reduce the flammable gas concentration to ≤ 25% of the LFL may continue during preparation of a RECOVERY PLAN. However, following submittal of the RECOVERY PLAN, actions to reduce the flammable gas concentration to ≤ 25% of the LFL shall be in accordance with the RECOVERY PLAN.)

**B.2**

Actions to reduce the flammable gas concentration to ≤ 25% of the LFL are performed in accordance with the RECOVERY PLAN.
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, “Response to a Surveillance Requirement VIOLATION.”

SR 3.7.1

The flammable gas concentration shall be VERIFIED to be ≤ 25% of the LFL in the tank headspace. A direct measurement of the parameter confirms that sufficient ventilation is available to prevent the flammable gas hazard from steady-state releases and induced gas releases following water additions, chemical additions, and waste transfers into DSTs, and that the safety function is met.

The Surveillance Frequencies identified in Table 3.7-1 are based on the minimum time for the flammable gas concentration to increase by 25% of the LFL calculated using the methodology in RPP-5926 and on engineering judgment that considers margin for future DST operations (e.g., waste transfers) and human factors (e.g., the same Surveillance Frequency for all DSTs in the tank farm). The analysis of the minimum time for the flammable gas concentration to increase by 25% of the LFL during steady-state storage conditions in the RPP-5926 methodology assumes:

(1) A zero airflow condition, which eliminates the need to define and control barometric breathing paths,

(2) A 10,000-gal water addition, which eliminates the need to reanalyze small water additions such as those associated with flushing equipment, and

(3) A conservative initial tank waste temperature, which eliminates the need to reanalyze should small increases in tank waste temperature occur over time.
In addition to the calculated steady-state releases, the RPP-5926 analysis methodology includes a hydrogen release of 9.6 ft³/day to bound slow, continuing induced gas releases from the dissolution of soluble settled solids following water additions, chemical additions, and waste transfers into DSTs.

Note: The time to 25% of the LFL is protected by AC 5.9.1, “DST and SST Time to Lower Flammability Limit.”

Because the Surveillance Frequencies are based on the minimum time for the flammable gas concentration to increase by 25% of the LFL, the flammable gas concentration could theoretically exceed 25% of the LFL between surveillances if the starting tank headspace flammable gas concentration is above 0% of the LFL. For example, if the tank headspace flammable gas concentration at the start of the surveillance interval is 5% of the LFL, the next flammable gas reading could theoretically be 30% of the LFL. This is acceptable based on:

1. The conservatively calculated time for the flammable gas concentration to increase by 25% of the LFL (e.g., zero airflow)

2. The DST headspace flammable gas concentration is normally at or near 0% of the LFL with operation of the DST primary tank ventilation system, and well below 25% of the LFL with passive ventilation when active ventilation is lost

3. The margin of safety provided by the 25% of the LFL control point.

Even if the surveillance discovers a flammable gas concentration above 25% of the LFL (the worst case is < 50% of the LFL), there is sufficient time (weeks to months) to take the required actions to prevent a flammable gas deflagration.
BASES

REFERENCES


B 3.8  Reserved for Future Use
B 3.9  Reserved for Future Use
B 3.10 Waste Transfer System Freeze Protection (Automation)

BASES

BACKGROUND This LCO ensures the waste transfer freeze protection safety instrumented system is operable to prevent the loss of the safety function of safety-significant SSCs due to freezing during waste transfers.

The waste transfer freeze protection safety instrumented system is a safety integrity level (SIL)-1 safety instrumented system that consists of Type T thermocouples with matching extension wiring, temperature transmitters, analog input safety modules, safety controllers, digital output safety modules, and safety annunciators located in the Central Control Room.

To meet the SIL-1 reliability requirement, the system is designed using a “de-energize when dangerous” principle. Under this principle, circuits are energized when no trip or fault condition exists and become de-energized when a low-temperature condition is detected, a fault is detected, or there is a loss of power or communications.

In the Central Control Room, a separate safety annunciator panel is provided for each tank farm. Each panel provides a low-temperature annunciator for each monitoring location, a single-system freeze protection fault annunciator for the tank farm, and a single-route selection (route-set) annunciator for the tank farm. The system provides three discrete types of alarm: (1) the low temperature alarm for a monitored location will be initiated for any measured temperature below the system trip limit of 32 ºF for encasements or 50 ºF for waste transfer-associated structures, and for any system fault (e.g., loss of power or loss of communications) that would affect reporting from that location or operability of safety-significant equipment; (2) the freeze protection fault alarm for a tank farm will be initiated for any system fault that would affect reporting from any monitored location in that tank farm; and (3) the route-set alarms for all tank farms will be initiated by any upload of route selection information to the system.

A general-service test push button is provided to VERIFY OPERABILITY of the system safety annunciators.

The waste transfer freeze protection safety instrumented system is identified as a safety-significant support system for waste transfer primary piping systems and isolation valves for double valve isolation.

The safety function of waste transfer freeze protection safety instrumented system is to prevent the loss of the safety function of safety-significant SSCs due to freezing during waste transfers. The protected safety-significant SSCs are waste transfer primary piping systems located in waste transfer-associated structures; buried or bermed waste transfer primary piping systems; and isolation valves for double-valve isolation located in waste transfer-associated structures.

Hazards associated with failure of the protected SSCs are described in RPP-13033, Chapter 3.0, “Hazards and Accident Analyses,” as follows:

- Section 3.3.2.4.3, “Waste Transfer Leak,” addresses hazards to the facility worker and co-located worker associated with a fine spray leak occurring due to loss of confinement or misrouting during a high head waste transfer, and the physical hazard (chemical burns) to facility workers from exposure to waste transfer leaks.

- Section 3.3.2.4.4, “Release from Contaminated Facility,” addresses hazards to the facility worker due to a flammable gas deflagration resulting from a waste leak in a waste transfer-associate structure.

This LCO ensures OPERABILITY of the waste transfer freeze protection safety instrumented system.
BASES

APPLICABILITY
LCO 3.10 is applicable when the waste transfer freeze protection safety instrumented system is used to monitor the air temperature in a waste transfer-associated structure or an encasement for buried/bermed waste transfer primary piping that is PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK during the months of October, November, December, January, February, and March. Analysis of site climatological data, as described in RPP-13033, Section 4.5.11, “Waste Transfer System Freeze Protection,” demonstrates there is no freeze hazard outside this time period.

The LCO applicability does not include waste transfer-associated structures, or encasements for buried/bermed waste transfer primary piping that are PHYSICALLY CONNECTED to the 242-A Evaporator vessel when the vessel contains waste, but not also PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK. As described in RPP-13033, Section 5.5.2.10, “Limiting Condition for Operation 3.10 – Waste Transfer System Freeze Protection (Automation),” physical connection to the 242-A Evaporator vessel with the potential for only gravity waste transfer from the 242-A Evaporator does not result in the need for safety-significant freeze protection to protect safety-significant waste transfer primary piping systems and isolation valves for double valve isolation.

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 Control Setting or Limiting Condition for Operation VIOLATION.”

A.1
If the waste transfer freeze protection safety instrumented system low temperature alarm is activated, WASTE TRANSFER PUMPS that are PHYSICALLY CONNECTED to the affected monitoring locations shall be placed UNDER ADMINISTRATIVE LOCK within 11 hours. The safety functions of the protected waste transfer primary piping systems and isolation valves for double valve isolation are not required when WASTE TRANSFER PUMPS are UNDER ADMINISTRATIVE LOCK.

Activation of the system low temperature alarm, without concurrent activation of the freeze protection fault alarm, indicates low temperature at the monitoring location(s) for which alarms have activated.
BASES

ACTIONS (continued) The Completion Time of 11 hours allows sufficient time for restoration of
compliant temperatures at affected monitoring locations, and adequately
limits the risk of freezing to protected waste transfer primary piping
systems and isolation valves for double valve isolation in the event of low
temperature, based on the time to freeze as documented in RPP-13033,
Section 4.4.5, “Waste Transfer Freeze Protection Safety Instrumented
System.”

Prior to placing the WASTE TRANSFER PUMPS UNDER
ADMINISTRATIVE LOCK, a controlled shutdown of the waste transfer,
including flushing, is allowed. Actions to mitigate the alarm condition
(e.g., to raise the temperature at affected monitoring locations) are also
allowed. The Completion Time of 11 hours provides a reasonable time to
perform a controlled shutdown.

B.1

If the waste transfer freeze protection safety instrumented system route set
alarm is activated, WASTE TRANSFER PUMPS that are PHYSICALLY
CONNECTED to the affected monitoring locations shall be placed
UNDER ADMINISTRATIVE LOCK within 11 hours. The safety
functions of the protected waste transfer primary piping systems and
isolation valves for double valve isolation are not required when WASTE
TRANSFER PUMPS are UNDER ADMINISTRATIVE LOCK.

Activation of the system route set alarm, except in response to an upload
of route selection information or in the performance of system surveillance
requirements, indicates failure of the route set function, or the occurrence
of an unexpected/unauthorized upload of route selection information to the
waste transfer freeze protection safety instrumented system. These
conditions may result in deactivation of low temperature alarms for
required monitoring locations.

The Completion Time of 11 hours allows sufficient time to restore route set
information, and to confirm OPERABILITY of the route set function
through performance of SR 3.10.2. The Completion Time of 11 hours also
adequately limits the risk of freezing to protected waste transfer primary
piping systems and isolation valves for double valve isolation when the
waste transfer freeze protection safety instrumented system is not capable
of providing a low temperature alarm for protected systems and equipment,
based on the time to freeze as documented in RPP-13033, Section 4.4.5.

(continued)
Prior to placing the WASTE TRANSFER PUMPS UNDER ADMINISTRATIVE LOCK, a controlled shutdown of the waste transfer, including flushing, is allowed. Actions to mitigate the alarm condition (e.g., to confirm route selection) are also allowed. The Completion Time of 11 hours provides a reasonable time to perform a controlled shutdown.

C.1

If the waste transfer freeze protection safety instrumented system is declared not OPERABLE, WASTE TRANSFER PUMPS that are PHYSICALLY CONNECTED to the affected monitoring locations shall be placed UNDER ADMINISTRATIVE LOCK within 11 hours. The safety functions of the protected waste transfer primary piping systems and isolation valves for double valve isolation are not required when WASTE TRANSFER PUMPS are UNDER ADMINISTRATIVE LOCK. Activation of the system freeze protection fault alarm, with or without concurrent activation of the system low temperature alarm, indicates a detected system fault (e.g., loss of power or loss of communications). The activation of the system freeze protection fault alarm indicates that the system (or affected portion of the system) is not OPERABLE. The waste transfer freeze protection safety instrumented system may also be declared not OPERABLE for conditions that do not activate the system freeze protection fault alarm.

The Completion Time of 11 hours adequately limits the risk of freezing to protected waste transfer primary piping systems and isolation valves for double valve isolation when the waste transfer freeze protection safety instrumented system is not capable of providing low temperature monitoring for protected systems and equipment, based on the time to freeze as documented in RPP-13033, Section 4.4.5.

Prior to placing the WASTE TRANSFER PUMPS UNDER ADMINISTRATIVE LOCK, a controlled shutdown of the waste transfer, including flushing, is allowed. Actions to mitigate the alarm condition (e.g., to restore system operability) are also allowed. The Completion Time of 11 hours provides a reasonable time to perform a controlled shutdown.
When the waste transfer freeze protection safety instrumented system has been declared not OPERABLE, completion of the Required Action by placement of the affected WASTE TRANSFER PUMPS UNDER ADMINISTRATIVE LOCK results in transition of affected waste transfer-associated structures and buried/bermed waste transfer piping to a status not protected under LCO 3.10. Restarting the waste transfer is allowed if protection for affected waste transfer-associated structures and buried/bermed waste transfer piping is provided by applying AC 5.8.8, “Waste Transfer System Freeze Protection (SAC).”

Failure to successfully meet the surveillance requirement (i.e., surveillance 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, “Response to a Surveillance Requirement VIOLATION.”

The OPERABILITY of active waste transfer freeze protection safety instrumented system safety annunciators shall be VERIFIED every 24 hours. This functional test, initiated using a dedicated push button on a control panel adjacent to the annunciators, VERIFIES the proper operation of each safety alarm through each output channel with the alarms acknowledged and reset according to the alarm sequence.

When route selection has been used to select annunciation for only those monitored locations PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK, low temperature annunciators for only the locations on the selected route will be activated by the annunciator test.

The surveillance frequency of every 24 hours is established by the SIL calculation to ensure that the waste transfer freeze protection safety instrumented system meets SIL-1 requirements (see RPP-13033, Section 4.4.5).
The active waste transfer freeze protection safety instrumented system safety annunciators shall be INDEPENDENTLY VERIFIED to correspond to the documented route selection. The OPERABILITY of alarm function for selected monitoring locations is performed using the safety annunciator functional test, and the approved waste transfer procedures. The approved waste transfer procedures identifies the waste transfer routes, and the waste transfer-associated structures and buried/bermed waste transfer piping that are physically connected to the waste transfer pump and protected under LCO 3.10.

When route selection has been used to select annunciation for only those monitored locations PHYSICALLY CONNECTED to an ACTIVE WASTE TRANSFER PUMP not UNDER ADMINISTRATIVE LOCK, low temperature annunciators for only the selected locations will be activated by the annunciator test. INDEPENDENT VERIFICATION shall be provided to confirm that activated low temperature annunciators correspond to the list of locations identified by the waste transfer procedures as protected under LCO 3.10.

The surveillance frequency of prior to removing the administrative lock on any PHYSICALLY CONNECTED ACTIVE WASTE TRANSFER PUMP ensures that safety annunciators selected as active are as identified in the waste transfer procedures prior to energizing any waste transfer pump. The surveillance shall be performed prior to removing the administrative lock on the ACTIVE WASTE TRANSFER PUMP, except when the administrative lock has been removed prior to the date on which the LCO becomes applicable. If the ACTIVE WASTE TRANSFER PUMP is not UNDER ADMINISTRATIVE LOCK on the date on which the LCO becomes applicable, the surveillance shall be performed within 8 hours of the beginning of applicability.

SR 3.10.3

A calibration check shall be performed every 48 months. If as-found results are outside the established acceptance tolerance, calibration shall be performed in accordance with the manufacturer’s operations manual. Following calibration, an as-left calibration check shall be performed to ensure calibration accuracy is with the established acceptance tolerance.
SURVEILLANCE REQUIREMENTS

prior to returning the system to service. The as-found and as-left results of the calibration checks shall be INDEPENDENTLY VERIFIED.

The surveillance frequency of every 48 months is established by the SIL Calculation to ensure that the waste transfer freeze protection safety instrumented system meets SIL-1 requirements (see RPP-13033, Section 4.4.5).

REFERENCES

BACKGROUND This LCO ensures the DST annulus high-level safety instrumented alarm system is operable to provide notification of high liquid levels in the DST annulus.

The DST annulus high-level safety instrumented alarm system is a safety integrity level (SIL)-1 safety instrumented system that consists of thermal dispersion-type level sensing elements and level switches, digital input safety modules, hard-wired light emitting diode (LED) local indicators, safety controllers, digital output safety modules, and safety annunciators located in the Central Control Room.

To meet the SIL-1 reliability requirement, the system is designed using a “de-energize when dangerous” principle. Under this principle, circuits are energized when no trip or fault condition exists and become de-energized when a trip condition occurs (high liquid level is detected), a fault is detected, or there is a loss of power or communications.

In the Central Control Room, a separate safety annunciator panel is provided for each tank farm, with a high liquid level annunciator for each DST annulus. The high liquid level alarm will be initiated for any liquid detected at the level of the sensing element, and for any system fault (e.g., loss of power or loss of communications) that would affect reporting from that location. For system faults that result in loss of reporting to the Central Control Room, but do not affect operability of the level sensing element, level switch, and digital input safety module, the hard-wired LED local indicator provided for each DST may be used to provide safety-significant monitoring of annulus level.

The system is designed to detect a liquid waste level that protects a high-level trip limit of 15 in. of waste in the DST annulus.

A general-service test push button is provided to VERIFY OPERABILITY of the system safety annunciators.

The DST annulus high-level safety instrumented alarm system is identified as a safety-significant system to provide notification of high-liquid levels in the DST annulus.

The safety function of the DST annulus high-level safety instrumented alarm system is to protect the facility worker from a flammable gas deflagration in a DST annulus caused by steady-state flammable gas releases from waste in the DST annulus. The safety function is provided by detecting a high liquid level in the DST annulus, and providing a safety alarm to alert Operations of liquid accumulation in the annulus that exceeds a height at which flammable gases generated by the waste could accumulate to a concentration in excess of the LFL.

Hazards associated with a flammable gas deflagration in the DST annulus are described in RPP-13033, Chapter 3.0, “Hazards and Accident Analyses,” Section 3.3.2.4.1, “Flammable Gas Accidents.” A deflagration in the DST annular space has significant consequences to the facility worker resulting from the effects of explosion overpressure and physical impacts due to explosion-induced failure of structures, systems, or equipment. A deflagration in the DST annular space may also result in toxicological exposure exceeding PAC-3 levels to the facility worker.

This LCO ensures OPERABILITY of the DST annulus high-level safety instrumented alarm system.

The LCO requires that the DST annulus high-level safety instrumented alarm system shall be OPERABLE.

The DST annulus high-level safety instrumented alarm system shall be considered OPERABLE when the definition of OPERABILITY is met, and the system surveillance requirements are met.

System OPERABILITY may be determined separately for each monitoring location. In addition, the system may be considered conditionally OPERABLE when Central Control Room alarm function is not OPERABLE (see Required Actions A.2.1.1 and A.2.1.2).
APPLICABILITY
LCO 3.11 is applicable to all DSTs at all times.

An exception is provided for 241-AY-102; annulus level monitoring for 241-AY-102 is provided under LCO 3.5, “DST Annulus Flammable Gas Control.”

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 Control Setting or Limiting Condition for Operation VIOLATION.”

A.1

Activation of a DST annulus high-level safety instrumented alarm system high-level alarm may indicate that the system is not OPERABLE. System status information, including an annulus level system fault alarm available on the Tank Farm Monitoring and Control System (TFMCS) may aid in determination of OPERABILITY. The system may also be determined not OPERABLE for other reasons (e.g., failure to meet a Surveillance Requirement). In the event that the OPERABILITY issue is apparent or readily diagnosed, and OPERABILITY is readily restored, the system shall be restored to OPERABLE status. The Completion Time of 48 hours is sufficient to diagnose and restore OPERABILITY for minor issues (e.g., failed annunciator light) and adequately limits the potential for accumulation of flammable gases in excess of 25% of the LFL, assuming that a leak to the DST annulus has occurred, based on the minimum time to 25% of the LFL as documented in RPP-8050, Lower Flammability Limit Calculations for Catch Tanks, DST Annuli, Waste Transfer-Associated Structures, and Double-Contained Receiver Tanks in Tank Farms at the Hanford Site.

A.2.1.1

If the DST annulus high-level safety instrumented alarm system OPERABILITY issue is limited to the Central Control Room alarm reporting function and the annulus high-level safety instrumented alarm system local LED indicator remains OPERABLE, annulus level monitoring may be provided using the local LED indicator. OPERABILITY of the annulus high-level safety instrumented alarm system high liquid level switch, level switch heater, and local LED indicator shall be VERIFIED prior to each use of the local LED indicator.

(continued)
ACTIONS (continued)

VERIFICATION of OPERABILITY is performed using a dedicated push button located on the field digital input safety module. The Completion Time of 48 hours is sufficient to obtain entry to the affected tank farm.

The Completion Time of 48 hours also adequately limits the potential for the accumulation of flammable gas in excess of 25% of the LFL, assuming that a leak to the DST annulus has occurred, based on the minimum time to 25% of the LFL. The Completion Time for continued monitoring (one per 48 hours thereafter) ensures VERIFICATION of OPERABILITY prior to each use of the local LED indicator.

If Action A.2.1.1 cannot be completed because the high-level local LED indicator is not OPERABLE, Condition B must be entered.

A.2.1.2

If the DST annulus high-level safety instrumented alarm system OPERABILITY issue is limited to the Central Control Room alarm reporting function and the annulus high-level safety instrumented alarm system local LED indicator remains OPERABLE, annulus level monitoring may be provided using the local LED indicator. VERIFICATION that the annulus waste level is below the system trip point is performed by observing the local LED indicator. The Completion Time of 48 hours is sufficient to obtain entry to the affected tank farm and perform the VERIFICATION of OPERABILITY provided by Required Action A.2.1.1.

The Completion Time of 48 hours also adequately limits the potential for the accumulation of flammable gas in excess of 25% of the LFL, assuming that a leak to the DST annulus has occurred, based on the minimum time to 25% of the LFL. The Completion Time for continued monitoring (one per 48 hours thereafter) using the local LED indicator adequately limits the potential for accumulation of liquid waste within the DST annulus.

A.2.2

If the DST annulus high-level safety instrumented alarm system Central Control Room alarm reporting function cannot be restored to OPERABLE status within 21 days, a RECOVERY PLAN shall be submitted to the DOE ORP.
BASES

ACTIONS
(continued)

The Completion Time of 21 days provides a reasonable time for diagnostic work for this safety instrumented alarm system, and for development of the RECOVERY PLAN. The RECOVERY PLAN will identify the actions to be taken to restore the system to OPERABLE status. The Completion Time is not tied to the time to LFL, because Required Action A.2.1.2 ensures that safety-significant monitoring of annulus level is maintained. Actions to restore the system to OPERABLE status may continue during preparation of the RECOVERY PLAN.

A.2.3

Following submittal of the RECOVERY PLAN, actions to restore the DST annulus high-level safety instrumented alarm system to OPERABLE status shall be in accordance with the RECOVERY PLAN.

B.1

Activation of a DST annulus high-level safety instrumented alarm system high-level alarm may indicate that the system is not OPERABLE. The system may also be determined not OPERABLE for other reasons (e.g., failure to meet a Surveillance Requirement). Where performance of Required Action A.2.1.2, or other system diagnostics, indicate that the Central Control Room alarm reporting function is not OPERABLE and the system local LED indicator is also not OPERABLE, there is a complete loss of safety-significant annulus level monitoring capability. System status information, including an annulus level system fault alarm available on the TFMCS may aid in determination of OPERABILITY.

If the DST annulus high-level safety instrumented alarm system Central Control Room alarm reporting function is not OPERABLE, and the local LED indicator is also not OPERABLE, the presence of tank waste in the DST annulus is conservatively assumed, and Condition C or Condition D shall be entered. The Completion Time of IMMEDIATELY when added to the 48-hour Completion Time for Required Actions A.1 or A.2.1.1 and A.2.1.2 limits the potential for the accumulation of a flammable gas concentration in excess of 25% of the LFL, assuming that a leak to the DST annulus has occurred, based on the minimum time to 25% of the LFL as documented in RPP-8050.

(continued)
If the DST annulus high-level safety instrumented alarm system cannot be restored to OPERABLE status within 21 days, a RECOVERY PLAN shall be submitted to the ORP. The Completion Time of 21 days provides a reasonable time for diagnostic work for this safety instrumented alarm system, and for development of the RECOVERY PLAN. The RECOVERY PLAN will identify the actions to be taken to restore the system to OPERABLE status, and proposed actions to ensure safe configuration pending restoration of OPERABLE status. The Completion Time is not tied to the time to LFL, because entering Condition C or D ensures that adequate measures are taken to monitor and mitigate flammable gas hazards. Actions to restore the system to OPERABLE status may continue during preparation of the RECOVERY PLAN.

Following submittal of the RECOVERY PLAN, Tank Operations Contractor actions to restore the DST annulus high-level safety instrumented alarm system to OPERABLE status shall be in accordance with the RECOVERY PLAN. If the RECOVERY PLAN includes alternate actions (i.e., actions other than the Required Actions defined by Condition C or D) to ensure safe configuration pending restoration of annulus high-level safety instrumented alarm system OPERABLE status, ORP approval is required prior to implementation of alternate actions.

Activation of a DST annulus high-level safety instrumented alarm system high-level alarm may indicate liquid accumulation in the annulus that exceeds a height at which flammable gases generated by the waste could accumulate to a concentration in excess of the lower flammable limit; it may also indicate that the system is not OPERABLE. System status information, including an annulus level system fault alarm available on the TFMCS may aid in determination of OPERABILITY.
BASES

ACTIONS (continued) Flammable gas monitoring of the annulus headspace allows tracking of the flammable gas concentration in the annulus headspace. Information on the actual concentration of flammable gas enables activities involving the affected DST annulus and other potentially hazardous locations to continue until the flammable gas concentration indicates the need for additional controls. Flammable gas monitoring for the DST annulus headspace shall be implemented within 36 hours, and performed every 48 hours thereafter.

The Completion Time of 36 hours when added to the 48-hour Completion Time for Required Actions A.1 or A.2.1.1 and A.2.1.2 adequately limits the potential for the accumulation of a flammable gas concentration in excess of 25% of the LFL, as does the Completion Time for continued monitoring (one per 48 hours thereafter), assuming that a leak to the DST annulus has occurred, based on the minimum time to 25% of the LFL as documented in RPP-8050.

D.1

Activation of a DST annulus high-level safety instrumented alarm system high-level alarm may indicate liquid accumulation in the annulus that exceeds a height at which flammable gases generated by the waste could accumulate to a concentration in excess of the lower flammable limit; it may also indicate that the system is not OPERABLE. System status information, including an annulus level system fault alarm available on the TFMCS may aid in determination of OPERABILITY.

Where flammable gas monitoring of the annulus headspace is not available, the potential for ignition is minimized by establishing a safe condition in the affected DST annulus and directly above the affected DST. Activities in the affected DST annulus and directly above the affected DST shall be suspended within 36 hours.

(continued)
Bases

**Actions**

The following activities necessary for establishing or maintaining a safe condition are exempt from suspension:

- Actions to establish flammable gas monitoring,
- De-energizing or removal of equipment that does not meet ignition controls,
- Actions necessary to reduce the flammable gas concentration, and
- Actions to restore DST annulus high-level safety instrumented alarm system operability.

Stopping activities in the affected DST annulus and directly above the affected DST minimizes activities that can produce an ignition source, and restricts the presence of workers in areas where an explosion hazard may exist. The exceptions are provided to accommodate actions necessary to ascertain and control a potential flammable gas hazard. The completion time of 36 hours when added to the 48-hour completion time for required actions A.1 or A.2.1.1 and A.2.1.2 adequately limits the potential for accumulation of flammable gas in excess of 25% of the LFL, assuming that a leak to the DST annulus has occurred, based on the minimum time to 25% of the LFL as documented in RPP-8050.

**D.2**

Where flammable gas monitoring of the annulus headspace is not available, the potential for ignition is minimized by establishing a safe condition in GAS-TRAPPING systems or equipment connected to the DST annulus. Activities in the GAS-TRAPPING systems or equipment connected to the affected DST annulus shall be suspended within 7 days. Flammable gas monitoring and actions to reduce the flammable gas concentration are exempt from suspension, as these actions are necessary for establishing or maintaining a safe condition.

Stopping activities in GAS-TRAPPING systems or equipment connected to the DST annulus minimizes activities that can produce an ignition source, and restricts the presence of workers in areas where an explosion hazard may exist. The completion time of 7 days when added to the 48-hour completion time for required actions A.1 or A.2.1.1 and A.2.1.2 adequately limits the potential for accumulation of flammable gas in excess of 60% of the LFL, assuming that a leak to the DST annulus has occurred, based on the minimum time to 60% of the LFL as documented in RPP-8050.
Where flammable gas monitoring of the annulus headspace is not available, the potential for ignition is minimized by establishing a safe condition in the affected DST annulus headspace and GAS-TRAPPING systems or equipment connected to the affected DST annulus. Ignition controls shall be applied to all installed equipment and manned work activities involving the affected DST annulus headspace and GAS-TRAPPING systems or equipment connected to the affected DST annulus within 7 days.

The application of ignition controls minimizes the potential for an ignition source related to installed equipment or the performance of work activities that remain allowable under Required Action D.1. The Completion Time of 8 days allows sufficient time to identify and remove or de-energize installed equipment that does not meet ignition controls, and to apply ignition controls developed under AC 5.9.2, “Ignition Controls,” to continuing work activities. The Completion Time of 7 days when added to the 48-hour Completion Time for Required Actions A.1 or A.2.1.1 and A.2.1.2 also adequately limits the potential for accumulation of flammable gas in excess of 60% of the LFL, assuming that a leak to the DST annulus has occurred, based on the minimum time to 60% of the LFL as documented in RPP-8050.

Where flammable gas monitoring of the annulus headspace is not available, that infrastructure shall be developed to ensure adequate understanding of conditions within the annulus headspace. Flammable gas monitoring shall commence within 21 days, and shall be performed every 48 hours thereafter.

The Completion Time of 21 days provides adequate time for implementation of actions and infrastructure and deployment of equipment required for flammable gas monitoring. The Completion Time is not based on the time to 60% of the LFL because actions to control ignition sources and minimize activities involving the affected DST and DST annulus have already been completed. The Completion Time of once per 48 hours thereafter, adequately limits the potential for accumulation of flammable gas in excess of 60% of the LFL, assuming that a leak to the DST annulus has occurred, based on the minimum time to 60% of the LFL as documented in RPP-8050. (Note: Transition from Condition D to Condition C or E is possible upon establishing flammable gas monitoring, and may allow restart of suspended activities. Transition from Condition D to Condition F may also be required, based on the results of flammable gas monitoring.)
When the flammable gas concentration in the annulus headspace exceeds 25% of the LFL, Required Action E.1 limits the potential for ignition by establishing a safe condition in the affected annulus and directly above the affected DST. Activities in the affected DST annulus and directly above the affected DST shall be suspended within 12 hours. The following activities necessary to establishing or maintaining a safe condition are exempt from suspension:

- Actions necessary to establish flammable gas monitoring,
- De-energizing or removal of equipment that does not meet ignition controls, and
- Actions necessary to reduce the flammable gas concentration.

Stopping activities in the affected DST annulus and directly above the affected DST minimizes activities that can produce an ignition source, and restricts the presence of workers in areas where an explosion hazard may exist. The exceptions are provided to accommodate actions necessary to ascertain and control a potential flammable gas hazard. The Completion Time of 12 hours adequately limits the potential for accumulation of flammable gas in excess of 25% of the LFL, assuming a leak to the DST annulus, based on the minimum time to LFL as documented in RPP-8050.

E.2

Flammable gas monitoring established under Conditions C or D shall continue under Condition E. Flammable gas monitoring shall commence within 24 hours, and shall be performed every 24 hours thereafter. The Completion Time of 24 hours (and once per 24 hours thereafter) adequately limits the potential for accumulation of flammable gas in excess of 60% of the LFL, assuming a leak to the DST annulus, based on the minimum time to 60% of the LFL as documented in RPP-8050.

E.3

Establishing a safe condition in the affected DST annulus headspace and GAS-TRAPPING systems or equipment connected to the affected DST annulus limits the potential for ignition in these locations. Activities in the GAS-TRAPPING systems or equipment connected to the affected DST

(continued)
annulus shall be suspended prior to the concentration of flammable gas in the annulus headspace exceeding 60% of the LFL in the affected DST annulus headspace. Flammable gas monitoring and actions to reduce the flammable gas concentration are exempt from suspension, as these actions are necessary for establishing or maintaining a safe condition.

Stopping activities in GAS-TRAPPING systems or equipment connected to the DST annulus minimizes activities that can produce an ignition source, and restricts the presence of workers in areas where an explosion hazard may exist. The Completion Time of prior to the concentration of flammable gas exceeding 60% of the LFL adequately limits the potential for accumulation of flammable gas in excess of 60% of the LFL. Based on the minimum time to 60% of the LFL, as documented in RPP-8050, this Completion Time is also sufficient to allow suspension of work activities in a controlled manner.

E.4

Establishing a safe condition in the affected DST annulus headspace and GAS-TRAPPING systems or equipment connected to the affected DST annulus limits the potential for ignition in these locations. Ignition controls shall be applied to all installed equipment and manned work activities involving the affected DST annulus headspace and GAS-TRAPPING systems or equipment connected to the affected DST annulus prior to the concentration of flammable gas in the annulus headspace exceeding 60% of the LFL.

The application of ignition controls minimizes the potential for an ignition source related to installed equipment or the performance of work activities that remain allowable under Required Action D.1. The Completion Time of prior to exceeding 60% of the LFL allows sufficient time to identify and remove or de-energize installed equipment that does not meet ignition controls, and to apply ignition controls developed under AC 5.9.2, “Ignition Controls,” to continuing work activities, based on the minimum time to 60% of the LFL as documented in RPP-8050.
When the concentration of flammable gas in the DST annulus headspace exceeds 60% of the LFL, a RECOVERY PLAN shall be submitted to ORP. The RECOVERY PLAN will identify the actions to be taken to reduce the flammable gas concentration to ≤ 25% of the LFL. The Completion Time of 10 days from discovery of a flammable gas concentration exceeding 60% of the LFL minimizes the potential for a flammable gas concentration exceeding 100% of the LFL, assuming a leak to the DST annulus, based on the minimum time to 100% of the LFL as documented in RPP-8050. Actions to reduce the flammable gas concentration to ≤ 25% of the LFL may continue during preparation of the RECOVERY PLAN.

Following submittal of the RECOVERY PLAN, actions to reduce the flammable gas concentration in the affected DST annulus headspace to ≤ 25% of the LFL shall be in accordance with the RECOVERY PLAN.

Failure to successfully meet the surveillance requirement (i.e., surveillance 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, “Response to a Surveillance Requirement VIOLATION.”

The OPERABILITY of DST annulus high-level safety instrumented alarm system annunciators shall be VERIFIED every 24 hours. This functional test, initiated using a dedicated push button on a control panel adjacent to the annunciators, VERIFIES the proper operation of each safety alarm through each output channel with the alarms acknowledged and reset according to the alarm sequence.

The OPERABILITY of DST annulus high-level safety instrumented alarm system annunciators shall also be VERIFIED for return-to-service following planned outage of the system under LCO 3.11, Condition G.
The surveillance frequency of every 24 hours is established by the SIL calculation to ensure that the DST annulus high-level safety instrumented alarm system meets SIL-1 requirements (see RPP-13033, Section 4.4.12).

SR 3.11.2

Functional testing of the DST annulus high-level safety instrumented alarm system high liquid level switch, level switch heater, and high liquid level switch fault detection capability shall be performed every 365 days. The functional test is performed using a dedicated push button and local LED indicator located on the field digital input safety module.

The surveillance frequency of every 365 days is established by the SIL calculation to ensure that the DST annulus high-level safety instrumented alarm system meets SIL-1 requirements (see RPP-13033, Section 4.4.12).

SR 3.11.3

Simulant testing of the DST annulus high-level safety instrumented alarm system high liquid level switches shall be performed every 10 years. Testing shall be performed outside the annulus in a controlled environment, using water as the waste simulant. Simulant testing requires removal of the level element probe from the tank annulus; simulant testing therefore requires a planned system outage.

If simulant testing is not performed, the DST annulus high-level safety instrumented alarm system liquid level element probes shall be replaced every 10 years.

The surveillance frequency of every 10 years is established by the SIL calculation to ensure that the DST annulus high-level safety instrumented alarm system meets SIL-1 requirements (see RPP-13033, Section 4.4.12).

REFERENCES
