November 21, 2003
GDP 03-0063

Mr. Martin J. Virgilio
Director, Office of Nuclear Material Safety and Safeguards
Attention: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Portsmouth Gaseous Diffusion Plant (PORTS)
Docket No. 70-7002, Certificate No. GDP-2
Transmittal of Revision 67 & Revision 68 to the Portsmouth Certification Application

Dear Mr. Virgilio:

In accordance with 10 CFR 76, the United States Enrichment Corporation (USEC) hereby submits Revision 67 (September 12, 2003) and Revision 68 (November 21, 2003) of USEC-02, Application for United States Nuclear Regulatory Commission (NRC) Certification, Portsmouth Gaseous Diffusion Plant.

Revision 67 incorporates changes from the Safety Analysis Report Update (SARUP) and Chapter 3 Update Certificate Amendment Requests (CARs) that have been approved as documented in the NRC's letter dated July 24, 2002 (Reference 1). Revision 67 was implemented effective on September 12, 2003. As noted in USEC's letter dated September 22, 2003 (Reference 2), USEC had 90 days from the implementation date of Revision 67 to provide a revision to the Certification Application incorporating the SARUP and Chapter 3 Update changes. Revision 68 incorporates additional changes to the Application that were approved since implementation of the SARUP and Chapter 3 Update amendments. Revision 68 was implemented effective on November 21, 2003. Revision bars are provided in the right-hand margin to identify the changes.

Revisions 67 and 68 incorporate changes to the SARUP and Chapter 3 Update submittals that were not approved by NRC as part of the SARUP and Chapter 3 Update CARs. As noted in USEC's transition plan for the SARUP and Chapter 3 Update submittals (Reference 3), USEC has treated the SARUP and Chapter 3 Update submittals as living documents. Since submittal of the final changes to the SARUP and Chapter 3 Update CARs to the NRC, USEC has continued to process changes to these documents. Any changes to the SARUP or Chapter 3 Update documents included in Revisions 67 and 68 that were not submitted to NRC for prior approval as part of the SARUP and Chapter 3 Update

NM5501
1/6 Extra Copies to PM

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CARs have been evaluated under 10 CFR 76.68 and determined not to require prior NRC review and approval.

The Fundamental Nuclear Materials Control Plan and Gaseous Diffusion Plant Security Program included with this submittal contain certain trade secrets and commercial and financial information exempt from public disclosure pursuant to Section 1314 of the Atomic Energy Act of 1954 (AEA), as amended, and 10 CFR 2.790 and 9.17(a)(4). In accordance with 10 CFR 76.33 (e) and 2.790(b), these documents are being submitted under separate cover (USEC Letter GDP 03-0064).

As noted in USEC's SARUP and Chapter 3 Update transition plan (Reference 3), USEC committed to provide six (6) complete copies of USEC-02, Volumes 1, 2, 3 and 4 to NRC Headquarters. In addition, two (2) complete copies of USEC-02 are also being provided to NRC Region II with this submittal.

Should you have any questions regarding this matter, please contact Mark Smith at (301) 564-3244. There are no new commitments contained in this submittal.

Sincerely,

S. A. Toelle

Steven A. Toelle
Director, Nuclear Regulatory Affairs

References:
1. Letter from Daniel M. Gillen (NRC) to Mr. J. Morris Brown (USEC), "Subject: Portsmouth Gaseous Diffusion Plant Certificate Amendment Requests: Safety Analysis Report and Chapter 3 Updates (TAC Nos. L32044 and L32148)", dated July 24, 2002
2. Letter from Steven A. Toelle (USEC) to Martin J. Virgilio (NRC), "Portsmouth Gaseous Diffusion Plant (PORTS), Docket No. 70-7002, Certificate No. GDP-2, Implementation of SARUP/Chapter 3 Update Certificate Amendment", dated September 22, 2003
3. Letter from Steven A. Toelle (USEC) to Martin J. Virgilio (NRC), "Portsmouth Gaseous Diffusion Plant (PORTS), Docket No. 70-7002, Certificate No. GDP-2, Transition Plan for the Safety Analysis Report Upgrade (SARUP) and Chapter 3 Update", dated July 15, 2002

Enclosures:
1. Oath and Affirmation
2. USEC-02, Application for United States Nuclear Regulatory Commission Certification, Portsmouth Gaseous Diffusion Plant, Revision 67 and 68, Copy Numbers 1 through 6

cc: G. Janosko, NRC HQ (w/o)
J. Henson, NRC Region II USEC-02, Copy Nos. 21, 172
B. Bartlett, NRC Resident Inspector - PGDP USEC-02, Copy No. 22
M. Raddatz, NRC Project Manager (w/o)
R. DeVault (DOE) USEC-02, Copy Nos. 24 through 28

Enclosure 1
GDP 03-0063

Oath and Affirmation

OATH AND AFFIRMATION

I, Steven A. Toelle, swear and affirm that I am the Director, Nuclear Regulatory Affairs, of the United States Enrichment Corporation (USEC), that I am authorized by USEC to sign and file with the Nuclear Regulatory Commission this Revision 67 (September 12, 2003) and Revision 68 (November 21, 2003) of the USEC Application for United States Nuclear Regulatory Commission Certification, Portsmouth Gaseous Diffusion Plant (USEC-02), that I am familiar with the contents thereof, and that the statements made and matters set forth therein are true and correct to the best of my knowledge, information, and belief.

S. A. Toelle

Steven A. Toelle

On this 21st day of November, 2003, the individual signing above personally appeared before me, is known by me to be the person whose name is subscribed to within the instrument, and acknowledged that he executed the same for the purposes therein contained.

In witness, hereof I hereunto set my hand and official seal.

Janet M Boothe

Ja'net M. Boothe, Notary Public
State of Maryland, Howard County
My commission expires June 01, 2007

Enclosure 2
GDP 03-0063

USEC-02
Application for United States
Nuclear Regulatory Commission Certification
Portsmouth Gaseous Diffusion Plant, Revision 67 and Revision 68

TSR-PORTS
Rev. 6

August 12, 1996

TECHNICAL SAFETY REQUIREMENTS
FOR
PORTSMOUTH GASEOUS DIFFUSION PLANT

UNITED STATES ENRICHMENT CORPORATION
PORTSMOUTH GASEOUS DIFFUSION PLANT

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SECTION 1.0

USE AND APPLICATION

SECTION 1.0 USE AND APPLICATION

1.1 INTRODUCTION

10 CFR 76.87(a) states "The Corporation shall establish technical safety requirements. In establishing the requirements, the Corporation shall consider the analyses and results of the safety analysis report submitted pursuant to 10 CFR 76.35." These Technical Safety Requirements (TSRs) are intended to fulfill the requirements of 76.87 and set forth approved limitations for operation of the Portsmouth Gaseous Diffusion Plant (PORTS). The TSRs define the conditions, safe boundaries, and the management or administrative controls necessary to ensure safe operation of the facility and are based on the accidents analyzed in the Safety Analysis Report (SAR).

1.2 DEFINITION OF TERMS

1.2.1 Actions - That part of a TSR that prescribes required actions to be taken under designated conditions within specified completion times.

1.2.2 Administrative Controls - The provisions relating to organization and management, procedures, recordkeeping, reviews and audit, and reporting necessary to ensure operation of the plant in a safe manner.

1.2.3 Allowable Value - The limiting value that the trip setpoint can have when tested periodically, beyond which the instrument channel is declared inoperable and corrective action must be taken.

1.2.4 Cascade Minimum Suction Pressure - The "A" suction pressure of any operating cell which is being used to reduce another cell's UF_6 inventory.

1.2.5 Channel Check - The qualitative assessment of channel behavior during operation. This determination shall be based on observation and shall include, where possible, a comparison of the channel indication and status with other indications and the status derived from independent instrument channels measuring the same parameter.

1.2.6 Channel Functional Test - The injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify operability, including required alarms, interlocks, trip functions, and channel failure trips. The Channel Functional Test may be performed by any series of sequential, overlapping, or total channel steps such that the entire channel is tested.

SECTION 1.0 USE AND APPLICATION

1.2.7 Completion Time - The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the time of discovery of a situation (e.g., inoperable equipment or variable not within limits) that requires entering an ACTIONS Condition unless otherwise specified, providing the system/component 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 apply until the Condition no longer exists or the system/component is not within the LCO Applicability.

1.2.8 Cylinder Categories - Cylinders are categorized as follows:

Category	UF_6 Cylinder Model Number
A	Cylinders with the following model numbers can be heated, based on their standard fill weight, to a limit of 235 °F and still meet the applicable void volume criteria: 1S, 2S, 5 (A, B, S, L), 8 (A & S), 12 (A & B), 30 (A & B), 48A, 48G (Serial Nos. 111821 and above), 48X, 48H, 48HX, 48Y.
B	Cylinders with the following model numbers can be heated, based on their standard fill weight, to a limit of 220 °F and still meet the applicable void volume criteria: 48O & 48OM (Serial Nos. 111820 and below), 48B (48B cylinders may also be known as 48T), 48F. *A Category B cylinder filled to less than its standard fill weight can be heated to 235 °F if the applicable void volume criteria can be met; such a cylinder can be heated as a Category A cylinder.
C	Damaged or overfilled cylinders that are fed by Controlled Feeding

1.2.9 Design Features (DF) - Those design attributes of structures, systems, and components that passively prevent or mitigate the consequences of radiological accidents that could cause significant consequences.

1.2.10 Fire Patrol - Required to perform monitoring of an area for fire due to a fire suppression or detection system being impaired/inoperable. This monitoring shall be performed at regular intervals not to exceed the interval specified in the facility-specific TSR. The person performing the fire patrol must be instructed on the following:
(1) specifically what system is inoperable and the area to be patrolled, (2) actions to take upon discovering a fire, and (3) procedures for reporting a fire.

1.2.11 Immediately - Required action should be pursued without delay and in a controlled manner.

1.2.12 Limiting Conditions for Operation (LCO) - The lowest functional capability or performance levels of structures, systems, components and their support systems required for normal safe operation of the plant.

SECTION 1.0 USE AND APPLICATION

1.2.13 Limiting Control Setting (LCS) - Settings for automatic alarm or protective devices related to those variables having significant safety functions.

1.2.14 Operable - An SSC shall be operable or have operability when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication, or other auxiliary equipment that are required for the SSC to perform its specified function(s) are also capable of performing their related support function(s).

1.2.15 Operating Cycle (Autoclave) - The time between the initial entrance into the Heating mode (Mode II) and completion of the intended task (feeding, sampling, transfer, etc.) inclusive of mode changes which might be required during the course of the evolution.

1.2.16 Planned Expeditious Handling (PEH) - Handling of equipment containing more than a safe mass of uranium.

1.2.17 Safety Limit (SL) - Those bounds within which the process variables must be maintained for adequate control of the operation and that must not be exceeded in order to protect the integrity of any physical system that is designed to guard against the uncontrolled release of radioactivity.

1.2.18 Surveillance Requirements (SRs) - Requirements relating to test, calibration, or inspection to ensure that the necessary quality of systems and components is maintained, that the plant operation will be within the safety limits, and that the limiting conditions for operation will be met.

1.2.19 UF_6 Cylinder (or cylinder) - Unless otherwise specified, UF_6 cylinder (or cylinder) is intended to be limited to large (2 1/2- ton and larger) UF_6 cylinders.

1.2.20 Uncomplicated Handling (UH) - Handling of equipment that contains a deposit of $\leq$ an always safe mass.

SECTION 1.0 USE AND APPLICATION

1.3 TIME INTERVALS FOR SURVEILLANCE

Interval Designation	Interval Between Consecutive Surveillances	Maximum Interval Between Consecutive Surveillances
Five-year	5 years to the day	5 years to the day (unless specifically stated otherwise)
Biennially	2 years	2 years 6 months
Annually	365 days	456 days
Semiannually	184 days	245 days
Quarterly	92 days	123 days
Monthly	31 days	39 days
Daily	24 hours	30 hours
Shiftly	12 hours	15 hours
Twice Each Shift	6 hours	8 hours

NOTE: The extension between the standard and maximum surveillance intervals is intended to be used to accommodate operational and maintenance scheduling. The time interval between surveillances on in-service equipment should not routinely extend to the maximum allowable interval.

The extension between the standard and maximum surveillance intervals is 25% of the standard value with the exception of twice each shift, quarterly, and semiannual items. The extension on these intervals is 33% consistent with past plant practice which has been in accordance with DOE 5481.1B.

SECTION 1.0 USE AND APPLICATION

1.4 LIST OF ACRONYMS

ANSI	-	American National Standards Institute
DF	-	Design Feature
LCO	-	Limiting Conditions for Operation
LCS	-	Limiting Control Setting
MAWP	-	Maximum Allowable Working Pressure
NRC	-	Nuclear Regulatory Commission
PEH	-	Planned Expeditious Handling
TSR	-	Technical Safety Requirements
SAR	-	Safety Analysis Report
SL	-	Safety Limit
SR	-	Surveillance Requirement
SSC	-	System, Structure or Component
UH	-	Uncomplicated Handling

1.5 INTENT OF TERMS

Shall	-	Requirement
Should	-	Recommendation
May	-	Permission

1.6 GENERAL APPLICATION

1.6.1 SAFETY LIMIT

1.6.1.1 Compliance with **SAFETY LIMIT** requirements is required during OPERATIONAL MODES specified in the Applicability statement.

1.6.1.2 If the **SAFETY LIMIT** is exceeded, immediately perform the following:

a. If the conditions do not require evacuation, attempt to bring the affected parameter within the **SAFETY LIMIT** in a manner that leaves the facility/system in an operational mode for which the safety limit is not applicable.

b. If appropriate, notify plant emergency personnel and initiate building evacuation.

c. Conduct a technical evaluation to determine if any damage has occurred and to evaluate the ability of the system to be restarted.

SECTION 1.0 USE AND APPLICATION

1.6.2 OPERATING LIMITS

1.6.2.1 LIMITING CONTROL SETTINGS

a. Compliance with the **LIMITING CONTROL SETTING** requirement is required during the OPERATIONAL MODES specified in the Applicability Statement.

1.6.2.2 LIMITING CONDITIONS FOR OPERATION

a. Compliance with the **LIMITING CONDITIONS for OPERATION** contained in these requirements is required during the OPERATIONAL MODES specified within the Applicability statement, except as provided in 1.6.2.2 b.

b. Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met.

c. When a **LIMITING CONDITION for OPERATION** is not met, complete the attendant action steps within the required time interval. If the action steps are not met within the specified time interval, or if none are provided, place the equipment/system in an operating mode for which the LCO does not apply. Action shall be initiated within 1 hour.

Exceptions to this TSR (1.6.2.2 c.) are stated in individual requirements.

Where corrective measures are completed that permit operation in accordance with the LCO or ACTIONS, completion of the actions required by this TSR (1.6.2.2 c.) is not required.

d. Entry into an OPERATIONAL MODE that is applicable to a particular LCO shall not be made unless the conditions for the **LIMITING CONDITIONS for OPERATION** are met without reliance on provisions contained in the ACTION statement. Exceptions to this rule are stated in the individual requirements. Additionally, this provision shall not prevent passage through or to OPERATIONAL MODES as required or allowed by ACTION statements.

e. LCO Completion Times. The completion times for LCO required actions begin when that specific condition is discovered, regardless of how long that condition may have previously existed. All completion times within a single row of an LCO table are measured from the point of discovery of that condition.

If a Completion Time requires periodic performance on a "once per..." or "every hour thereafter..." basis, the 25% time interval extension specified in the Note to TSR USE and APPLICATION Section 1.3 applies to each performance after the initial performance. For Completion Times specified as "once," the 25% time interval extension does not apply.

f. 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 1.6.2.2 b. for the system returned to service under administrative control to perform the testing required to demonstrate **OPERABILITY.**

g. Verification of OPERABILITY, as mandated in REQUIRED ACTION statements, may be accomplished by reviewing surveillance records or status boards to ensure that applicable equipment is OPERABLE or has not been declared inoperable. Systems and components are assumed to be OPERABLE when the associated SURVEILLANCE REQUIREMENTS have been met. However, this specification is not to be construed as implying that systems or components are OPERABLE when:

(1) The systems or components are known to be inoperable, although still meeting the SURVEILLANCE REQUIREMENTS; or

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

1.6.3 SURVEILLANCE REQUIREMENTS

1.6.3.1 **SURVEILLANCE REQUIREMENTS** shall be met prior to entering the OPERATIONAL MODES or other conditions specified for individual LCS and LCOs unless otherwise stated in an individual **SURVEILLANCE REQUIREMENT.**

1.6.3.2 Each **SURVEILLANCE REQUIREMENT** shall be performed in accordance with section 2 and within the maximum time interval defined in Section 1.3. Surveillances do not have to be performed on SSCs which are not in, or being prepared to enter, the applicable operating mode(s).

1.6.3.3 Failure to perform a **SURVEILLANCE REQUIREMENT** within the maximum acceptable time interval constitutes a failure to meet the OPERABILITY requirements for a **LIMITING CONDITION for OPERATION**. Exceptions are stated in the individual requirements.

When it is discovered that a surveillance has not been performed within the maximum acceptable time interval for frequency specified in Section 2, perform the following within either 24 hours or up to the limit of specified frequency (whichever is less) of discovery:

a. Perform the required surveillance, or

b. Place the equipment in an operating mode for which the system is not required.

In instances where inoperability is declared due to missed surveillances, this general usage action statement takes preference over the facility specific LCO action statement. In the event that the missed surveillance is not performed within the interval provided by this general LCO, the action steps associated with system inoperability shall be immediately initiated in accordance with the facility specific LCO.

1.6.3.4 Entry into an OPERATIONAL MODE or other specified condition shall not be made unless the **SURVEILLANCE REQUIREMENT**(s) associated with the **LIMITING CONDITION for OPERATION** has been performed within the stated surveillance interval or as otherwise specified in the individual surveillance requirements. This provision shall not prevent passage through OPERATIONAL MODES as required or allowed by ACTION statements. Exceptions are stated in the individual requirements.

1.6.4 CONDITIONS OUTSIDE TSR

In an emergency, if a situation develops that is not addressed by the TSRs, operations personnel should use their training and expertise to take actions to correct or mitigate the situation. Also, operations personnel may take actions that depart from a requirement in the TSR provided that: (a) an emergency situation exists; (b) these actions are needed immediately to protect the public and employee health and safety; and (c) no action consistent with the TSR can provide adequate or equivalent protection. Such actions must be approved by the Incident Commander as defined in the Emergency Plan. If emergency action is taken, both verbal and written notifications shall be made in accordance with 10CFR76.120.

SECTION 2.0

FACILITY SPECIFIC

TECHNICAL SAFETY REQUIREMENTS

SECTION 2.1 SPECIFIC TSRs

FOR

X-342, X-343, AND X-344 FACILITIES

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.1 X-342, X-343, X-344 AUTOCLAVE OPERATIONAL MODES:

I	**Cylinder Handling/ Preparation**	UF_6 cylinder movement, cylinder installation and connection, and other activities required prior to initiating cylinder heating and cylinder removal after disconnection from autoclave.
II	**Heating**	Cylinder containing UF_6 being heated inside an autoclave (excluding Mode VI); autoclave closed, UF_6 flow valve closed and steam valves open.
III	**Cylinder/Pigtail Operations**	Includes, but is not limited to pigtail connection/disconnections, roll/tilt, and valve clarity checks; steam valves closed, cylinder valve or safety valve may or may not be closed.
IV	**Feeding, Transfer or Sampling**	Transfer of UF_6 from a heated cylinder containing UF_6 to the Cascade or to another approved container; autoclave closed, steam valves open or closed, UF_6 flow valve open.
V	**Cold Feeding**	Sublimation of UF_6 from a cylinder without adding heat to the cylinder.
VI	**Controlled Feeding**	Sublimation of UF_6 from a cylinder contained within an autoclave under special heating limitations (Max. cylinder skin temperature 145 °F and Max. cylinder pressure 20 psia).
VII	**Shutdown**	Steam valves closed, autoclave may contain a cylinder, parent cylinder valve/safety valve and/or UF_6 flow valve closed.
VIII	**Containment**	Autoclave closed and at least one isolation valve in each autoclave penetration line is closed.

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.2 SAFETY LIMITS

APPLICABILITY: All Autoclave Operational Modes

2.1.2.1 SL: Autoclave shell pressure shall not exceed the values contained in the safety limit column of the table below.

Autoclave Shell Pressure Safety Limit Versus Autoclave Size	
Autoclave Size	**Safety Limit**
96 Inch	165 psig
84 Inch	181 psig
72 Inch	179 psig

BASIS:

Should the autoclave pressure rise above its maximum allowable working pressure (MAWP) the autoclave shell high pressure relief system is provided to relieve the pressure buildup to prevent catastrophic failure of the containment autoclave. The safety limit is 110% of the Maximum Allowable Working Pressure (MAWP) based on the 1995 ASME Pressure Vessel Code, Division I, Section VIII paragraph UG-125. This paragraph while not directly applicable to this application, does indicate that there is a high degree of confidence that the vessel pressure boundary will not fail at 110% of the stated MAWP. [SAR Sections 3.8.2.3, 3.8.5.3, 4.3.2.2.2, 4.3.2.2.4, 4.3.2.2.6, 4.3.2.2.7, 4.3.2.2.9, 4.3.2.2.13, and 4.3.2.2.14]

APPLICABILITY: All Autoclave Operational Modes

2.1.2.2 SL: Cylinder heating temperature shall not exceed the values contained in the safety limit column table below.

Cylinder Category	Safety Limit
A	250 °F
B	235 °F

BASIS:

The only time that the potential exists for a UF_6 cylinder to rupture is during the initial heating of the cylinder. During the heat up cycle the UF_6 expands in volume. Ullage or void volume is lost due to heating a cylinder to an excessive temperature based on the standard fill weight of UF_6 in the cylinder. A cylinder is assumed to fail at some point above its safety limit. The safety limit has been established for Category A cylinders at a value in which the remaining ullage is at least 3% for cylinders with depleted material and 5% for cylinders with product or feed material for that specified temperature. The Category B safety limit has been established at the temperature where there still remains an approximate 5% ullage for cylinders with depleted material and 7% ullage for cylinders with product or feed material due to the fact that these cylinders have uncertified volumes. These safety limits are conservative and do not reflect the zero ullage temperature of 280 °F for the 2.5, 10 and 14 ton heavy wall cylinders [SAR Sections 3.8.6.1, 4.3.2.2.2, 4.3.2.2.4, 4.3.2.2.10, 4.3.2.2.13, 4.3.2.2.14, and 4.3.2.2.15].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.1 Criticality Accident (Radiation) Alarm Systems

LCO 2.1.3.1a: Criticality accident detection coverage shall be operable.

APPLICABILITY: In areas, equipment, or processes which contain greater than 700 grams of ^{235}U at an enrichment greater than or equal to 1.0 wt % ^{235}U.

ACTIONS:

Condition	Required Actions	Completion Time
A. Areas, equipment, or processes not covered by criticality accident detection.	A.1 Implement the following for areas, equipment, or processes applicable to this LCO and that are not otherwise covered by criticality accident detection. A.1.1 Discontinue movement of cylinders containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND A.1.2 Complete the current transfer and/or sampling operation and place transfer or sampling autoclaves processing cylinders containing UF_6 enriched to ≥ 1 wt % ^{235}U in Mode III. AND A.1.3 Roll cylinders containing UF_6 enriched to ≥ 1 wt % ^{235}U with valves not in the 12 o'clock position to place the cylinder valve in the 12 o'clock position. AND A.1.4 Place feed autoclaves processing cylinders containing UF_6 enriched to ≥ 1 wt% ^{235}U in Mode VII. AND A.1.5 Discontinue movement of uranium enriched to ≥ 1 wt% ^{235}U. AND	Immediately
	A.2.1 Evacuate area within the area applicable to this LCO not covered by criticality accident detection. AND A.2.2 Restrict access to area evacuated in A.2.1. AND	Immediately after completing all steps in A.1
	A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification, such as a device that will alarm on sensing a 10mr/hr dose rate.	Immediately
B. Areas, equipment, or processes not covered by criticality accident detection.	B.1.1 Restore criticality accident detection by installing portable CAAS unit providing required criticality accident detection and same alarms as fixed unit. OR B.1.2 Restore criticality accident detection to operable status. TSR 1.6.2.2d is not applicable.	Prior to reinitiating activities

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.1 Criticality Accident (Radiation) Alarm Systems (continued)

LCO 2.1.3.1b: Criticality accident alarm shall be operable (audible)

APPLICABILITY: In areas where the maximum foreseeable absorbed dose in free air exceeds 12 rad.

ACTIONS:

Condition	Required Action	Completion Time
A. Area does not have an audible criticality accident alarm.	A.1 Implement the following for areas, equipment, or processes where a criticality accident could result in a maximum foreseeable dose exceeding 12 rad in the area of inaudibility and LCO 2.1.3.1a applies. A.1.1 Discontinue movement of cylinders containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND A.1.2 Complete the current transfer and/or sampling operation and place transfer or sampling autoclaves processing cylinders containing UF_6 enriched to ≥ 1 wt % ^{235}U in Mode III. AND A.1.3 Roll cylinders containing UF_6 enriched to ≥ 1 wt % ^{235}U with valves not in the 12 o'clock position to place the cylinder valve in the 12 o'clock position. AND A.1.4 Place feed autoclaves processing cylinders containing UF_6 enriched to ≥ 1 wt% ^{235}U in Mode VII. AND A.1.5 Discontinue movement of uranium enriched to ≥ 1 wt% ^{235}U. AND A.2.1 Evacuate area of inaudibility applicable to this LCO. AND A.2.2 Restrict access to area evacuated in A.2.1. AND A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification, such as a device that will alarm on sensing a 10mr/hr dose rate, or a radio in constant communication with the Plant Control Facility.	Immediately Immediately after completing all steps in A.1 Immediately
B. Area does not have an audible criticality accident alarm.	B.1.1 Restore criticality accident alarm to operable status. TSR 1.6.2.2d is not applicable.	Prior to reinitiating activities

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.1 Criticality Accident (Radiation) Alarm Systems (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Semiannually	SR 2.1.3.1.1 Calibrate radiation clusters to a set point of 5 mRad/hr. in air.
	SR 2.1.3.1.2 Verify that the cluster nitrogen horn and X-300 alarm sounds when two out of three channels in a cluster are tripped.
Quarterly	SR 2.1.3.1.3 Verify nitrogen supply pressure is at least 900 psig for each CAAS horn.

BASIS:

Each cluster consists of three neutron-sensitive detection units. Clusters are designed and calibrated to detect and alarm on a minimum credible criticality accident of concern, defined as producing an integrated total dose of 20 Rads. in one minute at two meters from the reacting material. This system will provide an audible signal in the event of a criticality that will alert personnel to evacuate the immediate work areas. The minimum acceptable length of time for the CAAS horn to sound is 2 minutes. [SAR Sections 3.8.7.1 and 4.3.2.6].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.2 UF_6 Cylinder High Pressure Autoclave Steam Shutoff

APPLICABILITY: Autoclave Operational Modes II, IV, VI

LCO: UF_6 cylinder high pressure autoclave steam shutoff system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. Cylinder high pressure autoclave steam shutoff system inoperable in Mode II	A.1 Place the autoclave in Mode VII	1 Hour
B. Cylinder high pressure autoclave steam shutoff system inoperable in Modes IV, VI	B.1 Restore operability and removal of UF_6 from the cylinder (any of Modes IV, VI) may be completed	Prior to initiating a new cylinder heating cycle

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.1.3.2.1 Perform channel functional test to verify the autoclave steam supply valve will close when pressure exceeds set point. Note: Allowable test tolerance to cover instrument drift and uncertainties during normal operation = + 5 psia
Semiannually	SR 2.1.3.2.2 Calibrate high pressure shutoff instrumentation set point to ≤115 psia. Note: Allowable test tolerance to cover instrument drift and uncertainties during normal operation = + 5 psia
Prior to entering Mode VI	SR 2.1.3.2.3 Calibrate high pressure shutoff instrumentation set point to ≤ 16.9 psia Note: Allowable test tolerance to cover instrument drift and uncertainties during normal operation = + 3.1 psia

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.2 UF_6 Cylinder High Pressure Autoclave Steam Shutoff (continued)

BASIS:

The UF_6 Cylinder High Pressure Autoclave Steam Shutoff System is a single channel system. The heating of a UF_6 cylinder containing an excessive amount of "light" gases at normal heating temperatures could result in the internal cylinder pressure exceeding the hydrostatic test pressure and possibly create a UF_6 release in the autoclave. In addition, in the event an over filled cylinder is heated in the autoclave the higher cylinder pressure caused by the reduced void volume maybe sufficient to exceed the set point value and thereby stop the cylinder heating and prevent a possible hydraulic rupture of the cylinder. The 115 psia actuation pressure for heating all cylinders other than Category C (controlled feeding) is based on the lowest MAWP of these cylinders. The set point value corresponds to the trip point established under DOE 5481.1B in 1985 and amended by DOE approval in 1995 to allow a 5 psia tolerance to comply with the definition of "Allowable Value" in ANSI/ISA-S67.04-1988. For Controlled Feeding (Mode VI, Category C Cylinder) purposes, the shutoff system must be calibrated to a lower set point (16.9 psia with a tolerance of 3.1 psia) to assure that the UF_6 does not liquify. Closure time testing for the steam supply valve is accomplished under TSR surveillance requirement 2.1.3.5.1. [SAR Sections 3.8.2.6, 3.8.5.6, 4.3.2.2.6, 4.3.2.2.7, and 4.3.2.2.9].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.3 UF_6 Cylinder High Temperature Autoclave Steam Shutoff

APPLICABILITY: Autoclave Operational Modes II, IV, VI

LCS: Cylinder temperature set points shall be in accordance with the following table:

UF_6 Cylinder High Temperature Set Points Versus Cylinder Category	
Cylinder Category	Limiting Control Setting
A	235 °F
B	220 °F
C	145 °F

LCO: Both channels of the UF_6 cylinder high temperature system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. One channel inoperable in Modes IV and VI	A.1 Restore operability and may continue operating in Modes IV or VI	Prior to initiating a new cylinder heating cycle
B. One channel inoperable in Mode II	B.1 Place autoclave in Mode VII	1 Hour
C. Both channels inoperable	C.1 Place autoclave in Mode VII	1 Hour

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.3 UF_6 Cylinder High Temperature Autoclave Steam Shutoff (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.1.3.3.1 Perform each channel functional test to verify the autoclave steam supply valve will close when temperature exceeds set point. Note: Allowable test tolerance to cover instrument drift and uncertainties during normal operation = + 5°F
Semiannually	SR 2.1.3.3.2 Calibrate cylinder high temperature shutoff instrumentation to a setpoint which coincides with the LCS for the applicable cylinder category. Note: Allowable test tolerance to cover instrument drift and uncertainties during normal operation = + 5 °F
Prior to entering Mode VI	SR 2.1.3.3.3 Calibrate high temperature shutoff instrumentation set point to ≤ 145 °F Note: Allowable test tolerance to cover instrument drift and uncertainties during normal operation = + 2.3 °F

BASIS:

Fill limits for UF_6 cylinders are established to allow adequate room for UF_6 expansion upon heating. Uranium hexafluoride exhibits a significant expansion when undergoing the phase change from solid to liquid. The expansion factor from a solid at 70°F to a liquid at 235°F is approximately a 53% increase in volume. The desired void volume is dependent upon whether the internal volume is certified to exceed a specified minimum as shown by its water weight stamped on the nameplate or uncertified in which a minimum design volume is used for the determination. Various cylinder models are placed in designated heating categories A, B to maintain at least a 5% void volume for certified volume cylinders containing feed and product and 3% void volume with depleted material. Uncertified volume cylinders are categorized to maintain at least a 7% void volume with product and 5% void volume with depleted material. This system maintains the initial condition of an acceptable temperature inside the cylinder within the parameters assumed in the accident analysis. The maintaining of temperature control will ensure that the cylinder hydrostatic or zero ullage limitation will not be exceeded or in the case of Controlled Feeding will ensure that the UF_6 is not liquefied. The LCS value corresponds to the trip set point established under DOE 5481.1B in 1985 and amended by DOE approval in 1995 to allow a 5 °F tolerance to comply with the definition of "Allowable Value" in ANSI/ISA-S67.04-1988. For Controlled Feeding (Mode VI) purposes, the shutoff system must be calibrated to a lower set point (145 °F a with a tolerance of 2.3 °F) to assure that the UF_6 does not liquify. [SAR Sections 3.8.2.7, 3.8.5.7, 4.3.2.2.2, 4.3.2.2.4, 4.3.2.2.10, 4.3.2.2.13, 4.3.2.2.14, and 4.3.2.2.15].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.4 Autoclave Shell High Steam Pressure Shutdown

APPLICABILITY: Autoclave Operational Modes II, IV, VI

LCS: Steam pressure set points shall be in accordance with table below:

Autoclave Shell High Steam Pressure Set Points Versus Cylinder Category	
Cylinder Category	Limiting Control Setting
A	8.0 psig
B	2.5 psig

LCO: The autoclave shell high pressure steam shutdown system shall be operable.

ACTIONS:

Condition		Required Actions		Completion Time
A.	One pressure instrument channel inoperable	A.1	Restore operability and may continue operating in Modes IV or VI	Prior to initiating new cylinder heating cycle
B.	One steam supply shutoff valve inoperable	B.1	Restore operability and may continue operating in Modes IV or VI.	Prior to initiating new cylinder heating cycle
C.	Both steam supply shutoff valves or both pressure instrument channels inoperable	C.1	Place autoclave in Mode VII	1 Hour

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.4 Autoclave Shell High Steam Pressure Shutdown (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.1.3.4.1 Perform channel functional test to verify the autoclave steam supply valves will close when the pressure exceeds the LCS set point.
Semiannually	SR 2.1.3.4.2 Calibrate shell high pressure steam shutdown instrumentation at the installed LCS set point.
Each time set point is changed	SR 2.1.3.4.3 Calibrate shell high pressure steam shutdown instrumentation at new LCS set point.

BASIS:

The autoclave shell high pressure steam shutdown is a "defense-in-depth" system that supports the UF_6 Cylinder High Temperature Autoclave Steam Shutoff System. The High Steam Pressure Shutdown system consists of pressure sensing channels and two channels of isolation valves. If one of the channels is found to be inoperable and the affected autoclave is in a "feeding" mode (Modes IV or VI), it is permissible to continue to feed since the cylinder is open to the cascade or another container and is at little or no risk of over pressurizing. In Mode II (Heating), however, the cylinder has the potential to be over pressurized. Therefore the loss of a protective channel presents enough of a risk to require that further heating be halted (place autoclave in Mode VII).

The accident of concern involves the prevention of a "0" ullage condition in a UF_6 cylinder and therefore the prevention of the resultant hydraulic rupture of the cylinder. The LCS set points of 8 psig and 2.5 psig as they correspond to cylinder categories were established such that when the instrument drift and other calibration uncertainties associated with the installed instrumentation is added to the LCS set point there is an adequate safety margin below the lowest cylinder temperature of 275 °F at which there can be "0" ullage.

The allowable value is calculated accounting for drift, calibration uncertainties, and instrument uncertainties per ISA-S67.04-1988.

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.5 Autoclave Shell High Pressure Containment Shutdown

APPLICABILITY: Autoclave Operational Modes II, IV, VI

LCO: The autoclave shell high pressure containment system shall be operable:

ACTIONS:

Condition	Required Actions	Completion Time
A. One instrument channel inoperable	A.1 Restore instrument channel to operable status. NOTE The current Operating Cycle may be completed.	Prior to initiating a new Operating Cycle
B. Both instrument channels inoperable	B.1 Place autoclave in Mode VII	1 Hour
C. One containment isolation valve on one or more autoclave penetration inoperable	C.1 Restore containment isolation valve to operable status. NOTE The current Operating Cycle may be completed.	Prior to initiating a new Operating Cycle
D. All containment isolation valves on any one autoclave penetration inoperable	D.1 Place autoclave in Mode VII	1 Hour
E. Steam leakage around autoclave locking ring	E.1 Place autoclave in Mode VII	1 Hour

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.5 Autoclave Shell High Pressure Containment Shutdown (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.1.3.5.1 Perform channel functional test to verify the High Pressure Containment system will actuate at or below 13 psig. Containment valves must close within 15 seconds of pressure switch actuation. For autoclaves that have an interlock feature incorporated into this system, the autoclaves must remain interlocked shut while the high pressure isolation signal is present.
Semiannually	SR 2.1.3.5.2 Calibrate shell high pressure shutdown instrumentation at ≤ 13 psig
Quarterly	SR 2.1.3.5.3 Leak rate the autoclave by pressurizing the autoclave to at least 90 psig and verify that the system pressure loss is less than or equal to 10 psig/hr for each of the following autoclave loop containment valve conditions: 1. Inner loop valves closed and Outer loop valves open 2. Inner loop valves open and Outer loop valves closed OR Perform a leak rate test where the maximum acceptable leakage shall not exceed 12 scfm at a minimum test pressure of 90 psig for each of the same conditions as stated above.

BASIS:

The steam used to heat a cylinder within an autoclave is controlled at approximately 5 psig. Therefore, when the autoclave internal pressure reaches the ≤ 15 psig (13 psig setpoint plus the 2 psi tolerance), the operating logic assumes that a UF_6 release has occurred within the autoclave and causes the containment valves to close, preventing an external release of UF_6. The 15 psig represents the lowest pressure at which it can be assumed that it is not due to a steam control failure and yet gives the early indication that a UF_6 release is in progress. Testing the containment system at 90 psig is representative of the peak credible accident pressure that could be attained assuming functioning of safety systems, design features and administrative controls to prevent rupture of a cylinder or pigtail [SAR Sections 3.8.2.1, 3.8.5.1, 4.3.2.2.2, 4.3.2.2.4, 4.3.2.2.13, and 4.3.2.2.14].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.6 Autoclave Shell High Pressure Relief System

APPLICABILITY: Autoclave Operational Modes II, IV, VI

LCS: Autoclave shell pressure relief set points shall be in accordance with table below:

Autoclave Shell High Pressure Relief Versus Autoclave Size		
Autoclave Size	Limiting Control Setting	Allowable Value (105% at MAWP)
96"	$\leq$ 150 psig	158 psig
84"	$\leq$ 165 psig	173 psig
72"	$\leq$ 163 psig	171 psig

LCO: Autoclave Shell High Pressure Relief system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. Rupture disk inoperable	A.1 Place autoclave in Mode VII	Immediately
B. Relief valve inoperable	B.1 Place autoclave in Mode VII	Immediately
C. Block valve closed and/or seal broken	C.1 Open or verify valve open AND	Immediately
	C.2 Reseal valve	8 Hours
D. Rupture disk/relief valve cavity pressure > 2 psig	D.1 Replace rupture disk	Prior to initiating a new cylinder heating cycle

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.6 Autoclave Shell High Pressure Relief System (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each autoclave startup	SR 2.1.3.6.1 Verify isolation block valve sealed open and pressure indicator in the cavity between the rupture disk and relief valve reads ≤ 2 psig once steam has been introduced into the autoclave
Annually	SR 2.1.3.6.2 Calibrate the relief valve

BASIS:

The ASME code (1995 ASME Pressure Vessel Code, Section VIII, Division I, Part UG, General Requirements) requires that over pressure relief be provided by a device stamped at or below the MAWP and sized such that the subsequent transient pressure will be limited to a maximum of 110% of MAWP when a single relief path is used. ASME code allows rupture disks to have a 5% burst tolerance. Rupture disks stamped at MAWP and rated at 72 °F will therefore burst at or below 105% of MAWP thus, the LCS is set at 100% MAWP. To comply with these standards, pressure relief devices are purchased and installed on the autoclaves with stamped ratings at or below the LCS [SAR Sections 3.8.2.10 and 3.8.5.10].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.7 High Condensate Level Shutoff

APPLICABILITY: Autoclave Operational Modes II, IV, VI

LCO: Both channels of the high condensate level shutoff system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. One channel inoperable	A.1 Restore operability. May continue operating in Modes IV or VI	Prior to initiating a new cylinder heating cycle
B. Both channels inoperable	B.1 Place autoclave in Mode VII	1 Hour

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Semiannually	SR 2.1.3.7.1 Perform each channel functional test to verify the autoclave steam supply valve will close when probes are contacted with water.

BASIS:

The Condensate level shutoff system is provided to prevent over pressurization or a nuclear criticality in an autoclave following a postulated UF_6 release. Excess water is undesirable in the event of a UF_6 release from the cylinder that could cause either high HF pressure as the result of the reaction between UF_6 and water or the excessive moderation of an unsafe mass of uranium thereby causing a criticality within the autoclave.

When the autoclaves were initially installed and the probes were in a fixed location, a design based acceptance water inventory test was conducted. This quantified the total amount of water retained (surfaces, pools, drain lines, etc.) in the autoclave. The successful completion of the water inventory tests verified that an undesirable accumulation of water in the autoclave would not occur.

The system function is to detect either a drain line plug or restriction and to shut off the steam flow to the autoclave. The undetected plugging of the drain line while the autoclave is in service, regardless of the probe location, would result in the rapid buildup of water inventory and thereby potentially providing the conditions necessary for a release of radioactive materials to the atmosphere or a criticality within the autoclave [SAR Sections 3.8.2.5, 3.8.5.5, 4.3.2.2.13, and 4.3.2.2.14].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.8 Cylinder Heating

APPLICABILITY: Autoclave Operational Mode II

LCO: Cylinder accountability weight shall be ≤ the standard fill weight prior to heating a UF_6 cylinder to normal operating temperature.

ACTIONS:

Condition	Required Actions	Completion Time
A. Accountability weight exceeds the standard fill weight	A.1 Calculate the temperature at which the cylinder will meet the following void volume criteria: Certified volume - stamped water weight - use water weight to determine actual cylinder volume. Min. void volume: 3% - cylinders with depleted material 5% - cylinders with product or feed material Uncertified volume - No stamped water weight - use min. design volume of the cylinder. Min. void volume: 5% cylinders with depleted material 7% - cylinders with product material **AND**	Prior to initiating Mode II
	A.2 Set the autoclave shell high pressure and autoclave high temperature system trips at the Category A or B setting to ensure that the calculated temperature will not be exceeded	Prior to initiating Mode II
B. Calculations determine that the cylinder cannot be heated in a manner that ensures void volume criteria can be met	B.1 Evacuate out the necessary material to meet void volume criteria and heating limitations **OR** handle cylinder emptying according to Mode VI	Prior to initiating Mode II

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.8 Cylinder Heating (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each cylinder heating	SR 2.1.3.8.1 Verify cylinder accountability weight is ≤ standard cylinder fill weight
Prior to initial heating under LCO 2.1.3.8 Required Actions	SR 2.1.3.8.2 Verify the autoclave has been calibrated for the proper cylinder category
Annually	SR 2.1.3.8.3 Calibrate scales used for accountability weights
Prior to use at the beginning of each shift	SR 2.1.3.8.4 Perform functional test of accountability scale

BASIS:

Minimum void volume requirements are established to prevent cylinder hydraulic rupture if temperature limits are exceeded. The standard fill weight of UF_6 if heated to 250°F will meet the identified void volume criteria. The heating of cylinders to a maximum of 235°F would provide approximately a 6.75% void volume which is an additional 35% safety factor. The proper heating of a cylinder regardless of its weight can be achieved if the net weight of the cylinder and the minimum volume of the cylinder are known such that the maximum heating temperature to meet the void volume criteria can be calculated. The TSR controlled temperature control systems provided the added assurance that the hydrostatic or hydraulic limitation will not be exceeded [SAR Sections 3.8.6.1, 4.3.2.2.2, 4.3.2.2.6, 4.3.2.2.14, and 4.3.2.2.15].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.9 Low Cylinder Pressure Shutoff

APPLICABILITY: Autoclave Operational Mode II

LCO: Low Cylinder Pressure Shutoff system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. Low cylinder pressure shutoff system inoperable	A.1 Place autoclave in Mode VII	1 Hour

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.1.3.9.1 Perform a channel functional test to verify steam isolation to the autoclave when after the initial allowable time of cylinder heating the cylinder pressure does not exceed the allowable value.
Semiannually	SR 2.1.3.9.2 Perform calibration with allowable values of $\geq$ 15.0 psia and $\leq$ 65 minutes.

BASIS:

The heating of a UF_6 cylinder having a closed or plugged cylinder valve and/or pigtail would negate the protection afforded by the cylinder high pressure shutoff system due to the isolation of the cylinder from the high pressure instrumentation. A UF_6 cylinder should not be heated if its pressure cannot be measured because excessive internal cylinder pressures could potentially rupture the cylinder. The low cylinder pressure shutoff system will isolate the steam supply to an autoclave when after the initial nominal hour ($\leq$ 65 minutes allowable value) of cylinder heating the cylinder pressure does not equal or exceed the allowable value of 15.0 psia. UF_6 cylinders are not heated unless their cold pressure is $\leq$ 10 psia which provides a 5.0 psia margin to the allowable value for the purpose of ensuring valve and line clarity to the cylinder pressure instrumentation. Setpoints established shall be consistent with ANSI/ISA-S67.04-Part I-1994 "Setpoints for Nuclear Safety Related Instrumentation" and ISA-RP67.04-Part II-1994 "Methodologies for the Determination of Setpoints for Nuclear Safety Related Instrumentation." The exception is that 2S sample cylinders heated to 235 °F would have a void volume of over 9% with the cylinder valve closed. This system only provides protection during initial heating and not at another time [SAR Sections 3.8.2.9 and 3.8.5.9].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.10 Cylinder Assay Limitation

APPLICABILITY: Autoclave Operational Mode II, IV, VI

LCO: No cylinder with a calculated or known assay value above 5% shall be placed in an autoclave for heating.

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to entering Mode II	SR 2.1.3.10.1 Verify cylinder assay (calculated) contained on the materials transfer log or other transfer authorizing documents is ≤ 5%

BASIS:

The Autoclave Criticality Analysis dated February 21, 1991 (POEF-T-3544), limits the assay in a cylinder to 5% U^{235} or less before the cylinder can be heated in a autoclave. The autoclave analysis also demonstrates that double contingency exists against a criticality occurring for cylinders with assays up to 5% [SAR Section 5.2, Appendix A, section 2.2].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.11 Autoclave Smoke Detection System

APPLICABILITY: All Autoclave Operational Modes

LCO: Autoclave UF_6 smoke detection systems shall be operable.

ACTIONS: **Note:** TSR 1.6.2.2(d) does not apply

Condition	Required Actions	Completion Time
A. For the X-342 and X-344 buildings: <1 operable smoke detector alarm circuit covering the area above the autoclaves	A.1 Provide continuous smoke watch at affected area **OR**	Immediately
	A.2 Place all autoclaves in the affected building in Mode VII	1 Hour
B. For the X-343 building: <1 operable smoke detector alarm circuit covering the area above each autoclave pair (i.e., No. 1 and 2; 3 and 4; 5 and 6) and autoclave No. 7 **OR** <4 operable smoke detector heads (total)	B.1 Provide continuous smoke watch at affected area **OR**	Immediately
	B.2 Place affected autoclaves(s) in Mode VII	1 Hour

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.11 Autoclave Smoke Detection System (Continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Semiannually	SR 2.1.3.11.1 Test active smoke heads to ensure alarm indication will occur when smoke head is exposed to a simulated smoke condition.

BASIS:

In the event of a UF_6 release in the autoclave area a local indicator will sound notifying operating personnel that immediate investigation and action must occur. The smoke detection system and subsequent personnel actions will mitigate the consequences of any UF_6 release. The detection components used are ionization type fire detectors designed to detect not only smoke but invisible combustion products. Due to their operating principle these detectors will also actuate in the presence of steam and vehicle exhaust, etc. Therefore prompt investigation of the actuation source is required. This LCO ensures that at least one smoke detector alarm circuit, covering the area above each autoclave that is not shut down, is operable. For autoclaves in the X-343 building, an autoclave smoke detector alarm circuit is required to have at least one operable smoke detector head above each respective autoclave pair (i.e., autoclave No. 1 and 2; 3 and 4; 5 and 6) and above autoclave No. 7, in order to be considered operable.

Additionally, a minimum of four (4) smoke detector heads (total) mounted on the ceiling are required to be operable in X-343 to alleviate any potential adverse effects on the smoke detector heads from wind inside the building when one or both crane doors are open. If this condition is not satisfied, the "affected autoclaves" referenced in Action B.2 encompasses all autoclaves in X-343.

Furthermore, a single smoke watch is adequate to implement Action B.1, regardless of how many autoclaves may be affected. Because of the physical layout of the autoclaves and the smoke detector heads in the X-342 and X-344 buildings, an autoclave smoke detector alarm circuit in either of these two buildings is required to have both smoke detector heads operable in order to be considered operable. Other smoke detectors (and their associated alarm circuits) located in these facilities but not physically above the autoclaves are not covered by this TSR and shall not be used to satisfy the LCO requirements [SAR Section 3.8.7.3].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.12 Liquid UF_6 Handling Cranes

APPLICABILITY: Autoclave Operational Mode I

LCO: Cranes shall be operable prior to lifting a cylinder containing liquid UF_6.

ACTIONS:

Condition	Required Actions	Completion Time
A. Crane inoperable (hoist brakes, upper/lower limit switches, hook, cable)	A.1 Tag crane out of service	1 Hour

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to first time use during shift	SR 2.1.3.12.1 Perform Operator functional crane inspection of: hoist, trolley, bridge, stop button and upper limit switch
Annually	SR 2.1.3.12.2 Perform load test (100% of rated capacity) and verify that the crane does not allow a load to move (except for compensatory movements) upon operator release of the contols.
Monthly	SR 2.1.3.12.3 Perform OSHA required monthly hands on inspection
Annually	SR 2.1.3.12.4 Perform OSHA required annual hands on inspection

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.12 Liquid UF_6 Handling Cranes (continued)

BASIS:

Failure of the crane lifting components or load braking system while lifting a liquid UF_6 cylinder could result in the uncontrolled dropping of the cylinder resulting in the rupture of the cylinder and the release of up to 28,000 pounds of UF_6. The assurance of operability is provided by the ongoing inspection and tests and enhanced by the configuration management program that addresses component quality and change control [SAR Section 3.8.6.2, 4.3.2.2.4, and 4.3.2.2.15]. The OSHA test requirements are contained in 29 CFR 1910. Compensatory maovements are small additional movements due to momentum after the crane drive mechanism stops and brakes are applied. These compensatory movements have no safety significance.

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.13 Pigtail Line Isolation

APPLICABILITY: Autoclave Operational Modes II, III, IV, V, VI

LCO: Pigtail line isolation system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. Parent cylinder safety valve, manifold/feed containment valve and/or daughter cylinder safety valve inoperable	A.1 Shut daughter cylinder valve **AND**	Immediately
	A.2 Place autoclave in Mode VII	1 Hour

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.1.3.13.1 Perform channel functional test to verify that the pigtail isolation valves will close when the manual pushbutton is actuated.

BASIS:

Failure of the sample/transfer manifold or pigtail during the sample/transfer operation would result in a UF_6 release. Operation of the pigtail isolation system to close the isolation valves would minimize the quantity of UF_6 released. In the event of a UF_6 release the manual actuation of a remote push-button is required to initiate the closure of the isolation valves which eliminate the source of liquid UF_6. Closure time testing for the pigtail isolation valves is accomplished under TSR surveillance requirement 2.1.3.5.1. The SAR accident analysis assumes that for pigtail line failures the pigtail isolation valves close within 30 seconds after actuation of the system. [SAR Sections 3.8.2.2, 3.8.5.2, 4.3.2.2.4, and 4.3.2.2.10].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.14 Liquid UF_6 Movement

APPLICABILITY: Autoclave Operational Mode I

LCO: Cylinders containing liquid UF_6 shall be moved by overhead cranes or scale carts.

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to cylinder movement by forklift or straddle carrier	SR 2.1.3.14.1 Verify the cylinder cooling time for solidification has been met

BASIS:

A liquid UF_6 release is significantly more severe than a release from a solid UF_6 source. Equipment reliability of straddle carriers and forklifts and road traffic conditions increase the risk of having a liquid UF_6 release. The handling of liquid UF_6 cylinders with cranes or scale carts is more reliable and therefore represents a lower risk. In the event a cylinder containing solid UF_6 is dropped, while the cylinder integrity may be compromised the rate of escaping UF_6 is sufficiently low enough to limit the release to several pounds upon taking emergency actions. SAR Section 3.2.4.5 provides the general guidelines used in determining UF_6 solidification [SAR Sections 3.8.6.2, 3.8.6.3, 4.3.2.2.4, and 4.3.2.2.15].

Solidification Criteria

- 48-inch cylinders containing less than 4000 pounds of liquid UF_6 must cool for at least 24 hours.
- 48-inch cylinders containing 4000-8000 pounds of liquid UF_6 must cool for at least 48 hours.
- 48-inch cylinders containing more than 8000 pounds of liquid UF_6 must cool for at least 5 days.
- 30-inch cylinders (all assumed to be filled to limit) must cool for at least 3 days.
- 5-inch, 8-inch, and 12-inch cylinders must cool for at least 24 hours.

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.15 Receiving Cylinder Fill Weights

APPLICABILITY: Autoclave Operational Mode IV

LCO: Receiving UF_6 cylinder fill weight shall be ≤ standard fill weight given in the table below.

Size Code	Description	Standard Fill Limit
1S	1S sample bomb	454 g
2S	2S sample bomb (unstamped)	2175 g
2S	2S sample bomb (stamped)	2200 g
5L	5 inch Aluminum	55 lbs (24,947 g)
5S	5 inch Steel	55 lbs (24,947 g)
5A	5 inch Monel	54.9 lbs (24,902 g)
5B	5 inch Nickel	54.9 lbs (24,902 g)
8H	8 inch Helium	245.00 lbs
8S	8 inch Steel	245 lbs (111.130 kg)
8A	8 inch Monel	255 lbs (115.665 kg)
10	10 inch	350 lbs (158.756 kg)
12A	12 inch, 1 valve (¾ inch)	460 lbs (208.651 kg)
12MD	12 inch, 2 valve (1 inch)	460 lbs (208.651 kg)
12FN	12 inch, 2 valve (1 inch)	430 lbs (195.0 kg)
12B	12 inch, 2 valve (¾ inch)	460 lbs (208.651 kg)
30A	2.5 TON	4950 lbs
30B	2.5 TON	5020 lbs
48A 1-5000	10 TON HW	21,030 lbs
48X	10 TON HW	21, 030 lbs

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.15 Receiving Cylinder Fill Weights (continued)

LCO (continued):

Size Code	Description	Standard Fill Limit
48B(T) 5001-9230	10 TON TW	20, 700 lbs
48F 9231-9660	14 TON HW	27,030 lbs
48Y 9661-9999	14 TON HW	27,560 lbs
48G(OM) 111820-below	14 TON TW	26,070 lbs
48G(OM) 111821-above	14 TON TW	28,000 lbs
48G(HX) 150001-151000	14 TON TW	27,030 lbs
48G(H) 151001-15XXXX	14 TON TW	27,030 lbs

ACTIONS:

Condition	Required Actions	Completion Time
A. Fill weight > Standard fill weight	A.1 Remove excess UF_6 according to LCO 2.1.3.8 Required Actions	NA
B. Fill weight > Standard fill weight and cylinder shipped	B.1 Notify receiver of overfilled condition	12 Hours

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each receiving cylinder disconnection	SR 2.1.3.15.1 Verify final cylinder fill weight as specified by the standard fill limit.

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.15 Receiving Cylinder Fill Weights (continued)

BASIS:

A safe fill limit must accommodate the internal volume of the cylinder, the density of the UF_6 at a specific temperature and an allowance for ullage or the gas volume above the liquid in the cylinder. The standard fill weight is based on providing a 5% ullage or void volume at a heating temperature of 250 °F [SAR Sections 3.8.6.1, 4.3.2.2.2, 4.3.2.2.6, 4.3.2.2.14, and 4.3.2.2.15]. |

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.16 UF_6 Cylinder Crane Movement

APPLICABILITY: Autoclave Operational Mode I

LCO: No UF_6 cylinder shall be moved over another cylinder if one of the cylinders contains liquid UF_6.

ACTIONS:

Condition	Required Action	Completion Time
A. UF_6 cylinders lifted one over the other when at least one of the cylinders contains liquid UF_6.	A.1 Move the lifted cylinder such that the LCO statement is satisfied.	Immediately

BASIS:

The cylinder drop and puncture scenarios in the accident analysis involving liquid UF_6 cylinders assume a release source term of 28,000 pounds of UF_6. The prohibition of lifting one cylinder over another if one of the cylinders contains liquid UF_6 preserves the accident analysis assumption of only one cylinder contributing to the release source term. [SAR Section 4.3.2.2.15].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.17 UF_6 Cylinder Weight Discrepancy

APPLICABILITY: Autoclave Operational Mode IV

LCO: UF_6 cylinders shall not be filled with UF_6 when there is > 40 pound discrepancy between shipper UF_6 cylinder weight and received cylinder weight until the weight discrepancy is explained.

ACTIONS:

Condition	Required Actions	Completion Time
A. UF_6 cylinder weight discrepancy > 40 pounds between shipper UF_6 cylinder weight and received cylinder weight	A.1 Reject the cylinder **AND**	Immediately
	A.2 Verify the reason for the weight discrepancy	Prior to removal of the rejection tag

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to entry of UF_6 into the cylinder	SR 2.1.3.17.1 Verify difference between shipped UF_6 cylinder weight and received UF_6 cylinder weight is $\leq$ 40 pounds

BASIS:

Liquid UF_6 will react explosively with hydrocarbon oil. The filling of a UF_6 cylinder that contains hydrocarbon oil with liquid UF_6 could result in the over pressuring of the cylinder to the point of its rupturing. The amount of UF_6 release could be as high as 28,000 lbs. of UF_6. Verification (by weight difference) that no unknown materials have been added to a UF_6 cylinder while in transit between plant or building cylinder handling operations conducted just prior to filling the cylinder with UF_6 increases the assurance that the cylinder does not contain any materials violently reactive with UF_6 [SAR Sections 4.3.2.2.10 and 4.3.2.2.11].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.18 UF_6 Plugs

APPLICABILITY: Operational Modes: All

LCO: Direct heat sources shall not be applied to solid UF_6 plugs until line clarity in the system has been assured.

ACTIONS:

Condition	Required Actions	Completion Time
A. Direct heat source being applied to a solid UF_6 plug	A.1 Discontinue direct heat application to the UF_6 plug **AND**	Immediately
	A.2 Ensure line clarity	Prior to reapplying direct heat

BASIS:

The application of an external heat source directly to a UF_6 plug can liquify the UF_6 within the center of the plug and thereby cause sufficient hydraulic forces to rupture the pipe containing the plug. The primary concern over the direct application of heat (i.e., steam tracing, heat tape, etc.) to the plug versus indirect heating (i.e., heated housings) is due to the fact that the energy is added to the plug at such a high rate that it is not evenly distributed over the entire plug and therefore does not allow for the sublimation of the plug before a portion of it liquefies. The secondary concern is that even though the UF_6 plug stays as a solid it must have room to expand. The consequences of a release of UF_6 from this type of failure mechanism would be minimal due to the fact that the UF_6 plug would remain as a solid and therefore, the release rate would be slow as the UF_6 sublimes into the atmosphere.

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343 AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.19 X-343 Cold Trapping Material Containing Intermediate Weight Gases

APPLICABILITY: X-343 Cold Trapping Operation

LCO: When cold trapping gas mixtures containing ClF_3 and greater than 2 mole% R-114 the following requirements apply to the cold traps:

1. R-114 concentration shall not exceed 5.85 mole%
2. Cold trap pressure shall not exceed 9.5 psia
3. Cold trap temperature shall not be lower than -73°F

ACTIONS:

Conditions	Required Actions	Completion Time
A. R-114 concentration greater than 5.85 mole% in cold trap(s)	A.1 Close cold trap inlet valve	Immediately
B. Cold Trap pressure greater than 9.5 psia	B.1 Decrease cold trap pressure to ≤ 9.5 psia **OR** Close cold trap inlet valve	Immediately
C. Cold Trap temperature lower than - 73 °F	C.1 Increase cold trap temperature to -73 °F **OR** Close cold trap inlet valve	Immediately

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343 AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.19 X-343 Cold Trapping Material Containing Intermediate Weight Gases (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to cold trapping gas mixtures	SR 2.1.3.19.1 Analyze gas mixtures for R-114 concentration OR Ensure gas mixtures have been properly diluted.
Prior to first time use during shift and shiftly thereafter while in operation.	SR 2.1.3.19.2 Monitor cold trap pressure and temperature (Max. cycle pressure in batch mode).

BASIS:

A mixture of ClF_3 and R-114 in the proper proportions can react and create a pressure excursion, if exposed to an ignition source. Pressure excursions in the X-343 cold traps are avoided because there is no credible ignition source associated with the cold trap operation and the R-114 concentration in the gas entering the cold traps is limited to less than that required to liquefy and accumulate in the traps. Limiting cold trap pressure and temperature parameters prevents liquefaction of the R-114, which could accumulate the R-114 in the cold trap, and pose the potential for a pressure excursion. The shiftly surveillance is adequate since temperature and pressure parameters must significantly exceed the LCO values before R-114 will liquify. The parameters will be initially established prior to cold trapping and maintained there after by control systems. In addition, an ignition source would still be required to initiate the reaction between any liquified components.

The limiting condition for operation requirements are not applicable to the X-344 cold trap operation because incoming cylinders that could contain increased levels of R-114 and ClF_3 are first processed in X-343 to reduce these intermediate weight gases to below a safe level.

When the gas mixtures are not analyzed prior to cold trapping, diluting the gas mixtures with plant dry air will reduce the R-114 concentration to a safe value. Based on statistical analysis of actual product data and applying worse case conditions, there is a 99.96% confidence level that diluting the gas mixture by pressuring the surge volume to at least 50 psia with plant dry air will ensure that the R-114 concentration remains below 5.85 mole%.

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.20 High Pressure Fire Water System (X-343 facility only)

APPLICABILITY: Autoclave Operational Modes I through VIII, when a filled or partially filled UF_6 Cylinder is located within the building.

LCO: The high pressure fire water system shall be operable.

ACTIONS: **Note: TSR 1.6.2.2 (d) does not apply**

Condition	Required Actions	Completion Time
A. <3,700 gpm flow capability at individual sprinkler system or individual sprinkler system inoperable	A.1 Halt hot work activities in the affected area AND	Immediately
	A.2 Restore water flow capability AND	4 Hours
	A.3 Obtain special Fire Services approval, provide portable fire suppression equipment and a continuous fire watch	Prior to resuming any hot work activities in the affected area
B. Condition A.2 required actions and/or completion time not accomplished	B.1 Initiate fire patrols every 4 hours for the affected area AND	4 Hours
	B.2 Initiate expediated repairs to restore water supply capability	Immediately

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.20 High Pressure Fire Water System (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Annually	SR 2.1.3.20.1 Functionally test sprinkler system at the Inspection Test Valve (ITV) for sustained water flow
Annually	SR 2.1.3.20.2 Verify sprinkler system control valves are in the desired position by viewing the "post indicator" on the valve. **AND** Operate the valves (except those that are planned to be closed) and verify the actuation of the supervisory alarm. **AND** Verify valve is left in open position by "drain" test.

BASIS:

The fire protection system is provided to mitigate a fire that could cause structural damage to roof purlins, trusses and columns followed by localized collapse of the roof with potential onsite and off-site consequences due to the breach of the UF_6 containment boundary and the resulting UF_6 release. Surveillances for the fire water pump testing are addressed in TSR 2.2.3.4 (for the Cascade) and apply to those pumps relied upon to meet required flow rate of 3,700 gpm. These systems are designed to meet the intent of the insurance industry "improved risk" criteria as interpreted by the Authority Having Jurisdiction (AHJ) as described in SAR Section 5.4 [SAR Sections 3.8.7.2 and 4.3.2.2.16].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.21 Autoclave Locking Ring Interlock System

APPLICABILITY: Autoclave Operational Modes II, IV, and VI (for autoclaves that do not have an interlock feature incorporated into the autoclave shell high pressure containment shutdown system)

LCO: The autoclave locking ring interlock system shall be operable

ACTIONS:

Condition	Required Action	Completion Time
A. Detection-initiating channel is inoperable	A.1 Verify that autoclave internal pressure is < 15 psig AND	Prior to equalizing and opening the autoclave shell.
	A.2 Restore operability Note: The current operating cycle may be completed	Prior to initiating a new operating cycle.

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.1.3.21.1 Perform a channel functional test of the autoclave locking ring interlock system to provide assurance that the system prevents the hydraulics from opening the autoclave when internal pressure is ≥ 15 psig.
Annually	SR 2.1.3.21.2 Perform a channel calibration of the detection-initiation channel.

BASIS:

The autoclave locking ring interlock system prevents opening of the autoclave shell when pressure exceeds a specified value. SAR accident analysis assumes taht an autoclave containment isolation signal is not inadvertently overridden following an accident. For autoclaves that do not have an interlock feature incorporated into the autoclave shell high pressure containment shutdown system,

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.1.3.21 Autoclave Locking Ring Interlock System

BASIS (continued)

the autoclave locking ring interlock system is assumed to accomplish this function. The 15 psig value specified in this TSR is based on the autoclave shell high pressure containment system actuation limit. The autoclave locking ring interlock system also provides an equipment and personnel safety function, and typically utilizes a more conservative setpoint of approximately 0.5 psig to accomplish this function. Following modifications to the autoclaves, this interlock feature will be incorporated into all autoclave high pressure containment shutdown systems. [SAR Sections 3.8.2.8, 3.8.5.8, 4.3.2.2.2, 4.3.2.2.4, 4.3.2.2.13, and 4.3.2.2.14].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.4 GENERAL DESIGN FEATURES

2.1.4.1 UF_6 Cylinder Lifting Fixtures

DF: UF_6 cylinder lifting fixtures are designed with a safety factor of 5 to 1.

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.1.4.1.1 Perform load test at a minimum of 100% rated capacity
Prior to first time use during shift	SR 2.1.4.1.2 Perform inspection of cylinder lifting fixture

BASIS:

Lifting fixtures used to handle liquid filled UF_6 cylinders are credited for prevention of the liquid cylinder drop and rupture accident scenario [SAR Sections 3.8.6.2, 4.3.2.2.4, and 4.3.2.2.15].

2.1.4.2 UF_6 Cylinders

DF: Large UF_6 (2.5 Ton and greater) cylinders are as a minimum designed to a MAWP of 100 psig

SURVEILLANCE:

Frequency	Surveillance
5 Year	SR 2.1.4.2.1 Perform hydrostatic test on large UF_6 cylinders with the following exception; cylinders that are full of UF_6 but have an expired hydrostatic test date may be heated for removal of the UF_6 but shall be hydrostatic tested prior to refilling.
Prior to cylinder filling or heating	SR 2.1.4.2.2 Inspect cylinder for defects

BASIS:

UF_6 cylinder MAWP $\geq$ 100 psig is a basic assumption in the accident analysis and relates to the overall structural integrity of the UF_6 containment barrier [SAR Sections 3.8.6.1, 4.3.2.2.2, 4.3.2.2.4, 4.3.2.2.6, 4.3.2.2.7, 4.3.2.2.9, 4.3.2.2.10, and 4.3.2.2.14].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.4 GENERAL DESIGN FEATURES

2.1.4.3 UF_6 Cylinder Pigtails

DF: Newly fabricated pigtails are designed to withstand at least 400 psig

SURVEILLANCE:

Frequency	Surveillance
Prior to initial use	SR 2.1.4.3.1 Inspect and perform hydrostatic test at least to 400 psig and ensure inspection tag is attached to the pigtail.

BASIS:

Structural integrity of the pigtail significantly reduces the likely hood of a catastrophic rupture [SAR Sections 3.8.2.4, 3.8.5.4, 4.3.2.2.2, 4.3.2.2.4, 4.3.2.2.6, 4.3.2.2.7, 4.3.2.2.9, 4.3.2.2.10, and 4.3.2.2.13].

2.1.4.4 X-342 Condensate Sump and Oil Interceptor

DF: Condensate sump and oil interceptor shall contain Borosilicate glass Raschig Rings

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.1.4.4.1 Verify that the surveillance requirements contained in ANSI Standard 8.5 are satisfied.

BASIS:

X-342A sump and oil interceptor are of an unfavorable geometry and Raschig rings are used to enhance criticality prevention [SAR Section 5.2, Appendix A, sections 2.3 and 2.4].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.4 GENERAL DESIGN FEATURES

2.1.4.5 Autoclave Shell

DF: The autoclave shell Maximum Allowable Working Pressure (MAWP) shall be at least 150 psig.

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.1.4.5.1 Perform visual inspection of autoclave shell and head according to the National Board Inspection Code U-110.1 Inspection of Shells and Heads.

BASIS:

The autoclave shell, valves and external piping out to the second isolation valve were credited in the cylinder rupture inside an operating autoclave scenario for containing the reaction products resulting from the release and its reaction with autoclave steam and water [SAR Sections 3.8.2.3, 3.8.5.3, 4.3.2.2.2, 4.3.2.2.4, 4.3.2.2.6, 4.3.2.2.7, 4.3.2.2.9, 4.3.2.2.10, 4.3.2.2.13, and 4.3.2.2.14].

2.1.4.6 Overhead Crane Capacity

DF: Cranes that transport cylinders containing liquid UF_6 are designed with a minimum lifting capacity of 18 tons.

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.1.4.6.1 Perform surveillance in accordance with SR 2.1.3.12.2.

BASIS:

Cranes used to handle liquid UF_6 cylinders are credited for prevention of a liquid cylinder drop and rupture [SAR Sections 3.8.6.2, 4.3.2.2.4, and 4.3.2.2.15].

SECTION 2.1 SPECIFIC TSRs FOR X-342, X-343, AND X-344 FACILITIES

2.1.4 GENERAL DESIGN FEATURES

2.1.4.7 Liquid UF_6 Cylinder Handling Scale Carts

DF: The scale carts that carry liquid UF_6 cylinders are designed and maintained not to fail in a manner to cause primary system integrity failure.

SURVEILLANCE:

Frequency	Surveillance
Biennially	SR 2.1.4.7.1 Perform a visual inspection of the scale cart for structural damage.

BASIS:

The scale carts are designed and maintained to handle weight loads appropriate for their usage to minimize the potential of cylinder failure during handling of cylinders containing greater than 500 lbs of liquid UF_6 . [SAR Sections 3.8.6.3, 4.3.2.2.4, and 4.3.2.2.15]

SECTION 2.2 SPECIFIC TSRs

FOR

X-330 AND X-333 CASCADE FACILITIES

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.1 X-330/X-333 CASCADE OPERATIONAL MODES

I	**Startup/Checkout**	Cell/equipment motors ready to be energized, cell/equipment being made ready for startup
II	**Operating**	Motors energized and cell/equipment pressurized with UF_6 to > Cascade minimum suction pressure
III	**Standby**	Motors energized, UF_6 at ≤ Cascade minimum suction pressure
IV	**Treatment**	Cell/equipment isolated from Cascade, intitial charge of CLF_3 /F_2 placed into cell/equipment
V	**Floating**	Motors de-energized and isolation block valve(s) open and UF_6 pressure ≥ Cascade Minimum Suction Pressure
VI	**Shutdown**	Cell/equipment motors de-energized, block/boundary valve(s) closed.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.2 SAFETY LIMITS

APPLICABILITY: All Cascade Operational Modes

2.2.2.1 SL: Coolant pressures shall not exceed values in Table 1

BASIS:

Overpressurization and rupture (multiple tubes) of the coolant system into the UF_6 system could result in the subsequent release of UF_6 due to overpressurization of the UF_6 enrichment system. The Safety Limit has been established at 110% of the MAWP based on the ASME Pressure Vessel Code, Division I, Section VIII. While not directly applicable to this application, the 110% overpressurization value does indicate that there is a high degree of confidence that the vessel pressure boundary will not fail at 110% of the stated MAWP.

APPLICABILITY: All Cascade Operational Modes (except during maintenance)

2.2.2.2 SL: Cascade pressures shall be $\leq$ 40 psia for X-31 (except 31-1-odd) and X-33 sized equipment.

Cascade pressures shall be $\leq$ 16 psia for X-31-1-odd and X-29 sized equipment.

BASIS:

Overpressurization and rupture of the cascade system could result in a release of UF_6 to the cell housing and potentially to the atmosphere. For uprated equipment the safety limit is based on a postulated cascade system rupture pressure of 40 psia. This value is less than 110% of the design pressure of the limiting uprated cascade system components, the rupture of which could release significant quantities of UF_6. The only exception is the compressor seals which have been tested to a pressure greater than 40 psia. Given the highest system operating pressure of 25 psia, there is reasonable assurance that the cascade system will remain below this safety limit during anticipated transients.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.1 Coolant High Pressure Relief System

APPLICABILITY: Cascade Operational Modes II and III

LCS: ≤ Coolant pressure listed in Table 1:

TABLE 1

Coolant System Overpressure Protection		
Equipment	Limiting Control Setting	Safety Limit
X-33	330 psig	363 psig
X-31	330 psig	363 psig
X-29	400 psig	440 psig
X-330 A Booster	400 psig	440 psig
X-333 A & B Boosters	400 psig	440 psig
X-326 A Booster	400 psig	440 psig
X-330 & X-333 EBSs	400 psig	440 psig

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.1 Coolant High Pressure Relief System (continued)

LCO: Coolant high pressure relief system shall be operable.

ACTIONS:

Conditions		Required Actions		Completion Time
A.	Rupture disk inoperable	A.1	Place cell/equipment in Mode VI	30 Minutes
B.	Cavity between double rupture disks blocked	B.1	Restore vent to atmosphere	8 Hours
C.	Isolation block valve closed and/or seal broken	C.1	Open **or** verify open valve **AND**	Immediately
		C.2	Reseal valve	8 Hours

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Annually and prior to entering Modes II or III from either Modes I, IV, or VI	SR 2.2.3.1.1 Verify isolation block valve sealed open and cavity between rupture disks, if present, is vented to atmosphere.

BASIS:

The 1995 ASME Pressure Vessel Code, Division I, Section VIII requires that overpressure relief be provided by a device stamped at or below the MAWP and sized such that the subsequent transient pressure will be limited to a maximum of 110% of MAWP. ASME Code allows rupture disks to have a 5% burst tolerance. Rupture disks stamped at MAWP will therefore burst at or below 105% of MAWP. The LCS is set at 100% of MAWP. To comply with these standards, pressure relief devices are purchased and installed on the Cascade cell coolant condensers with stamped ratings at or below the MAWP [SAR Section 3.8.3.4].

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.2 Criticality Accident (Radiation) Alarm Systems

LCO 2.2.3.2a: Criticality accident detection shall be operable

APPLICABILITY: In areas, equipment, or processes which contain greater than 700 grams of ^{235}U at an enrichment ≥ 1.0 wt % ^{235}U.

ACTIONS:

Condition	Required Action	Completion Time
A. Areas, equipment, or processes not covered by criticality accident detection.	A.1 Implement the following for areas, equipment, or processes applicable to this LCO and that are not otherwise covered by criticality accident detection. A.1.1 Discontinue cell maintenance activities that require breach of the containment boundary of cells containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND A.1.2 Monitor temperatures/pressures in the cascade cells containing UF_6 enriched to ≥ 1 wt % ^{235}U hourly to maintain UF_6 in the gaseous state. AND A.1.3 Waste containing uranium enriched to ≥ 1 wt % ^{235}U shall not be handled. AND A.1.4 Wet air pumps shall not be used for evacuation of cells containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND A.1.5 Monitor temperature and pressure of surge drums containing UF_6 enriched to ≥ 1 wt % ^{235}U hourly to maintain inventory in gaseous state. AND A.1.6 Place freezer/sublimers containing UF_6 enriched to ≥ 1 wt % ^{235}U in mode F/S III, F/S IV, or F/S V. AND A.2.1 Evacuate the area not covered by detection capability. AND A.2.2 Restrict access to area evacuated in A.2.1. AND A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate.	Immediately Immediately Immediately
B. Areas, equipment, or processes not covered by criticality accident detection.	B.1.1 Restore criticality accident detection by installing portable CAAS unit providing required criticality accident detection and same alarms as fixed unit. OR B.1.2 Restore criticality accident detection to operable status. TSR 1.6.2.2(d) is not applicable.	48 Hours 48 Hours

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.2 Criticality Accident (Radiation) Alarm System (continued)

LCO 2.2.3.2b: Criticality accident alarm shall be operable (audible)

APPLICABILITY: In areas where the maximum foreseeable absorbed dose in free air exceeds 12 rad.

ACTIONS:

Condition	Required Action	Completion Time
A. Area does not have an audible criticality accident alarm.	A.1 Implement the following for areas, equipment, or processes where a criticality accident could result in a maximum foreseeable dose exceeding 12 rad in the area of inaudibility and LCO 2.2.3.2a applies. A.1.1 Discontinue cell maintenance activities that require breach of the containment boundary of cells containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND A.1.2 Monitor temperatures/pressures in the cascade cells containing UF_6 enriched to ≥ 1 wt % ^{235}U hourly to maintain UF_6 in the gaseous state. AND A.1.3 Waste containing uranium enriched to ≥ 1 wt % ^{235}U shall not be handled. AND A.1.4 Wet air pumps shall not be used for evacuation of cells containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND A.1.5 Monitor temperature and pressure of surge drums containing UF_6 enriched to ≥ 1 wt % ^{235}U hourly to maintain inventory in gaseous state. AND A.1.6 Place freezer/sublimers containing UF_6 enriched to ≥ 1 wt % ^{235}U in mode F/S III, F/S IV, F/S V. AND A.2.1 Evacuate area of inaudibility. AND A.2.2 Restrict access to area evacuated in A.2.1. AND A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate, or a radio in constant communication with the Plant Control Facility.	Immediately Immediately Immediately
B. Area does not have an audible criticality accident alarm.	B.1.1 Restore criticality accident alarm to operable status. TSR 1.6.2.2(d) is not applicable.	48 hours

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.2 Criticality Accident (Radiation) Alarm System (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Semiannually	SR 2.2.3.2.1 Calibrate radiation clusters to a set point of 5 mRad/hr. in air.
	SR 2.2.3.2.2 Verify that the cluster nitrogen horn and X-300 alarm sounds when two out of three channels in a cluster are tripped.
Quarterly	SR 2.2.3.2.3 Verify nitrogen supply pressure is at least 900 psig for each CAAS horn.

BASIS:

Each cluster consists of three neutron-sensitive detection units. Clusters are designed and calibrated to detect and alarm on a minimum credible criticality accident of concern, defined as producing an integrated total dose of 20 Rads. in one minute at two meters from the reacting material. This system will provide an audible signal in the event of a criticality that will alert personnel to evacuate the immediate work areas. The minimum acceptable length of time for the CAAS horn to sound is 2 minutes. [SAR Sections 3.8.7.1 and 4.3.2.6].

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.3 CADP UF_6 Smoke Detection System

APPLICABILITY: Cascade Operational Mode II, above atmospheric pressure

LCO: 50% of the installed CADP UF_6 smoke detection heads shall be operable within each cell, bypass housing, tie line and booster station operating above atmospheric pressure.

ACTIONS: Note: TSR 1.6.2.2(d) does not apply

Condition	Required Actions	Completion Time
A. Less than two smoke detectors operable in: Cell **or** Bypass Housing **or** Tie Line **or** Booster Station	A.1 Provide continuous smoke watch at affected area. **OR**	1 Hour
	A.2 Reduce cell/equipment pressure below atmospheric pressure or exit Mode II	2 Hours
B. CADP computer inoperable	B.1 Place affected smoke detectors in manual operation	Immediately

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Monthly	SR 2.2.3.3.1 Perform test of operable smoke detectors to verify that the smoke detectors have provided an alarm condition in the ACR.
Shiftly	SR 2.2.3.3.2 Channel check the smoke detector heads

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.3 CADP UF_6 Smoke Detection System (continued)

BASIS:

In the event of a UF_6 release in a cell, bypass housing, tie-line or booster station, an alarm will sound in the ACR notifying operating personnel that immediate investigation and action must occur. The CADP system is sensitive enough to detect very minor out gassings of UF_6 and therefore will provide operators sufficient time to take any actions necessary to minimize the amount of UF_6 released [SAR Sections 3.8.7.3, 4.3.2.1.1, 4.3.2.1.2, 4.3.2.1.3, and 4.3.2.1.7].

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.4 High Pressure Fire Water System

APPLICABILITY: Cascade Operational Modes I through VI, Mode VI is not applicable when the lube oil is valved off or removed from the cells covered by a specific sprinkler system.

LCO: The high pressure fire water system shall be operable.

ACTIONS: Note: TSR 1.6.2.2 (d) does not apply

Condition	Required Actions	Completion Time
A. No water flow capability at individual sprinkler system	A.1 Halt hot work activities in the affected area **AND**	Immediately
	A.2 Restore water flow capability	4 Hours
	A.3 Obtain special Fire Services approval, provide portable fire suppression equipment and a continuous fire watch	Prior to resuming any hot work activities in the affected area
B. Condition A.2 required actions and/or completion time not accomplished	B.1 Initiate fire patrols every 4 hours for the affected area	4 Hours
C. $\leq$ 16,000 gpm but $\geq$ 4,000 gpm available for 4 hours	C.1 Restore water supply capability	8 Hours
D. Condition C required actions and/or completion time not accomplished	D.1 Initiate expedited repairs to restore water supply capability	Immediately
E. <4,000 gpm available for 4 hours	E.1 Initiate expedited repairs to restore water supply capability **AND**	Immediately
	E.2 Halt hot work activities in the affected area **AND**	Immediately
	E.3 Initiate fire patrols every 4 hours for the affected areas	4 Hours

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.4 High Pressure Fire Water System (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Monthly	SR 2.2.3.4.1 Manually start electric and diesel fire water pumps
Monthly	SR 2.2.3.4.2 Verify X-640-2 Fire Water Storage Tank contains at least 270,000 gallons of water (filled to at least 90% of capacity).
Monthly	SR 2.2.3.4.3 Verify adequate diesel supply for diesel fire water pumps in X-640-1 and X-6644 pumphouses.
Annually	SR 2.2.3.4.4 Functionally test sprinkler system at the Inspection Test Valve (ITV) for sustained water flow
Annually	SR 2.2.3.4.5 Simulate automatic start of electric fire water pumps
Annually	SR 2.2.3.4.6 Verify electric and diesel fire water pump flow is ≥ 90% of their rated capacity
Annually	SR 2.2.3.4.7 Verify sprinkler system control valves are in the desired position by viewing the "post indicator" on the valve. **AND** Operate the valves (except those that are planned to be closed) and verify the actuation of the supervisory alarm. **AND** Verify valve is left in open position by "drain" test.
Annually	SR 2.2.3.4.8 Visually inspect the exterior of X-640-2 Fire Water Storage Tank.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.4 High Pressure Fire Water System (continued)

BASIS:

The fire protection system is provided to mitigate a fire that could cause structural damage to roof purlins, trusses and columns followed by localized collapse of the roof with potential onsite and off-site consequences due to the breach of the UF_6 containment boundary and the resulting UF_6 release. Surveillances for fire water pump testing apply to those pumps relied upon to meet required flow rates. These systems are designed to meet the intent of the insurance industry "improved risk" criteria as interpreted by the Authority Having Jurisdiction (AHJ) as described in SAR Section 5.4. The sprinkler system will minimize the potential for, and mitigate the effects of a large fire. The fire water system flow requirement is conservative with respect to the system evaluation presented in the SAR. [SAR Sections 3.8.7.2 and 4.3.2.1.9].

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.5 Coolant Removal

APPLICABILITY: Cascade Operational Mode IV

LCO: Cell and applicable Freezer Sublimer (F/S) coolant systems shall be drained of coolant before addition of oxidants for cell treatment.

ACTIONS:

Condition	Required Actions	Completion Time
A. Failure to drain coolant prior to adding oxidants and there are no indications of a reaction	A.1 Evacuate cell contents	1 Hour
B. Failure to drain coolant prior to adding oxidants and there are indications of a reaction	B.1 Stop cell/equipment motors **AND**	Immediately
	B.2 Drain coolant	1 Hour

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each cell treatment	SR 2.2.3.5.1 Verify and document the removal of cell coolant prior to the initial charge of oxidants.

BASIS:

In the event of a leak from the coolant system to process, the failure to control the concentrations of coolant and ClF_3/F_2 within the cell can form explosive mixtures that in the presence of an ignition source could over pressure the cell and release toxic materials. The draining of coolant includes the evacuating of the coolant system to between 18 and 30 inches of Hg for the X-27 and X-29 size equipment. The other equipment sizes have no specific coolant evacuation requirement other than for the system pressure to be below atmospheric pressure. The indications of an exothermic reaction are usually rapid pressure spikes and/or a rapid increase in temperature. A leaking block valve between a F/S that has a leaking cooler and the host cell could allow coolant and treatment gases to mix and therefore potentially form a highly exothermic reaction mixture.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.6 Cell Treatment Monitoring

APPLICABILITY: Cascade Operational Mode IV

LCO: Cell treatments shall be monitored with an Infrared Analyzer.

ACTIONS: Note: TSR 1.6.2.2(d) does not apply

Condition	Required Actions	Completion Time
A. Infrared Analyzer inoperable	A.1 Initiate sampling for free ClF_3 and the presence of hydrocarbons	30 Minutes
B. Above condition required actions and/or completion time are not accomplished	B.1 Evacuate cell contents	30 Minutes

SURVEILLANCE:

Frequency	Surveillance
Each cell treatment	SR 2.2.3.6.1 Verify and document the installation of an Infrared Analyzer prior to the initial charge of treatment gas

BASIS:

Failure to maintain an adequate amount of ClF_3 within the cell can lead to the formation of reaction products that will result in highly exothermic reactions upon the re-introduction of ClF_3/F_2. In addition, the Infrared Analyzer is used to detect the presence of hydrocarbon materials that could also react violently with ClF_3/F_2 under the right conditions. Replacing an inoperable analyzer can take up to three hours. For this reason sampling is initiated within thirty minutes and continued until an operable analyzer is hooked up and operating properly.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.7 Cell Inverse Recycle Treatment

APPLICABILITY: Cascade Operational Mode IV

LCO: Individual cells shall be isolated from each other when the cell inverse recycle treatment method is used.

SURVEILLANCE:

Frequency	Surveillance
Each cell inverse recycle treatment	SR 2.2.3.7.1 Verify and document that an inverse recycle treatment cell is not tied together with any other cell prior to the initial charge of treatment gas

BASIS:

Due to the inverse recycle treatment method there is no assurance that an adequate supply of ClF_3 would be present in the second cell tied to the parent cell. The lack of a sufficient amount of ClF_3 allows the formation of ClO_2 on the interior cell surfaces that upon contact with a new supply of ClF_3 will react violently and could cause a breach in the cell containment; thereby releasing toxic materials and spreading contamination.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.8 Seal Exhaust Station Enrichment

APPLICABILITY: Cascade Operational Mode II

LCO: U^{235} enrichment at the Seal Exhaust Station system shall not exceed:

ASSAY LIMITATIONS	
AREA I	3% U^{235}
AREA II	5% U^{235}
AREA III	10% U^{235}

ACTIONS:

Condition	Required Actions	Completion Time
A. Enrichment limitation is being exceeded	A.1 Locate source of higher enrichment material entering Seal Exhaust Station and isolate source from the station	8 Hours
B. Required action and completion time not met	B.1 Provide an alternate means of seal exhausting	2 Hours

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Shiftly	SR 2.2.3.8.1 Monitor the cascade assay gradient to verify that the LCO limitations have not been exceeded.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.8 Seal Exhaust Station Enrichment (continued)

BASIS:

To process UF_6 with an enrichment greater than the given limitations through the Seal Exhaust Station could result in a criticality involving the Alumina Traps. The Area III seal exhaust station has been analyzed to be safe at an enrichment of 15% U^{235}. For this event to occur numerous compressor seals are required to be leaking and the alumina traps must trap the minimum mass required at a particular assay for a criticality [SAR Section 5.2, Appendix A, section 1.3].

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.9 *Evacuation Booster Station (EBS) Enrichment*

APPLICABILITY: Cascade Operational Mode II

LCO: U^{235} enrichment within the Evacuation Booster Station shall not exceed:

ASSAY LIMITATIONS		
LOCATION	**Seal Exhaust Valved-In**	**Seal Exhaust Valved-Off**
X-330 EBS	**10% U^{235}**	**10% U^{235}**
X-333 EBS	**3.0% U^{235}**	**10% U^{235}**

ACTIONS:

Condition	Required Actions	Completion Time
A. X-330 enrichment limitation is being exceeded	A.1 Isolate the EBS from the higher enrichment source	1 Hour
B. X-333 enrichment limitation exceeded when seal exhaust is valved in	B.1 Valve off seal exhaust **AND**	Immediately
	B.2 Verify seal exhaust station inlet did not exceed the maximum assay	4 Hours
C. X-333 enrichment limitation exceeded when seal exhaust is valved off	C.1 Isolate the EBS from the higher enrichment source	1 Hour

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to startup	SR 2.2.3.9.1 Determine enrichment of material to be pumped based on cascade location or sampling to ensure LCO limit is not exceeded

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.9 Evacuation Booster Station (EBS) Enrichment (continued)

BASIS:

The X-330 EBS has been analyzed to be safe at an enrichment of 15% U^{235} when the seal exhaust is valved in. Both EBSs are safe up to an enrichment of 54% U^{235}, assuming the seal exhaust is valved off. Due to the possible interaction of the X-333 EBS via the seal exhaust, the enrichment is limited unless the seal exhaust is valved off, reference DM-620 [SAR Section 5.2, Appendix A, section 1.6].

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.10 Crane Movement of Cascade Equipment

APPLICABILITY: Cascade Operational Modes II & V

LCO: Area Control Room operator shall know time and travel path of cascade equipment moved overhead of cells.

ACTIONS:

Condition	Required Actions	Completion Time
A. Equipment being moved without prior notification of the ACR operator	A.1 Place equipment on the floor at the first closest location **AND**	Immediately
	A.2 Inform ACR operator of equipment movement time and travel path	Prior to resuming equipment movement

SURVEILLANCE REQUIREMENTS: None

BASIS:

In the event a piece of equipment is dropped on a cell/equipment operating above atmosphere the amount of UF_6 released could be reduced significantly by the prompt action to de-energize the motors which reduces the internal pressure of the cell/equipment to below atmosphere, thereby stopping the release of UF_6. An ACR operator that knows the travel path of the equipment could respond more quickly to the affected location upon receiving less than specific indications of a major problem [SAR Section 4.3.2.1.8].

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.11 Evacuation Booster Station Oxidant Limit

APPLICABILITY: Cascade Operational Mode II

LCO: EBS shall not pump material with a ClF_3 and/or F_2 concentration ≥ 8 mole%.

ACTIONS:

Condition	Required Actions	Completion Time
A. ClF_3/F_2 concentration exceeded	A.1 Close EBS suction valve and evacuate	30 Minutes

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to transfer of material containing ClF_3/F_2	SR 2.2.3.11.1 Review sample or infrared analyzer results of material to be pumped to ensure LCO is not exceeded

BASIS:

Failure to control the concentrations of CLF_3/F_2 within the EBS could result in highly reactive mixtures if there was a simultaneous coolant leak in the EBS cooler. The resultant mixture in the presence of an ignition source could over pressure the EBS and cause the spread of contamination.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.12 UF_6 Plugs

APPLICABILITY: Operational Modes: All

LCO: Direct heat sources shall not be applied to solid UF_6 plugs until line clarity in the system has been assured.

ACTIONS:

Condition	Required Actions	Completion Time
A. Direct heat source being applied to a solid UF_6 plug	A.1 Discontinue direct heat application to the UF_6 plug **AND**	Immediately
	A.2 Ensure line clarity	Prior to reapplying direct heat

BASIS:

The application of an external heat source directly to a UF_6 plug can liquify the UF_6 within the center of the plug and thereby cause sufficient hydraulic forces to rupture the pipe containing the plug. The primary concern over the direct application of heat (i.e., steam tracing, heat tape, etc.) to the plug versus indirect heating (i.e., heated housings) is due to the fact that the energy is added to the plug at such a high rate that it is not evenly distributed over the entire plug and therefore does not allow for the sublimation of the plug before a portion of it liquefies. The secondary concern is that even though the UF_6 plug stays as a solid it must have room to expand. The consequences of a release of UF_6 from this type of failure mechanism would be minimal due to the fact that the UF_6 plug would remain as a solid and therefore, the release rate would be slow as the UF_6 sublimes into the atmosphere.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.13 Cascade Pressure Limitation

APPLICABILITY: Cascade Operational Modes II and V

LCO: Cascade cell high side pressures shall be ≤ 25 psia for X-31 (except 31-1-odd) & X-33 size cells; and cascade cell high side pressures shall be ≤ 14.45 psia for 31-1-odd and for X-29 size cells.

ACTIONS:

Condition	Required Actions	Completion Time
A. Cascade cell pressure discovered > LCO value for specified cell size	A.1 Reduce cell pressure to ≤ the LCO value for the specified cell size	Immediately

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Daily	SR 2.2.3.13.1 Verify that each cell is operating at ≤ the LCO value for the specified cell size
Prior to cascade physical inventory	SR 2.2.3.13.2 Calibrate the cell datum when utilized in place of the unit datum
Annually	SR 2.2.3.13.3 Calibrate the unit datum

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.13 Cascade Pressure Limitation (continued)

BASIS:

The accident analysis provided in SAR Section 4.3.2 assumes that cascade high pressure accidents proceed to their conclusion which, in many cases, results in some form of breach in the cascade system. It is at this point that the consequences are evaluated and the identification of any mitigating actions takes place. The cascade was not designed to directly measure cell pressures in the ACR or to measure pressures that approach 40 psia. Motor load and other process indicators in the ACR alert the operator to significant cascade transients which require appropriate actions to be taken, including cell shutdown, to preclude cascade pressures from exceeding 40 psia which is the postulated rupture pressure of cascade piping. The monitoring of cell pressures from the local cell panels is sufficient to ensure that the steady state pressures do not exceed 25 psia. Due to the ability to perform a channel check across the 8 to 10 stage pressure indicating controllers (PICs) per cell and the fact that within an operating cell any stage high side pressure increase will quickly cascade through the cell (i.e., raise the other stage high side pressure), it is not necessary that all the PICs are functional to determine the cell pressure. The calibration of the unit and cell datums will ensure an adequate level of accuracy (cell averaging) and therefore the calibration of individual PICs is not necessary. As part of the cascade inventories there are several data comparisons made that provide the information needed to identify any out of tolerance PIC without doing a calibration. The cascade inventory data comparison includes analyzing stage compression ratios and the comparison of motor amperage versus stage high pressure against known process relationships.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.14 Compressor Motor Manual Trip System

APPLICABILITY: Cascade Operational Modes II and III

LCO: Compressor motor manual trip system for UF_6 stage motors shall be operable.

ACTIONS:

Conditions	Required Actions	Completion Time
A. DC voltage potential < 200 at cascade unit battery room/X-533 main DC bus **OR** No DC power at the cell breaker	A.1 Notify Cascade Control of potential need to utilize alternate means for cell shutdown **AND**	Immediately
	A.2 Restore DC voltage potential	48 Hours
B. Condition A.2 required actions and/or completion time not accomplished	B.1 Shutdown affected cascade compressors	8 Hours
C. X-533 Air Circuit Breaker air pressure ≤ 195 psig	C.1 Notify Cascade Control of potential need to utilize alternate means for cell shutdown **AND**	Immediately
	C.2 Restore air pressure to > 195 psig	48 Hours
D. Condition C.2 required actions and/or completion time not accomplished	D.1 Shutdown affected cascade compressors	8 Hours

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.14 Compressor Motor Manual Trip System (continued)

ACTIONS: (continued)

E.	Individual battery (connected cell)/ charger system conditions (other than voltage) found outside surveillance parameters	E.1 Restore individual battery parameters to within limits **AND** E.2 If battery charger is inoperable, verify applicable battery bank is operable TSR 1.6.2.2.d does not apply	90 Days 8 Hours
F.	PCF DC bus voltage potential is < 100 volts DC.	F.1 Verify that Condition A is not in effect. **AND** F.2 Verify that applicable ACR compressor motor stop button is operable. **AND** F.3 Restore PCF DC bus voltage potential ≥ 100 volts DC.	Immediately Immediately 7 Days
G.	ACR compressor motor stop button for "00" and "000" compressors inoperable (other than loss of battery voltage). **OR** ACR is evacuated.	G.1 Verify that the applicable PCF cell trip capability is operable. **AND** G.2 Restore ACR cell trip to operable status. TSR 1.6.2.2.d does not apply	Immediately 7 Days
H.	PCF compressor motor stop button for "00" and "000" compressors inoperable (other than loss of battery voltage).	H.1 Verify that the applicable ACR cell trip capability is operable **AND** H.2 Restore PCF cell trip to operable status. TSR 1.6.2.2.d does not apply	Immediately 7 Days

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.14 Compressor Motor Manual Trip System (continued)

ACTIONS: (continued)

I.	Both conditions G and H apply.	I.1	Notify Cascade Control of potential need to utilize alternate means for cell shutdown	Immediately
			AND	8 Hours
		I.2	Station an operator at an established alternate shutdown location with communications to the ACR or PCF.	
			OR	8 Hours
		I.3	Shutdown affected UF_6 compressor motor(s).	
J.	Required Action E.1, E.2, F.1, F.2, F.3, G.2, or H.2 not accomplished	J.1	Station an operator at an established alternate shutdown location with communications to the ACR or PCF.	8 Hours
			OR	
		J.2	Shutdown affected UF_6 compressor motor(s).	8 Hours

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Daily	SR 2.2.3.14.1 Verify cascade unit/X-533 main DC bus DC voltage $\geq$ 200
Daily	SR 2.2.3.14.2 Verify X-533 ACB bus air pressure > 195 psig
Prior to cell restart after a planned cell shutdown	SR 2.2.3.14.3 a) Perform a functional test: of the ACR and PCF cell motor stop buttons for the "00" and "000" cells; and of the ACR cell motor stop button for "0" cells; b) Monitor expected cell block valve closures and any other required recycle valve actuation.
Each planned cell shutdown	Note: Performance of this surveillance to demonstrate system operability is not required for any cell in operation until the next planned shutdown.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.14 Compressor Motor Manual Trip System (continued)

SURVEILLANCE REQUIREMENTS (continued)

Quarterly	SR 2.2.3.14.4 Inspect battery terminals and racks fro evidence of corrison and fro cell leakage of electrolyte.
Quarterly	SR 2.2.3.14.5 Check that the specfic gravity of the pilot cell is ≥ 1.180.
Daily	SR 2.2.3.14.6 Verify that the battery charger output is> 0 DC amps.
Quarterly	SR 2.2.3.14.7 Visually check the cell elctrolyte levels to verify that the level is above the low level indication line and no more than 0.25 inches above the high level indication line.
Annually	SR 2.2.3.14.8 Check that the specfic gravity of the cells is ≥ 1.180.
Daily	SR 2.2.3.14.9 Verify PCF DC bus voltage ≥100.
Daily	SR 2.2.3.14.10 Verify DC power is available at UF_6 compressor motor breakers.

BASIS:

The accident analysis discusses the fact that large UF_6 release scenarios from the cascade can be mitigated or terminated by stopping the cell motors which allow the cascade systems to go to subatmospheric pressure. If during a release situation, this rapid reduction in cell pressure causes an "underloading" in this part of the cascade. It is at this time coupled with the internal resistance of the cascade equipment (control valves, barrier, piping, etc.) that there will be inleakage in to the cascade which will mitigate the release until the necessary valve evolutions can take place to isolate the system from any additional supply of UF_6 and to prepare the system for compensatory actions and repair. The operator in response to process alarms and indications such as, two simultaneous smoke alarms in the same cell or a cell deblade will take action to shutdown the affected cell. In order to initiate a cell shutdown the DC control and trip power circuit must be functional. However, the failure of the local cell trip circuit to function on demand does not constitute a significant impact on any of the scenarios where cell shutdown is assumed to occur at sometime during the scenario. This is due to the numerous alternate and independent means available for disrupting cell power, i.e., breaker manual trip or X-300/switchyard de-energization of electrical feeders, buses, transformer bays, main switchyard lines.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.14 Compressor Motor Manual Trip System (continued)

The functional test of the ACR and PCF cell manual trip buttons for the "00" and "000" cells (SR 2.2.3.14.3.a) may be accomplished by (1) crediting a successful function of the ACR or PCF trip system at the time the cell was shutdown, and (2) testing the function of the trip button(s) not utilized during the planned cell shutdown. It is permissible to verify functionality via tripping the breaker on a deenergized bus, performing combinations of wiring and relay checks, and/or tripping the breaker from the "test" position. In determining the appropriate test method, credit may be taken for portions of the circuitry previously tested during or since the previous cell shutdown (e.g., the breaker mechanism does not necessarily need to be cycled twice to test both the ACR and PCF trip buttons). Functional testing the ACR trip button for the "0" cells to satisfy this surveillance requirement may be accomplished by crediting a successful function of the ACR trip at the time the cell was shutdown. Other available shutdown locations, such as the Local Control Center (LCC) or the switchyard are considered alternate shutdown locations. Because of the number of available trip locations, these alternate locations are not required to be tested periodically. Note that a planned cell shutdown is defined as the process of manually deenergizing the process motors in accordance with approved procedures when the cell trip is not required to mitigate a transient condition.

Cell tripping is classified as a momentary load per IEEE Standard 485-1983, Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations, Section 4.2.3, and as such represents a small instantaneous ampere-hour load on the total battery banks. The additional battery surveillances provide additional assurances that the battery system will be able to deliver the power necessary to trip the cell breakers as long as the system voltage is maintained above 200 volts. Any failure of the cell trip action to stop the compressor motor(s) should be investigated. The 200 VDC and the 195 psig air pressure values have been long standing action points for establishing operability of these systems. For example, the 200 VDC value has been in the Operational Safety Requirements document since 1985 and the 195 psig air pressure value is also the interlock set point in the X-533 switchyard for the prevention of the initial energization of the air circuit breakers when the system air pressure is below 195 psig. The use of available vendor information coupled with engineering evaluations provided the basis for the determination that the systems in question would perform at > than these specified parameters. [SAR Sections 3.8.3.1, 3.8.3.2, 4.3.2.1.1, 4.3.2.1.2, 4.3.2.1.3, 4.3.2.1.5, 4.3.2.1.7, and 4.3.2.1.8].

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.15 Moderation Control

Applicability: Cascade Operational Modes I, II, III, IV, V, VI

LCO: Moderation Control shall be maintained when the UO_2F_2 mass is > safe mass.

ACTIONS: Note: TSR 1.6.2.2(d) does not apply

Condition	Required Actions	Completion Time
A. UO_2F_2 deposit > safe mass in a fluorinating (including chemical treatment) environment.	A.1 Continue to maintain a fluorinating environment for the deposit **AND** A.2 Initiate actions to determine the cause of deposit and its significance. **AND** A.3 Establish and document a plan of action **AND** A.4 Initiate SR 2.2.3.15.3	Immediately Immediately 30 Days 90 Days
B. UO_2F_2 deposit > safe mass with the deposit not in a fluorinating environment.	B.1.1 Establish a dry cover gas blanket at ≥ 14 psia except when performing maintenance or operational activities associated with remediation of the deposit, equipment removal or leak repair. **AND** B.1.2 Initiate SR 2.2.3.15.2 **AND** B.2 Remove equipment containing the UO_2F_2 deposit from the cascade **OR** Note: Upon completion of B.3, Condition A is re-entered. B.3 Initiate re-fluorinating activities	Within 72 Hours after entering Mode VI 12 Hours 180 days Within 72 hours of removal of dry cover gas blanket

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.15 Moderation Control (continued)

Condition	Required Actions	Completion Time
C. Installed equipment containing known or previously unknown deposit of UO_2F_2 deposit > safe mass opened to atmosphere.	C.1 Apply TSR 2.2.3.16 as appropriate to equipment removed AND C.2 A person shall be stationed to valve off local sprinkler system, if inadvertently actuated, anytime the system opening(s) remain uncovered. AND A fire watch, equipped with portable CO_2 and/or dry chemical fire suppression equipment, shall be established during cutting/welding AND Cover opening(s) with prestaged waterproof covers, if conditions develop where a moderating material can begin to enter opened equipment. AND C.3 Cover opening(s) that expose UO_2F_2 deposit to atmosphere when maintenance evolutions are <u>not</u> impacting equipment. AND C.4 Maintain dry cover gas blanket ≥ 14 psia when cascade system maintenance evolutions are <u>not</u> impacting equipment. AND Note: Upon completion of C.5, Condition B is re-entered. C.5 Maintain dry cover gas blanket ≥14 psia following completion of cascade system maintenance on affected equipment and UO_2F_2 deposit is not in a fluorinating environment.	Immediately Immediately Immediately after determining acceptable UF_6/HF conditions Within 72 hours after completing REQUIRED ACTION C.3 Within 72 hours after completing system maintenance
D. UO_2F_2 deposit > safe mass, not in a fluorinating environment and coolant system pressure ≤ RCW condenser pressure.	D.1.1 Increase coolant system pressure to > RCW condenser pressure. AND D.1.2 Initiate SR 2.2.3.15.1 OR	4 Hours 12 Hours
	D.2 Drain RCW from coolant condenser	20 Hours
E. UO_2F_2 deposit > safe mass with the deposit not in a fluorinating environment and required dry cover gas blanket < 14 psia.	E.1 Re-establish a dry cover gas blanket ≥ 14 psia.	12 Hours

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.15 Moderation Control (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each shift when not in a fluorinating environment, deposit > safe mass and RCW not drained	SR 2.2.3.15.1 Verify coolant system pressure > RCW condenser pressure.
Each shift when dry cover gas blanket is required by Condition B or C	SR 2.2.3.15.2 Monitor the system pressure and adjust pressure to ≥ 14 psia.
Quarterly when in Condition A	SR 2.2.3.15.3 Monitor size of the deposit.
Quarterly	SR 2.2.3.15.4 Perform routine qualitative radiation surveys of bypass housings to check for deposits and initiate "NDA" quantitative measurements based on "radiation reading trending".

BASIS:

As used in this TSR, the term "safe mass" is defined as being 43.5% of the minimum fissionable mass for system conditions (enrichment, geometry, H/U, reflection, etc.). Cascade deposits of UO_2F_2 (and deposits of other compounds resulting from wet air inleakage) and freeze-out of UF_6 are an expected result of normal operation. It is considered non-credible for a dry criticality to occur in the Cascade. Therefore, for a freeze-out condition, criticality would not result and the UF_6 freeze-out may be remediated at the discretion of the operating organization. Any deposit that has a uranium mass less than the "always" safe mass (i.e., optimally moderated material) may be remediated at the discretion of the operating organization. In regards to those situations in which a loss of moderation control could result in criticality, it has been determined that NCSA specified controls provide double contingency against the inleakage of liquid water into the cascade. Based on additional technical evaluations it is not possible to hydrate a deposit of uranyl fluoride above a H/U ratio of 4 by exposure to ambient air within the process buildings. Therefore, there is no potential for criticality when a cascade deposit is less than the safe mass at a H/U ratio of 4 due to exposure to atmospheric water vapor in the ambient process building air.

The amount of water required for a criticality reaction varies with the enrichment and the mass. However, at any given enrichment, there is a minimum amount of water that is required for a criticality to occur. As the H/U ratio changes from this optimum level, the amount of water required overall increases. For enrichments between 3% and 7% ^{235}U the minimum amount of water occurs at an H/X ratio of about 200. The optimum H/U ratio is always greater than an H/U of 4. The TSR control time limits are established for a deposit in a buffered condition. The TSR time limits are based on the following assumptions: (1) that the equipment breathes with changes in atmospheric pressure, (2) that any atmospheric moisture entering the system remains in the system, (3) that an H/U of 4 is the maximum that can be achieved, and (4) that a minimum critical mass at an H/U of 4 is present. If the mass of the uranium deposit is greater than the minimum critical mass at an H/U of 4, it will always require more water to achieve criticality than would be required for the minimum critical mass at an H/U of 4. Therefore, the time required to reach the H/U ratio for a criticality to be possible would be greater than the time limit specified in the TSR. The only situation where the TSR controls would be in question would be for a deposit above a minimum critical mass at an H/U of 4 that had been exposed to wet air for an unknown period of time. In this event, sampling of the gas inside the equipment for moisture content and/or sampling of the deposit to determine the H/U ratio would potentially be required to establish a baseline. The deposit significance determination would provide the analysis of the adequacy of the TSR controls.

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.15 Moderation Control (continued)

UF_6, F_2, and ClF_3 react with available water more readily than UO_2F_2 absorbs water. For instance, water entering onstream cascade equipment will preferentially react with UF_6 to form more UO_2F_2 rather than react with UO_2F_2 to form hydrates (moderated forms) of UO_2F_2. HF gas formed as a byproduct of the water-UF reaction cannot liquefy to moderate a deposit at the pressures encountered in the cascade. A UO_2F_2 deposit cannot become moderated if it is being continuously fluorinated and moderation is not a concern until the equipment is taken off-stream and evacuated of UF_6. Continued fluorination of the deposit provides nuclear criticality safety by preventing moderation of the deposit.

Chemical treatment processes which involve the addition of ClF_3 and/or F_2 (i.e. fluorinating agents) provide the same level of moderation control as when the deposit is exposed to UF_6. Fluorinating gas treatments have been used as a means of drying out equipment after exposure to atmospheric air and for removing/reducing uranium deposits since the enrichment plants were placed into service. It has been demonstrated that these fluorinating agents will react vigorously and preferentially with any available moisture. The presence of excess fluorinating agents will not only prevent further hydration of a deposit but will over time effectively remove any free moisture and dehydrate the exposed deposit to an H/U ratio as low as when the deposit was exposed to the UF_6 process. In addition, use of fluorinating agents will convert UO_2F_2 deposits to UF_6, thereby reducing the deposit mass. Repeated use of the fluorinating agents (i.e., chemical treatment) will proceed to reduce/eliminate the deposit which is the safest condition. Therefore, a deposit that has been hydrated to some extent due to "breathing" or during the times necessary to expose the deposit to atmosphere when maintenance functions are performed can be dehydrated by the presence of a fluorinating agent. The sustained liberation of UF_6 from the deposit during a chemical treatment is the proven indicator that the deposit has been dehydrated. Once a deposit has been dehydrated, re-entry into Condition B establishes a new initiating time for required actions. After having been exposed to a fluorinating environment in which there has been the sustained liberation of UF_6, the re-entry to the buffered condition for one year will not decrease the assumed safety margin for this condition. Chemical treatment activities as discussed in this LCO may include preparation activities such as evacuation, leakrate, seal checks and cell startup.

UO_2F_2 deposits in onstream operating equipment are not a nuclear criticality safety concern due to continuous fluorination of the deposit. Over time, sustained or large wet air inleakage in operating equipment (active process area) will readily announce itself in the form of changing motor loads, compressor surging, line recorder readings, stage control valve positions, A-suction pressures, etc. Additionally, deposit formation in operating equipment will be dispersed by the gas flow. This dispersion of UO_2F_2 can occur on the inside of process piping, across barrier tubing, on cooler fins and inside compressors on the rotor and stator. Due to this dispersion, the formation of deposits in unsafe geometries in active process areas where there is UF_6 gas flow is not likely, given the above indicators. However, the above mentioned indicators and continuous gas flow are not always available for wet air inleakage in bypass/auxiliary piping, expansion joints and valves (inactive process areas). Operational experience indicates that quarterly surveillances by NDA methods for UO_2F_2 deposits in inactive process area is appropriate for early detection and prudent remediation of the deposit. Follow up surveys are conducted to assure that the deposit does not become sufficiently large to become an operational problem or a cascade structural concern.

Upon discovery of a deposit exceeding the safe mass of uranium, the significance of the deposit is determined. The significance determination includes an assessment of the following criteria. If the mass and enrichment of the deposit, including uncertainty, is less than a minimum critical mass at an H/U of 4, the following items may have limited significance. Also, the determination of a deposit configuration and/or distribution may render further evaluation unnecessary.

a. mass and enrichment of the deposit;
b. formation mechanism and assessment of likely chemical composition of deposit;
c. distribution/configuration of the deposit relative to geometry or interaction parameters;
d. presence of a fluorinating environment during deposit formation;

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.15 Moderation Control (continued)

e. if fluorinating environment not always present, determine presence of dry gas buffer;
f. estimate length of time exposure to atmospheric moisture may have occurred;
g. evaluate mass of U at enrichment versus minimum critical mass at H/U of 4;
h. if mass of U is greater than a minimum critical mass at H/U of 4, calculate amount of water/time required to reach the H/U ratio where deposit mass equals minimum critical mass and compare to TSR controls.

Routine NDA surveillance methods are of limited value (e.g., with respect to quantification of deposit size) for active process areas which include compressors, converters, process gas coolers and freezer/sublimers. However, sustained or large wet air inleakage in active process areas will readily announce itself which will prompt corrective actions by operating personnel. Also, the formation of UO_2F_2 deposits in unsafe geometries in active process areas is not likely given the above corrective actions. The limited ability to hydrate a deposit in-place process equipment assures that these deposits will remain critically safe after shutdown. Thus the primary concern for the formation of UO_2F_2 deposits in unsafe geometries in operating equipment is if this equipment trips or is shutdown while containing UF_6 and massive wet air inleakage occurs. In this event, the wet air inleakage will be obvious from the equipment leak rate which will prompt corrective actions to limit the size of the deposit.

For shutdown equipment, moderation control can be provided by a fluorinating environment or by a dry gas (plant air or nitrogen) blanket over the deposit even if significant wet air inleakage has occurred. Once a system has been isolated from the cascade and filled to ≥ 14 psia with dry gas blanket, normal atmosphere pressure fluctuations may cause minor in and out flow through any existing system leaks. Analyses have demonstrated that this "breathing" of the cell or even the exposure to atmospheric air (diffusion) when the system is opened to allow for necessary maintenance will not significantly affect deposit moderation. Even for periods much longer than the one year limitation, moderation above an H/U ratio of 4 would not be expected. The daily surveillance demonstrates that the gas blanket is maintained as assumed in the analyses. The LCO requirements of this TSR assure nuclear criticality safety for equipment with UO_2F_2 deposits greater than a safe mass.

Maintenance evolutions or cascade system maintenance terminology, used in the Required Action statements, include other related tasks such as decontamination and sampling. Condition C is considered to be met when the UF_6 primary system is first breached. During the time frame it takes to cover the cell opening(s) created by equipment removal which would expose a greater than safe mass deposit to the atmosphere or while maintenance is being performed on the same opening(s), actions are taken to further reduce the probability of a criticality. These actions involve covering of equipment openings as soon as possible, stationing a person to valve off sprinkler water in case of an inadvertent actuation, establishing a fire watch and having waterproof covers available that can be quickly placed over the opening(s) should the sprinklers actuate under a real fire situation. The fire watch provides the capability for potentially mitigating a fire, utilizing CO_2 and/or dry chemical type of extinguishing agents, while in its early stages of development, thereby preventing any sprinkler actuation. If the normal equipment vertical opening orientation is assumed to exist, verses the SAR accident analysis assumed horizontal opening orientation, it would require a significantly long period of time to accumulate the necessary water mass to cause a criticality. The stated actions will preclude sufficient water from entering the equipment to moderate the deposit to a critical state. Also the potential for moderation from RCW system water is controlled by NCSA requirements and demonstrated to meet the double contingency principle. [SAR Section 5.2, Appendix A, sections 1.1 and 1.2]

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.16 Removed Equipment With Deposits

APPLICABILITY: Cascade Operational Mode VI, equipment removed from the Cascade with UO_2F_2 mass > safe mass

LCO: Equipment removed from the Cascade shall be handled as follows:

1. Equipment that has contained UF_6 and could contain > a safe mass of UO_2F_2 shall be surveyed prior to and after removal to determine PEH (Planned Expedious Handling) or UH (Uncomplicated Handling) classification.

2. Equipment classified as PEH shall have openings to atmosphere covered or closed.

3. Equipment classified as PEH shall be decontaminated to ≤ safe mass within 72 hours of removal and post PEH classification.

ACTIONS:

Conditions	Required Actions	Completion Time
A. Applicable equipment removed prior to classification survey	A.1 Declare the equipment PEH **AND**	Immediately
	A.2 Perform "NDA" survey	Prior to declassifying to UH
B. PEH equipment openings not covered or closed	B.1 Cover or close openings **AND**	Immediately after determination of acceptable UF_6/HF conditions
	B.2 A person shall be stationed to valve off local sprinkler system, if inadvertently actuated, during the time equipment opening(s) remain open or uncovered. **AND** Cover openings with prestaged waterproof covers, if conditions develop where a moderating material can begin to enter opened equipment	Immediately
C. PEH equipment not decontaminated to ≤ safe mass within 72 hours	C.1 Ensure equipment openings remain covered or closed **AND**	Immediately
	C.2 Reinitiate a dry air or nitrogen atmosphere	Immediately

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.16 Removed Equipment With Deposits (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Daily	SR 2.2.3.16.1 Inspect equipment for closed or covered openings
Prior to equipment exiting building	SR 2.2.3.16.2 Inspect equipment for closed or covered openings

BASIS:

For a criticality to occur in a piece of equipment with a uranium deposit that has been removed from the cascade would require that the deposit be moderated. Cascade deposits in operating equipment regardless of their size, at the enrichment level of ≤ 7% will remain safe as long as the deposit is unmoderated. For unmoderated deposits (H/U=0) > 7% assay but ≤ 20% assay the mass required for a criticality would exceed the amount of UF_6 available in the cascade at this enrichment range. As used in this TSR the term "safe mass" is defined as being 43.5% of the minimum fissionable mass for the assay of concern in a fully moderated and fully reflected system whether these specific conditions actually exist or not. In addition, determining the mass of any uranium deposit in the equipment allows segregation and controlled handling of equipment containing amounts of U^{235} that require additional controls to prevent the formation of an unsafe mass/geometry. It is not likely based on the chemistry of UO_2F_2 deposits for this potential mass to be moderated by diffusion of ambient air to greater than a H/U ratio of 4. The loss of moderation control as described in the SAR requires that the equipment be dropped such that an opening is tilted upwards to receive fire water (i.e. water in liquid state) and that a fire must occur simultaneously in order to actuate the sprinkler system (i.e. probability of a false actuation is 1x 10^{-6} per year, Factory Mutual) and this accident scenario meets Double Contingency. The actions that shall occur to further reduce the probability of a criticality, involve the covering of the equipment openings as soon as possible and during the time frame it takes to get covers in place, stationing a person to valve off sprinkler water in case of an inadvertent actuation and having waterproof covers available that can be quickly placed over the opening(s) should the sprinklers actuate under a real fire situation. If the normal equipment vertical opening orientation is assumed to exist, verses the SAR accident analysis assumed horizontal opening orientation, it would require a significantly long period of time to accumulate the necessary water mass to cause a criticality. Typically, the time to cover a removed piece of equipment is determined by the time necessary to lift it from the cell and the time to allow for flange cooling. However, this time frame can be extended due to UF_6/HF out gassing which is an immediate hazard to local personnel. In either case these actions will preclude sufficient water from entering the equipment to moderate the deposit to a critical state. [SAR Section 5.2, Appendix A, section 1.11].

SECTION 2.2 SPECIFIC TSRs FOR X-330 NAD X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.17 Motor Load Indicators

APPLICABILITY: Modes II and III when "00" or "000" UF_6 stage compressors motors are operating

LCO: Cascade UF_6 stage compressor motor load indicators for "00" and "000" compressor motors shall be operable.

ACTIONS:

Conditions	Required Actions	Completion Time
A. ACR stage compressor motor load indicator inoperable.	A.1 Verify that the stage compressor motor load indicators for the adjacent stages are operable. Note: If more than one ACR indicator is inoperable, perform this action for each inoperable indicator. TSR 1.6.2.2.d does not apply	4 Hours
B. ACR stage compressor motor load indicators inoperable for ≥ 2 adjacent stage motors. **OR** An ACR is evacuated.	B.1 Verify that the applicable cell compressor motor load indicator in the PCF is operable by performing a Channel Check. **AND** B.2 Restore at least one of the adjacent ACR stage compressor motor load indicators to operable status.	4 Hours 7 Days
C. PCF cell compressor motor load indicator inoperable.	C.1 Verify that the applicable ACR stage compressor motor load indicator(s) are operable. **OR** C.2 Verify that Required Action A.1 is complete. TSR 1.6.2.2.d does not apply.	4 Hours 4 Hours

SECTION 2.2 SPECIFIC TSRs FOR X-330 NAD X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.17 Motor Load Indicators (continued)

ACTIONS: (continued)

Conditions	Required Actions	Completion Time
D. Required Action B.1 or B.2 or C.1 and C.2 not accomplished	D.1 Station an operator at the local cell panel to monitor cell parameters with communications to the ACR or PCF. **OR** D.2 Shutdown affected UF_6 compressor motor(s)	8 Hours 8 Hours

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Following compressor motor start	SR 2.2.3.17.1 Perform a Channel Check of the ACR stage compressor motor load indicators.

BASIS:

The motor load indicators provide an indication of various types of failures of the compressor(s). Using ammeter indications in the CAR for the individual compressor motors, operators can quickly identify various abnormalities caused by malfunctions of the process equipment. Operator training is relied upon to distinguish between load changes associated with normal fluctuations, such as cascade power increases, and equipment malfunctions. Compressor load changes can be caused by such events as compressor failures, inadvertent closures of B-stream block valves or stage control valves, or failures of primary system pressure boundary that cause inleakage or a release of UF_6 . Compressor surging will produce large swings in the loads. If an ammeter should malfunction, the load changes can be seen on the ammeters for the compressor motors in stages that are adjacent to the stage that is experiencing the compressor malfunction. Motor indicators in the ACRs are used to detect large load changes for cell compressor motors in the enrichment cascade. Load indications in the PCF are used to detect large load changes for cell compressor motors (i.e., PCF indicator provides total load for all of the stages in a particular cell). These PCF indicators are not required to satisfy the LCO unless the ACR indicator is inoperable. In the event of evacuation of an ACR, the ammeter indications in the PCF can be used to monitor for large load changes that could be representative of a pressure increase.

SECTION 2.2 SPECIFIC TSRs FOR X-330 NAD X-333 FACILITIES

2.2.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.2.3.17 Motor Load Indicators (continued)

BASIS (continued):

Although the monitors in the PCF are less sensitive than those in the ACR, they are able to indicate the significant compressor load changes. This indication of an event and mitigative action by the operator (1) controls the primary system pressure and temperature increases to minimize the potential for primary system integrity failures and (2) reduces the primary system pressure to minimize UF_6 releases for onsite personnel. This system is not essential for off-site public protection. The Surveillance Requirement is provided to ensure that, after motor start, the ammeter provide qualitative (or relative) indication of motor load. It is appropriate to perform this surveillance after sufficient UF_6 is introduced into the cell so that a nominal reading on the ammeter can be obtained. [SAR Sections 3.8.3.6, 4.3.2.1.1, 4.3.2.1.2, 4.3.2.1.3, and 4.3.2.1.5]

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.4 GENERAL DESIGN FEATURES

2.2.4.1 Seal Exhaust Pump Overflows

DF: Seal exhaust pumps shall contain an overflow that limits the oil inventory in the pump.

SURVEILLANCE:

Frequency	Surveillance
Prior to pump startup	SR 2.2.4.1.1 Verify that the oil overflow is in place and that the effluent valve if present is open

BASIS:

The seal exhaust pump cavities are of an unfavorable geometry in the presence of an oil moderator. The pump overflow lines ensure that the oil volume does not exceed the safe quantity when mixed with uranium of a limited enrichment that is documented in Nuclear Criticality Safety Evaluation and Approvals [SAR Section 5.2, Appendix A, section 1.3].

SECTION 2.2 SPECIFIC TSRs FOR X-330 AND X-333 FACILITIES

2.2.4 GENERAL DESIGN FEATURES

2.2.4.2 Process Building Cranes

DF: The process building cranes in X-330 and X-333 that are used to move heavy equipment above/around the UF_6 primary system, that is intended to be operated above atmospheric pressure, are designed and shall be maintained not to fail in a manner to cause primary system integrity failure.

SURVEILLANCE:

Frequency	Surveillance
Prior to first time use during shift	SR 2.2.4.2.1 Perform operator functional crane inspection of hoist, trolley, bridge, and upper limit switch.
Biennially	SR 2.2.4.2.2 Verify crane hoist does not allow load to move (except for compensatory movements) upon operator release of the controls while at a minimum of 100% of rated capacity.

BASIS:

The process building cranes on the cell floor consist of the overhead bridge cranes and associated equipment in the enrichment facilities and the withdrawal facilities. The process building cranes shall not fail in a manner to cause primary system integrity failure during: (1) normal operations: (2) natural phenomena events with the crane parked in the parked position; and (3) an evacuation event due to a release of crane controls. These safety functions are passive in nature (i.e., no action components are required of the system). The movement of a heavy load with a crane is infrequent. Thus, the movement of a heavy load with a crane concurrent with a natural phenomena event is not considered a credible event. The assurance of crane operability is provided by the surveillance requirements. In addition to the surveillance requirements specified above, cranes handling heavy equipment as described in this DF are inspected and tested in accordance with sections of applicable industry standards as described in the SAR Chapter 1, Appendix A. Compensatory movements are small additional movements due to momentum after the crane drive mechanism stops and brakes are applied. These compensatory movements have no safety significance. [SAR Sections 3.8.9.2, 4.3.2.1.5, and 4.3.2.1.8].

SECTION 2.3 SPECIFIC TSRs

FOR

X-333 FREEZER SUBLIMERS

SECTION 2.3 SPECIFIC TSRs FOR X-333 FREEZER SUBLIMERS

2.3.1 FREEZER SUBLIMER OPERATIONAL MODES

I	**Freeze**	Solidification of UF_6 from the Cascade "B" stream on the F/S vessel finned tubes by cold liquid coolant flowing through inside of the F/S vessel tubes.
II	**Sublime**	Removal of solid UF_6 from the F/S vessel tubes by flowing heated coolant through the inside of the F/S vessel tubes. The UF_6 converts directly from a solid to a gas and is returned to the Cascade "A" stream.
III	**Cold Standby**	UF_6 is maintained as a solid in the F/S vessel by recirculating cold coolant through the F/S tubes while the F/S process lines are isolated from the Cascade.
IV	**Hot Standby**	UF_6 is maintained in an equilibrium state as the coolant and UF_6 temperatures equalize. The F/S process lines are isolated from the Cascade and there is no flow of coolant through the F/S vessel.
V	**Shutdown**	F/S UF_6 process lines are isolated from the Cascade, the F/S is in Mode IV and the unit has been tagged out of service. In the case where the containment of the F/S unit is to be breached the F/S vessel would be emptied of UF_6 inventory.

SECTION 2.3 SPECIFIC TSRs FOR X-333 FREEZER SUBLIMERS

2.3.2 SAFETY LIMITS

APPLICABILITY: All F/S Operational Modes

2.3.2.1 SL: Shall not exceed 11,900 pounds of UF_6 in F/S vessel.

BASIS:

The original design of the Freezer/Sublimer system considered the potential for UF_6 bridging between fins or adjoining coolant tubes that could cause mechanical stress rupture of the coolant tubes inside the F/S vessel when heated. The release of the coolant to the interior of the F/S could result in over-pressuring an expansion joint in the piping to the Cascade and a subsequent crack would release the mixture of coolant and UF_6. A safety limit of 11,900 lbs. UF_6 was established in the original design for the amount of UF_6 at which the onset of bridging could occur [SAR Section 3.8.3.5].

SECTION 2.3 SPECIFIC TSRs FOR X-333 FREEZER SUBLIMERS

2.3.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.3.3.1 Freezer/Sublimer UF_6 High-High Weight Trip System

APPLICABILITY: F/S Operational Mode I, III

LCS: ≤ 9,000 pounds of UF_6 in F/S vessel

LCO: A. Both channels of the High-High Weight Trip system shall be operable.

B. Weight of coolant in F/S vessel shall be ≥ 1800 pounds or ≥ 96 inches.

ACTIONS:

Condition	Required Actions	Completion Time
A. One weight channel inoperable	A.1 Restore operability and current freeze cycle with subsequent cold standby maybe completed	Prior to re-entry into Mode I
B. Both weight channels inoperable	B.1 Exit Mode I or III	Immediately
C. < 96 inches of coolant in F/S vessel or <1800 pounds	C.1 Add coolant to vessel **OR** exit Mode I or III	1 Hour

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.3.3.1.1 Perform channel functional test to verify isolation of the F/S when the set point is exceeded Note: Allowable test tolerance to cover instrument drift and uncertainties during normal operation = + 456 total lbs.
Semiannually	SR 2.3.3.1.2 Calibrate the F/S High High Weight system set point at ≤ 9000 pounds UF_6 Note: Allowable test tolerance to cover instrument drift and uncertainties during normal operation = + 456 total lbs.
Prior to Mode I	SR 2.3.3.1.3 Ensure coolant level is ≥ 96 inches

SECTION 2.3 SPECIFIC TSRs FOR X-333 FREEZER SUBLIMERS

2.3.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.3.3.1 Freezer/Sublimer UF_6 High-High Weight Trip System (continued)

BASIS:

The UF_6 High-High Weight Trip System prevents the rupture of the F/S vessel due to excess UF_6. The vessel weight is monitored by two independent measuring systems and is activated by weight trip switches. The F/S weighing system measures the combined weight of the UF_6 and R-114 in the vessel. The amount of R-114 in the system is maintained at 2,000 lbs. $\pm$ 200 lbs. The trip occurs when the UF_6 weight in the F/S vessel reaches 9,000 lbs. In this case, the F/S vessel is not fully isolated, but is placed in the sublime mode trip configuration for the system, with the weight control valve (FV3600) and FV3602 open to the cascade "A" stream, thus reducing the UF_6 inventory in the F/S vessel. After the inventory is reduced, the F/S is placed in the Hot Standby Mode.

The original design of the Freezer/Sublimer system considered the potential for UF_6 bridging between fins or adjoining coolant tubes that could cause mechanical stress rupture when heated. Applying heat to an overfilled vessel could result in a rupture in the form of a crack and subsequent UF_6 release. The Limiting Control Setting (LCS) is set at 9,000 lbs. of UF_6 which with a potential weighing system tolerance of an additional 200 lbs. of UF_6 provides an adequate safety margin of 2,700 lbs. of UF_6 to prevent vessel damage due to tube bridging. The set point value corresponds to the trip point established under DOE 5481.1B in 1985 and provide a test tolerance to comply with the definition of "Allowable Value" in ANSI/ISA-S67.04-1988 [SAR Section 3.8.3.5].

SECTION 2.3 SPECIFIC TSRs FOR X-333 FREEZER SUBLIMERS

2.3.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.3.3.2 Assay Limitations

APPLICABILITY: F/S Operational Modes I, II, III, IV, V

LCO: No F/S unit shall freeze out or contain UF_6 of an enrichment greater than 3.0% U^{235}.

ACTIONS:

Condition	Required Actions	Completion Time
A. Freezing out UF_6 of enrichment > 3.0% U^{235}	A.1 Place F/S in Mode IV	Immediately

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to Mode I	SR 2.3.3.2.1 Determine enrichment of material to be frozen out is $\leq$3.0% U^{235}.

BASIS:

"ORNL/CSD/TM-288 (Calculational Criticality Analyses of 10- and 20-MW UF_6 Freezer/Sublimer Vessels, W. C. Jordan of ORNL Computing and Telecommunications Division, February 1993) document states that if the F/S vessel is filled with solid UF_6 at an H/U of 0.33 and the R-114 tubes are filled with water, the F/S system will be subcritical when the UF_6 is at an enrichment of 3.0% U^{235} or less [SAR Section 5.2, Appendix A, section 1.2].

SECTION 2.3 SPECIFIC TSRs FOR X-333 FREEZER SUBLIMERS

2.3.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.3.3.3 Freezer/Sublimer Venting

APPLICABILITY: F/S Operational Modes I, II, III, IV

LCO: F/S vent block valve shall be sealed open

ACTIONS:

Condition	Required Actions	Completion Time
A. Units 2,3,5,7 AFS(unit)C(cell) V1 valve closed and/or seal broken	A.1 Open or verify valve open **AND**	Immediately
	A.2 Seal valve open	8 Hours
B. Units 4 and 6 AFS(unit)C(cell)V1 and AFS(unit)C6V2 valve closed and/or seal broken	B.1 Open or verify open one of the vent valves **AND**	Immediately
	B.2 Seal valve open	8 Hours

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to entering Modes I,II,III,IV from Mode V	SR 2.3.3.3.1 Verify that the vent valve is sealed open

BASIS:

Provide a relief path for any F/S system high pressure to the cascade in order to not over pressure the vessel. The source of high pressure would be from a ruptured coolant tube(s) [SAR Section 3.8.3.4].

2.3.4 GENERAL DESIGN FEATURES

NONE

SECTION 2.4 SPECIFIC TSRs

FOR

X-330 AND X-333 COLD RECOVERY

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.1 COLD RECOVERY OPERATIONAL MODES:

I	**Preparation**	Sampling of UF_6 and low molecular weight gases stored in surge drum banks prior to processing.
II	**Freeze**	Separation of UF_6 from other gases in cold traps by solidifying the UF_6 at extreme low temperatures, refrigerant flow, inlet valve open, vent valve open.
III	**Flash**	Vaporization of solid UF_6 from cold traps to holding drums, refrigerant flow off, heaters energized, inlet valve closed, vent valve closed, holding drum inlet valve open.
IV	**Refeed**	Returning UF_6 from holding drums to the cascade at the appropriate matching enrichment location.
V	**Vent**	Removal of low molecular weight gases through chemical traps to atmosphere without prior cold trapping.
VI	**Standby**	The cold trap is operational, no process gases flowing through trap, inlet valve closed.
VII	**Shutdown**	The cold trap and/or its auxiliary components are not operational; no gas flow, heaters de-energized, refrigeration maybe shutdown.

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.2 SAFETY LIMITS

NONE

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCE

2.4.3.1 Criticality Accident (Radiation) Alarm System

LCO 2.4.3.1a: Criticality accident detection shall be operable.

APPLICABILITY: In areas, equipment, or processes which contain greater than 700 grams of ^{235}U at an enrichment ≥ 1.0 wt % ^{235}U.

ACTIONS:

Condition	Required Action	Completion Time
A. Areas, equipment, or processes not covered by criticality accident detection.	A.1 Implement the following for areas, equipment, or processes applicable to this LCO and that are not otherwise covered by criticality accident detection.	Immediately
	A.1.1 Discontinue cell maintenance activities that require breach of the containment boundary of cells containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND	
	A.1.2 Waste containing uranium enriched to ≥ 1 wt % ^{235}U shall not be handled. AND	
	A.1.3 NaF traps containing uranium enriched to ≥ 1 wt % ^{235}U shall not be handled. AND	
	A.1.4 Wet air pumps shall not be used for evacuation of cells containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND	
	A.1.5 Monitor temperature and pressure of surge drums containing UF_6 enriched to ≥ 1 wt % ^{235}U hourly to maintain inventory in gaseous state. AND	
	A.2.1 Evacuate the area not covered by detection capability. AND	Immediately
	A.2.2 Restrict access to area evacuated in A.2.1. AND	
	A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate.	Immediately
B. Areas, equipment, or processes not covered by criticality accident detection.	B.1.1 Restore criticality accident detection by installing portable CAAS unit providing required criticality accident detection and same alarms as fixed unit. OR	48 hours
	B.1.2 Restore criticality accident detection to operable status. TSR 1.6.2.2(d) is not applicable.	48 hours

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCE

2.4.3.1 Criticality Accident (Radiation) Alarm System (continued)

LCO 2.4.3.1b: Criticality accident alarm shall be operable (audible).

APPLICABILITY: In areas where the maximum foreseeable absorbed dose in free air exceeds 12 rad.

ACTIONS:

Condition	Required Action	Completion Time
A. Area does not have an audible criticality accident alarm.	A.1 Implement the following for areas, equipment, or processes where a criticality accident could result in a maximum foreseeable dose exceeding 12 rad in the area of inaudibility and LCO 2.4.3.1a applies. A.1.1 Discontinue cell maintenance activities that require breach of the containment boundary of cells containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND A.1.2 Waste containing uranium enriched to ≥ 1 wt % ^{235}U shall not be handled. AND A.1.3 NaF traps containing uranium enriched to ≥ 1 wt % ^{235}U shall not be handled. AND A.1.4 Wet air pumps shall not be used for evacuation of cells containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND A.1.5 Monitor temperature and pressure of surge drums containing UF_6 enriched to ≥ 1 wt % ^{235}U hourly to maintain inventory in gaseous state. AND A.2.1 Evacuate area of inaudibility. AND A.2.2 Restrict access to area evacuated in A.2.1. AND A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate, or a radio in constant communication with the Plant Control Facility.	Immediately Immediately Immediately
B. Area does not have an audible criticality accident alarm.	B.1.1 Restore criticality accident alarm to operable status. TSR 1.6.2.2(d) is not applicable.	48 hours

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCE

2.4.3.1 Criticality Accident (Radiation) Alarm System (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Semiannually	SR 2.4.3.1.1 Calibrate radiation clusters to a set point of 5 mRad/hr. in air.
	SR 2.4.3.1.2 Verify that the cluster nitrogen horn and X-300 alarm sounds when two out of three channels in a cluster are tripped.
Quarterly	SR 2.4.3.1.3 Verify nitrogen supply pressure is at least 900 psig for each CAAS horn.

BASIS:

Each cluster consists of three neutron-sensitive detection units. Clusters are designed and calibrated to detect and alarm on a minimum credible criticality accident of concern, defined as producing an integrated total dose of 20 Rads. in one minute at two meters from the reacting material. This system will provide an audible signal in the event of a criticality that will alert personnel to evacuate the immediate work areas. The minimum acceptable length of time for the CAAS horn to sound is 2 minutes. [SAR Sections 3.8.7.1 and 4.3.2.6].

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCE

2.4.3.2 Cold Trap Pressure Relief System

APPLICABILITY: Cold Recovery Operational Mode III

LCO:
A. The cold trap pressure relief system shall be operable.
B. Relief drum pressure shall be ≤ 0.3 psia.

ACTIONS:

Condition	Required Actions	Completion Time
A. Pressure relief control valve inoperable	A.1 De-energize cold trap heaters	Immediately
B. Rupture Disk inoperable or stamped burst pressure > 61.1 psig at 72 °F	B.1 De-energize cold trap heaters	Immediately
C. Block valves between cold trap inlet and relief drum closed and/or seal broken	C.1 Open or verify open block valve(s) **AND**	Immediately
	C.2 Seal valve open	8 Hours
D. Relief drum pressure > 0.3 psia	D.1 Evacuate relief drum to ≤ 0.3 psia	30 Minutes
E. Unable to evacuate relief drum or within required completion time	E.1 De-energize cold trap heaters	Immediately

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCE

2.4.3.2 Cold Trap Pressure Relief System (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Semiannually	SR 2.4.3.2.1 Calibrate the relief system instrumentation
Semiannually	SR 2.4.3.2.2 Verify the relief control valve will open between 30.0 & 30.6 psig **AND** will reclose ≥ 27.44 psig but less than the actual trip pressure
Prior to Mode III	SR 2.4.3.2.3 Verify flow path to relief drum is open, block valves sealed open **AND** relief drum pressure is ≤ 0.3 psia
Annually	SR 2.4.3.2.4 Calibrate the holding drum pressure alarm

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCE

2.4.3.2 Cold Trap Pressure Relief System (continued)

BASIS:

In order to prevent a cold trap rupture due to excessive internal trap pressure, a pressure relief valve set to open at approximately 30 psig and a rupture disk are installed. The rupture disk is to be nominally rated at ≤ 61.1 psig at a coincident temperature of 72 °F (equivalent to 54.4 psig at 190 °F) which is ≤ the cold trap MAWP and in accordance with the manufacturer's range as specified by Section VIII of the ASME Pressure Vessel Code. To ensure the design differential across the rupture disk is not exceeded, the relief drum pressure is evacuated to ≤ 0.3 psia prior to the cold trap flashing operation. Rupture of the cold trap could result in the release of UF_6 and other toxic gases such as ClF_3 [SAR Section 3.8.3.4].

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCE

2.4.3.3 Cold Recovery Enrichment

APPLICABILITY: Cold Recovery Operational Mode II

LCO: The U^{235} enrichment of a gas mixture to be cold trapped shall not exceed:

1. 5.0% in X-333 Cold Recovery
2. 10% in X-330 Cold Recovery

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to entering Mode II	SR 2.4.3.3.1 Verify by Cascade location of material source or sample result the U_{235} enrichment to be : ≤ 5.0% in X-333 **OR** ≤ 10.0% in X-330

BASIS:

The cold trapping gas mixtures of a U^{235} enrichment greater than the stated limitations under optimum reflection could result in a critical reaction within the Cold Recovery system [SAR Section 5.2, Appendix A, section 1.8]. The X-330 Cold Recovery operation has been analyzed to be safe at an enrichment of 27% U^{235}.

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCE

2.4.3.4 X-333 Wet Air Evacuation Enrichment

APPLICABILITY: Cold Recovery Operational Mode V

LCO: U^{235} enrichment of gas mixture to be vented through Wet Air Alumina traps shall not exceed 3.0%.

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to entering Mode V	SR 2.4.3.4.1 Verify U^{235} enrichment by sampling or source location

BASIS:

The venting of wet air mixtures of a U^{235} enrichment greater than the stated limitations under optimum reflection could result in a critical reaction within the X-333 Alumina traps. There is not a limiting enrichment for the X-330 wet air operation due to the use of 5 inch traps. Although there is a "T" section in the vent line that has a enrichment limitation of 27% U^{235} the plant limitation of 10% enrichment addresses this situation [SAR Section 5.2, Appendix A, section 1.3].

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCE

2.4.3.5 Reaction Products

APPLICABILITY: Cold Recovery Operational Mode II

LCO: The cold trapping of gas mixtures containing reaction products and/or ClF_3 shall meet the following requirements:

1. Mixtures containing Freon and ClF_3 shall not be cold trapped unless the Freon concentration is ≤ 16.9 mole%.

2. Mixtures shall contain quantities of ClF_3/F_2 not less than 0.14 mole% or not more than 5.25 mole% ClF_3.

3. Cold trap inlet pressure shall not exceed 3.3 psia.

4. Cold trap upper shell temperature shall not be lower than - 65°F.

ACTIONS:

Condition	Required Actions	Completion Time
A. Cold Trapping material concentration does not comply with limitations, i.e., > 16.9 mole% Freon or < 0.14 mole% ClF_3 or > 5.25 mole % ClF_3	A.1 Close cold trap inlet valve	Immediately
B. Col trap upper shell temperature between -65°F and -70°F	B.1 Increase cold trap temperature to -65°F or warmer	Immediately
C. Cold trap upper shell temperature lower than -70°F	C.1 Close cold trap inlet valve	Immediately
D. Cold trap inlet pressure > 3.3 psia	D.1 Decrease cold trap inlet pressure to ≤ 3.3 psia	Immediately

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCE

2.4.3.5 *Reaction Products (continued)*

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to entering Mode II	SR 2.4.3.5.1 Verify sample or Infrared Analyzer results of drum bank material be trapped are with in LCO limitations
Twice a shift, after entering Mode II	SR 2.4.3.5.2 Monitor cold trap inlet pressure and upper shell temperature

BASIS:

Failure to control the concentrations of various mixtures of coolant and ClF_3 can result in liquification of these materials in the cold trap and formation of violently reactive mixtures that could ignite when the trap is flashed creating an over-pressure situation. Rupture of the trap and the release of toxic gases into the cold trap room can only occur if the pressure relief system fails to operate [SAR Section 3.8.3.4].

SECTION 2.4 SPECIFIC TSRs FOR X-330 AND X-333 COLD RECOVERY

2.4.4 GENERAL DESIGN FEATURES

NONE

SECTION 2.5 SPECIFIC TSRs

FOR

X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.1 WITHDRAWAL STATION OPERATIONAL MODES

I	**Preparation**	Withdrawal station checkout performed, UF_6 cylinder weighing, inspection and hookup completed.
II	**Compression/ Liquifaction**	Withdrawal loop compressors running, loop UF_6 supply suction valve open, inlet valve to UF_6 condenser open and liquifaction of UF_6 is based on temperature/pressure conditions.
III	**Withdrawal**	Liquid UF_6 is draining into a cylinder; filled cylinders are being disconnected, weighed or placed by crane into local storage for cool down.
IV	**Standby**	Withdrawal loop compressors shutdown or operating on recycle, withdrawal loop UF_6 supply suction valve open or closed, vent valve(s) establishing a vent path from the compression loop to the cascade are open or closed. The withdrawal loop may still contain stored UF_6 but station pressure remains below atmospheric.
V	**Transport**	Cylinders being moved from local storage lot for further handling and storage.
VI	**Shutdown**	Withdrawal loop compressors not running, withdrawal loop UF_6 supply suction valve closed and UF_6 evacuated from the loop. Accumulators may still contain some UF_6.

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.2 SAFETY LIMITS

APPLICABILITY: All Withdrawal Operational Modes

2.5.2.1 SL: Coolant pressures shall not exceed the values contained in the Safety Limit column of the table below:

LOCATION VERSUS SAFETY LIMIT	
LAW STATION	**330 PSIG**
ERP STATION	**440 PSIG**

BASIS:

Overpressurization and rupture (multiple tubes) of the coolant system into the UF_6 system could result in the subsequent release of UF_6 due to overpressurization of the UF_6 enrichment system. The Safety Limit has been established at 110% of the MAWP based on the ASME Pressure Vessel Code, Division I, Section VIII. While not directly applicable to this application, the 110% overpressurization value does indicate that there is a high degree of confidence that the vessel pressure boundary will not fail at 110% of the stated MAWP. [SAR Section 3.8.3.4]

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.1 Criticality Accident (Radiation) Alarm Systems

LCO 2.5.3.1a: Criticality accident detection shall be operable

APPLICABILITY: In areas, equipment, or processes which contain greater than 700 grams of ^{235}U at an enrichment greater than or equal to 1.0 wt % ^{235}U.

ACTIONS:

Condition	Required Action	Completion Time
A. Areas, equipment, or processes not covered by criticality accident detection.	A.1 Implement the following for areas, equipment, or processes applicable to this LCO and that are not otherwise covered by criticality accident detection. A.1.1 Discontinue movement of cylinders containing UF_6 enriched to ≥1.0 wt % ^{235}U. AND A.1.2 Waste containing uranium enriched to ≥1.0 wt % ^{235}U shall not be moved AND A.1.3 Discontinue maintenance activities that require breach of containment of equipment containing uranium enriched to ≥1.0 wt % ^{235}U. AND A.1.4 Complete current cycle and then discontinue withdrawal of UF_6 enriched to ≥1.0 wt % ^{235}U	Immediately
	AND A.2.1 Evacuate area within the area not covered by criticality accident detection. AND A.2.2 Restrict access to area evacuated in A.2.1.	Immediately
	AND A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate.	Immediately
B. Areas, equipment, or processes not covered by criticality accident detection.	B.1.1 Restore criticality accident detection by installing portable CAAS unit providing required criticality accident detection and same alarms as fixed unit. OR	48 hours
	B.1.2 Restore criticality accident detection to operable status. TSR 1.6.2.2d is not applicable.	48 hours

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.1 Criticality Accident (Radiation) Alarm System (continued)

LCO 2.5.3.1b: Criticality accident alarm shall be operable (audible)

APPLICABILITY: In areas where the maximum foreseeable absorbed dose in free air exceeds 12 rad.

ACTIONS:

Condition	Required Action	Completion Time
A. Area does not have an audible criticality accident alarm.	A.1 Implement the following for areas, equipment, or processes where a criticality accident could result in a maximum foreseeable dose exceeding 12 rad in the area of inaudibility and LCO 2.5.3.1a applies. A.1.1 Discontinue movement of cylinders containing UF_6 enriched to ≥1 wt % ^{235}U. AND A.1.2 Waste containing uranium enriched to ≥1.0 wt % ^{235}U shall not be moved. AND A.1.3 Discontinue maintenance activities that require breach of containment of equipment containing uranium enriched to ≥1.0 wt % ^{235}U. AND A.1.4 Complete current cycle and then discontinue withdrawal of UF_6 enriched to ≥1.0 wt % ^{235}U. AND A.2.1 Evacuate area of inaudibility. AND A.2.2 Restrict access to the area of inaudibility. AND A.3 Provide personnel allowed into the area of inaudibility with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate, or a radio in constant communication with the Central Control Facility.	Immediately Immediately Immediately
B. Area does not have an audible criticality accident alarm.	B.1 Restore criticality accident alarm to operable status. TSR 1.6.6.2d is not applicable.	48 hours

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.1 Criticality Accident (Radiation) Alarm System (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Semiannually	SR 2.5.3.1.1 Calibrate radiation clusters to a set point of 5 mRad/hr. in air
	SR 2.5.3.1.2 Verify that the cluster nitrogen horn and the X-300 alarm sounds when two out of three channels in a cluster are tripped.
Quarterly	SR 2.5.3.1.3 Verify that the nitrogen supply pressure to the cluster horns is at least 900 psig.

BASIS:

Within the cluster, three neutron-sensitive detection units are provided to detect radiation from a criticality accident. Clusters are designed and calibrated to detect and alarm on a minimum credible criticality accident of concern, defined as producing an integrated total dose of 20 Rads. in one minute at two meters from the reacting material. This system will provide an audible signal in the event of a criticality that will alert personnel to evacuate the immediate work areas. The minimum acceptable length of time for the CAAS horn to sound is 2 minutes [SAR Sections 3.8.7.1 and 4.3.2.6].

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.2 Coolant High Pressure Relief System

APPLICABILITY: Withdrawal Operational Modes II, III, IV

LCS: Coolant pressure set points shall be in accordance with the following table:

LOCATION VERSUS LIMITING CONTROL SETTING	
LAW STATION	**≤ 300 PSIG**
ERP STATION	**≤ 400 PSIG**

LCO: The coolant high pressure relief system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. Rupture disk inoperable	A.1 Place the affected withdrawal loop in Mode VI	30 Minutes
B. Block valve closed and/or seal broken	B.1 Open or verify valve open **AND**	Immediately
	B.2 Reseal valve	8 Hours
C. Condition B Required Actions and/or Completion Time not accomplished	C.1 Place the affected withdrawal loop in Mode VI	30 Minutes

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.2 Coolant High Pressure Relief System (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each withdrawal loop post maintenance startup	SR 2.5.3.2.1 Verify isolation block valve sealed open

BASIS:

The 1995 ASME Pressure Vessel Code, Division I, Section VIII requires that overpressure relief be provided by a device stamped at or below the MAWP and sized such that the subsequent transient pressure will be limited to a maximum of 110% of MAWP. ASME Code allows rupture disks to have a 5% burst tolerance. Rupture disks stamped at MAWP will therefore burst at or below 105% of MAWP. The LCS is set at 100% of MAWP. To comply with these standards, pressure relief devices are purchased and installed on the Cascade cell coolant condensers with stamped ratings at or below the MAWP [SAR Section 3.8.3.4]. The Tails Withdrawal uses a heat transfer medium with a much lower vapor pressure that remains as a liquid. As a result, there cannot be a catastrophic failure of the equipment.

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.3 UF_6 Smoke Detection

APPLICABILITY: Withdrawal Operational Modes II, III

LCO: Compressor/Accumulator UF_6 Smoke Detectors shall be operable.

ACTIONS: Note: TSR 1.6.2.2(d) does not apply

Condition				Required Actions		Completion Time
A. Smoke detectors operable				A.1	Provide a continuous smoke watch	1 Hour
Location	ERP	LAW	TAILS			
Inside Compressor Housing	<2	<2	<2			
Outside Compressor Housing per Compressor	<1	<1	<1			
Condenser/Accumulator Area	<2	<2	<2			

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Monthly	SR 2.5.3.3.1 Perform test of active CADP smoke detectors to verify that the smoke detectors have provided an alarm condition in the ACR.
Quarterly	SR 2.5.3.3.2 Test active smoke heads to ensure alarm indication will occur when smoke head is exposed to a simulated smoke condition.

BASIS:

In the event of a UF_6 release in the compressor area or withdrawal room, an alarm will sound in the ACR notifying operating personnel that immediate investigation and action must occur. The smoke detection system is sensitive enough to detect very minor out gassings of UF_6 and therefore will prompt the operator actions necessary to minimize the amount of UF_6 released [SAR Sections 3.8.7.3, 4.3.2.2.1, and 4.3.2.2.12].

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.4 Pigtail Line Isolation System

APPLICABILITY: Withdrawal Operational Modes II,III

LCO: Pigtail line isolation system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. One smoke detector for a withdrawal position inoperable	A.1 Restore operability and may complete current cylinder filling	Prior to start of new cylinder filling
B. Both smoke detectors for a withdrawal position inoperable	B.1 Isolate cylinder and withdrawal manifold **AND**	15 Minutes
	B.2 Restore operability	Prior to initiation/resuming cylinder filling
C. Isolation valve(s) inoperable	C.1 Isolate cylinder and withdrawal manifold **AND**	15 Minutes
	C.2 Restore operability	Prior to initiation/resuming cylinder filling

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.5.3.4.1 Perform channel functional test to verify that with the simulation of smoke at the smoke detectors the two isolation valves will close within ≤ 30 seconds after detection.

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.4 Pigtail Line Isolation System (continued)

BASIS:

Failure of the cylinder pigtail during the filling of a cylinder would result in a UF_6 release. Operation of the pigtail isolation system to close the isolation valves would minimize the quantity of UF_6 released. Prior to initiation of withdrawal, both smoke detectors over the withdrawal position must be operable. This system is actuated by either of the 2 smoke detectors over each withdrawal position or can be initiated manually [SAR Sections 3.8.4.1, 4.3.2.2.4, and 4.3.2.2.11].

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.5 Assay Monitoring

APPLICABILITY: Withdrawal Operational Modes II, III

LCO: Assay monitoring shall be required when withdrawing > 1.0% U^{235} material.

ACTIONS:

Condition	Required Actions	Completion Time
A. Assay and Gamma spectrometer inoperable	A.1 Initiate 2 hour sampling with assay result in 4 hours OR	2 Hours
	A.2 Place the affected withdrawal loop in Mode IV	2 Hours

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Daily	SR 2.5.3.5.1 Perform a comparison of the assay spectrometer reading against a known assay controller sample and make any necessary assay spectrometer adjustments.

BASIS:

Enrichment monitoring of the UF_6 withdrawn into shipping containers is essential to ensuring that the maximum enrichment, as it relates to the other necessary parameters (geometry, moderation, mass, etc.), required for a critical reaction is not exceeded. This monitoring is essential for the Tails area to ensure the enriched assay of the accumulators is not exceeded. The monitoring at the ERP and LAW stations enhance the controls necessary to ensure that enrichment limitation for the autoclave are not exceeded [SAR Section 5.2, Appendix A, section 1.4].

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.6 Withdrawal Accumulator Enrichment

APPLICABILITY: Withdrawal Operational Modes II, III

LCO: Withdrawal accumulator UF_6 enrichment limitation shall be in accordance with table below:

LOCATION	SIZE	ENRICHMENT
ERP-1	4 INCH	≤ 10%
ERP-2	8 INCH	≤ 10%
LAW A & B	8 INCH	≤ 10%
TAILS	10 INCH	≤ 5%
TAILS	30 INCH	≤.95%

ACTIONS:

Condition	Required Actions	Completion Time
A. Enrichment limitation exceeded	A.1 Place withdrawal loop in Mode IV	15 Minutes

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Every 2 Hours	SR 2.5.3.6.1 Monitor assay spectrometer and/or samples to verify enrichment limitations are being met

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.6 Withdrawal Accumulator Enrichment (continued)

BASIS:

Storing UF_6 of a U^{235} enrichment greater than the stated limitations in the Withdrawal Area accumulators could result in a critical reaction. The ERP-1 accumulator has been analyzed to be safe at an enrichment of 100% U^{235}. [SAR Section 5.2, Appendix A, section 1.4].

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.7 UF_6 Cylinder Enrichment

APPLICABILITY: Withdrawal Operational Mode III

LCO: A. UF_6 Cylinder weighted average enrichment limitation shall be in accordance with table below:

B. UF_6 condensing pressure ≤ 45 psig

	14-Ton	10-Ton	10-Ton*	2.5-Ton
Cylinder Diameter Inches	48	48	48	30
Weighted Average Product Assay % U^{235} Full Cylinder	≤ 4.5	≤ 4.5	≤ 5.0	≤ 5.0
Maximum Assay % U^{235}	5.25	10.0	10.0	10.0
* Applies only to properly identified 48X intraplant cylinders.				

ACTIONS:

Condition	Required Actions	Completion Time
A. Enrichment limitation exceeded	A.1 Close the cylinder valve	15 Minutes
B. Condensing pressure limitation exceeded	B.1 Reduce condensing pressure to ≤ 45 psig **AND**	15 Minutes
	B.2 Place the withdrawal loop in Mode IV	30 Minutes

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.7 UF_6 Cylinder Enrichment (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Every 2 hours	SR 2.5.3.7.1 Monitor assay spectrometer and/or samples to verify enrichment limitations are being met
Once per shift	SR 2.5.3.7.2 Monitor the condenser pressure to ensure ≤ 45 psig

BASIS:

Filling a UF_6 cylinder with a U^{235} enrichment greater than the stated limitations eliminates one of the two constraints assumed to be present to prevent a criticality. Three nuclear criticality safety reports (POEF-T-3597, POEF-T-3563, and GAT-DM-1333) provide the justification for the the acceptability of filling 14-ton cylinders with 5.25% material and 10-ton cylinders with 10% material. The maximum assay values are predicated on the liquid filling of the cylinders under moderation control. Moderation control is based on maintaining a H/U ratio ≤ .088. High concentrations of HF cannot enter the condensation/liquification stations from the cascade since, as a light gas, HF preferentially proceeds toward the cascade top to be removed by either the Top or Side Purge Cascade. The controlling of the condenser pressure ≤ 45 psig will provide added assurance that what HF is present will not condense [SAR Section 5.2, Appendix A, section 1.4].

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.8 UF_6 Cylinder Cart Movement

APPLICABILITY: Withdrawal Operational Mode III

LCO: Movement of the cylinder cart, shall be prohibited while the cylinder is connected to the withdrawal manifold.

ACTIONS:

Condition	Required Actions	Completion Time
A. Air interlock key not over pigtail or air hose not disconnected from cylinder cart	A.1 Tag out the air supply to cylinder cart **OR**	Immediately
	A.2 Stop UF_6 withdrawal and disconnect pigtail	1 Hour

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each pigtail connection	SR 2.5.3.8.1 Verify air interlock key is over pigtail prior to starting UF_6 withdrawal

BASIS:

Movement of the cylinder cart while a UF_6 cylinder is connected to the withdrawal manifold and boundary valves are open, may lead to a large UF_6 release [SAR Section 4.3.2.2.11].

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.9 Liquid UF_6 Cylinder Movement

APPLICABILITY: Withdrawal Operational Modes III, V

LCO: Cylinders containing liquid UF_6 shall be moved by overhead cranes or scale carts.

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each cylinder disconnection	SR 2.5.3.9.1 Verify the cylinder valve protector has been installed prior to removing cylinder from withdrawal cart
Prior to cylinder movement by forklift or straddle carrier	SR 2.5.3.9.2 Verify the cylinder cooling time for solidification has been met.

BASIS:

A liquid UF_6 release is significantly more severe than a release from a solid UF source. Equipment reliability of straddle carriers and forklifts and road traffic conditions increase the risk of having a liquid UF_6 release. The handling of liquid UF_6 cylinders with cranes or scale carts is more reliable and therefore represents a lower risk. In the event a cylinder containing solid UF_6 is dropped, while the cylinder integrity may be compromised the rate of escaping UF_6 is sufficiently low enough to limit the release to several pounds upon taking emergency actions. SAR Section 3.2.4.5 provides the general guidelines used in determining UF_6 solidification [SAR Sections 3.8.6.2, 3.8.6.3, 4.3.2.2.4, and 4.3.2.2.15].

Solidification Criteria

- 48-inch cylinders containing less than 4000 pounds of liquid UF_6 must cool for at least 24 hours.
- 48-inch cylinders containing 4000-8000 pounds of liquid UF_6 must cool for at least 48 hours.
- 48-inch cylinders containing more than 8000 pounds of liquid UF_6 must cool for at least 5 days.
- 30-inch cylinders (all assumed to be filled to limit) must cool for at least 3 days.
- 5-inch, 8-inch, and 12-inch cylinders must cool for at least 24 hours.

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.10 Liquid UF_6 Handling Cranes

APPLICABILITY: Withdrawal Operational Mode III

LCO: Cranes shall be operable prior to lifting a cylinder containing liquid UF_6.

ACTIONS:

Condition	Required Actions	Completion Time
A. Crane inoperable (hoist brakes, upper/lower limit switches, hook, cable)	A.1 Tag crane out of service	1 Hour

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to first time use during shift	SR 2.5.3.10.1 Perform Operator functional crane inspection of: hoist,trolley,bridge,stop button and upper limit switch
Annually	SR 2.5.3.10.2 Perform load test (100% of rated capacity) and verify that the crane does not allow a load to move (except for compensatory movements) upn operator release of the controls.
Monthly	SR 2.5.3.10.3 Perform OSHA required monthly hands on inspection
Annually	SR 2.5.3.10.4 Perform OSHA required annual hands on inspection

BASIS:

Failure of the crane lifting components or load braking system while lifting a liquid UF_6 cylinder could result in the uncontrolled dropping of the cylinder resulting in a rupture of the cylinder and the release of up to 28,000 pounds UF_6. The OSHA test requirements are contained in 29 CFR 1910. The assurance of operability is provided by the ongoing inspections and tests and enhanced by the Configuration Management Program that addresses component quality and change control. Compensatory movements are small additional movements due to momentum after the crane drive mechanism stops and brakes are applied. These compensatory movements have no safety significance. [SAR Sections 3.8.6.2, 4.3.2.2.4, and 4.3.2.2.15].

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.11 Cylinder Fill Weights

APPLICABILITY: Withdrawal Operational Mode III

LCO: UF_6 cylinder fill weight prior to removal of cylinder from scale cart shall be ≤ Standard fill weight given in table below.

CYLINDER CODE	DESCRIPTION	STANDARD FILL WEIGHT lbs. UF_6
30A	2.5 TON	4950
30B	2.5 TON	5020
48A 1-5000	10 TON HW	21030
48X	10 TON HW	21030
48B(T) 5001-9230	10 TON TW	20700
48F 9231-9660	14 TON HW	27030
48Y 9661-9999	14 TON HW	27560
48G(OM) 111820-below	14 TON TW	26070
48G(OM) 111821-above	14 TON TW	28000
48G(HX) 150001-151000	14 TON TW	27030
48G(H) 151001-15xxxx	14 TON TW	27030

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.11 Cylinder Fill Weights (continued)

ACTIONS:

Condition	Required Actions	Completion Time
A. Fill weight > Standard fill weight and cylinder still on scale cart	A.1 Evacuate excess UF_6 prior to cylinder removal from scale cart	NA
B. Fill weight > Standard fill weight and UF_6 cylinder removed from scale cart	B.1 Tag cylinder as having been over filled **AND**	Immediately
	B.2 Transport cylinder with solidified UF_6 for accountability weighing and handling under autoclave specific LCO 2.1.3.8 "Required Actions"	NA

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each cylinder disconnection	SR 2.5.3.11.1 Verify final cylinder fill weight.
Prior to placing cylinder in the withdrawal position	SR 2.5.3.11.2 Perform a functional test of the scale.

BASIS:

A safe fill limit must accommodate the internal volume of the cylinder, the density of the UF_6 at a specific temperature and an allowance for ullage or the gas volume above the liquid in the cylinder. The operational fill weight is based on providing a 5% ullage or void volume at a heating temperature of 250 °F. The functional test of the scale will consist of obtaining a cylinder tare weight and comparing it to the accountability tare weight to verify that the two weights are within 40 pounds. [SAR Sections 3.8.6.1, 4.3.2.2.2, 4.3.2.2.6, 4.3.2.2.14, and 4.3.2.2.15]

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.12 UF_6 Cylinder Crane Movement

APPLICABILITY: Withdrawal Operational Mode I, III

LCO: No UF_6 cylinder shall be moved over another cylinder if one of the cylinders contains liquid UF_6.

ACTIONS:

Condition	Required Action	Completion Time
A. UF_6 cylinders lifted one over the other when at least one of the cylinders contains liquid UF_6.	A.1 Move the lifted cylinder such that the LCO statement is satisfied.	Immediately

BASIS:

The cylinder drop and puncture scenarios in the accident analysis involving UF_6 cylinders assume a release source term of 28,000 pounds of UF_6 . The prohibition of lifting one cylinder over another if one of the cylinders contains liquid UF_6 preserves the accident analysis assumption of only one cylinder contributing to the release source term. [SAR Section 4.3.2.2.15]

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.13 UF_6 Plugs

APPLICABILITY: All Withdrawal Operational Modes

LCO: Direct heat sources shall not be applied to solid UF_6 plugs until line clarity in the system has been assured.

ACTIONS:

Condition	Required Actions	Completion Time
A. Direct heat source being applied to a solid UF_6 plug	A.1 Discontinue direct heat application to the UF_6 plug **AND**	Immediately
	A.2 Ensure line clarity	Prior to reapplying direct heat

BASIS:

The application of an external heat source directly to a UF_6 plug can liquify the UF_6 within the center of the plug and thereby cause sufficient hydraulic forces to rupture the pipe containing the plug. The primary concern over the direct application of heat (i.e., steam tracing, heat tape, etc.) to the plug versus indirect heating (i.e., heated housings) is due to the fact that the energy is added to the plug at such a high rate that it is not evenly distributed over the entire plug and therefore does not allow for the sublimation of the plug before a portion of it liquefies. The secondary concern is that even though the UF_6 plug stays as a solid it must have room to expand. The consequences of a release of UF_6 from this type of failure mechanism would be minimal due to the fact that the UF_6 plug would remain as a solid and therefore, the release rate would be slow as the UF_6 sublimes into the atmosphere.

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.14 Motor Load Indicators

APPLICABILITY: Mode II when second stage compressor motors are running.

LCO: Withdrawal station second stage UF_6 compressor motor load indicators in the ACRs (LCR at ERP) shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. ACR (LCR at ERP) compressor motor load indicator operable. **OR** ACR is evacuated.	A.1 Shutdown affected compressor motor. **OR** A.2 Station an operator at station panels to monitor station parameters with communications to the ACR/LCR. [Not applicable if ACR is evacuated.] **OR** A.3 Place affected equipment in Mode IV.	4 Hours 4 Hours 4 Hours

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Following compressor motor start.	SR 2.5.3.14.1 Perform a Channel Check of the ACR (LCR at ERP) compressor motor load indicator.

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.14 Motor Load Indicators

BASIS:

The motor load indicators provide an indication of various types of failures of the compressor motors. Using ammeter indications in the ACR (LCR for ERP) for the individual compressor motors, operators can quickly identify most abnormalities caused by various malfunctions of the process equipment. Operator training is relied upon to distinguish between load changes associated with normal fluctuations, such as inventory changes, and equipment malfunctions. Compressor load changes can be caused by such events as compressor failures or failures of the primary system pressure boundary that cause inleakage or a release of UF_6 . The detection of an event and mitigative action by the operator will control primary pressure and temperature increases to minimize UF_6 releases for on-site personnel. At ERP, a motor load alarm is actuated in the ACR during an event to provide backup indication when the LCR is unmanned. This system is not essential for off-site public protection. The surveillance requirement is provided to ensure that, after motor start, the ammeter provides nominal indication of motor load. [SAR Sections 3.8.4.4, 4.3.2.2.1, and 4.3.2.2.12]

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.15 Withdrawal Station Compressor Motor Manual Trip System

APPLICABILITY: Mode II when second stage compressor motors are running.

LCO: Withdrawal station second stage UF_6 compressor motor manual trip system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. ACR (LCR at ERP) compressor motor stop button inoperable (not due to loss of DC voltage)	A.1 Notify Cascade Control of potential need to utilize alternate means for applicable compressor motor shutdown.	Immedaitely
	AND	
	A.2 Station an operator at at an established alternate motor shutdown location with communications to the ACR (LCR for ERP) or PCF.	8 Hours
	OR	
	A.3 Shutdown affected UF_6 compressor motors	8 Hours
	OR	
	A.4 Place affected equipment in Mode IV.	8 hours

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.15 Withdrawal Station Compressor Motor Manual Trip System (continued)

ACTIONS: (continued)

Condition	Required Actions	Completion Time
B. Battery/connected cell/charger conditions (other than voltage) found outside surveillance parameters.	B.1 If the AC battery charger is inoperable, verify that the applicable battery is operable. **AND** B.2 If battery/cell conditions are found outside surveillance parameters, restore battery/cell parameters to within limits. TSR 1.6.2.2.d does not apply.	8 Hours 90 Days
C. DC voltage potential < 200 volts at applicable battery room. **OR** No DC power at the compressor motor breaker.	C.1 Notify Cascade Control of potential need to utilize alternate means for applicable compressor motor shutdown. **AND** C.2 Station an operator at an established alternate motor shutdown location with communications to the ACR (LCR for ERP) or PCF. **OR** C.3 Shutdown affected UF_6 compressor motors. **OR** C.4 Place affected equipment in Mode IV.	Immediately 8 Hours 8 Hours 8 Hours

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.15 Withdrawal Station Compressor Motor Manual Trip System (continued)

ACTIONS: (continued)

Condition	Required Actions	Completion Time
D. Required Action B.2 not accomplished.	D.1 Station an operator at an established alternate motor shutdown location with communications to the ACR (LCR for ERP) or PCF. **OR** D.2 Shutdown affected UF_6 compressor motors. **OR** D.3 Place affected equipment in Mode IV.	8 Hours 8 Hours 8 Hours

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Daily	SR 2.5.3.15.1 Verify withdrawal station DC bus voltage ≥ 200 volts DC.
Daily	SR 2.5.3.15.2 Verify DC power is available at UF_6 compressor motor breakers.
Daily	SR 2.5.3.15.3 Verify that the battery charger output is > 0 DC amps.
Quarterly	SR 2.5.3.15.4 Inspect battery terminals and racks for evidence of corrosion and for cell leakage of electrolyte.

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.15 Withdrawal Station Compressor Motor Manual Trip System (continued)

SURVEILLANCE REQUIREMENTS: (continued)

Frequency	Surveillance
Quarterly	SR 2.5.3.15.5 Check that the specific gravity of the pilot cell is≥ 1.180.
Quarterly	SR 2.5.3.15.6 Visually check the cell electrolyte levels to verify that the level is above the low level indication line and no more than 0.25 inches above the high level indication line.
Annually	SR 2.5.3.15.7 Check that the specific gravilty of the cells is ≥ 1.180.
Each scheduled motor trip prior to restart after a planned motor trip	SR 2.5.3.15.8 Utilize the ACR (or LCR for ERP) motor stop button for each planned motor trip or verify that the motor stop button opens the breaker prior to restart. Note:Performance of this surveillance to demonstrate system operability is not required for any compressor in operation until the next planned shutdown.

BASIS:

The compressor motor manual trip system aids in the prevention and mitigation of UF_6 releases during withdrawal station operations by reducing the operating pressure and temperature to minimize the potential for process system integrity failure and to minimize the release of UF_6 after a failure of the system integrity. Station compressor motors can be tripped from their associated ACRs with the exception of ERP which is tripped from the Local Control Room (LCR). All three withdrawal stations have emergency trip capability in the PCF but this trip is a withdrawal station trip, not just a compressor trip. This PCF trip button is not required to satisfy this LCO but may be used as an alternate trip method when specified by a Required Action statement. Additional alternate trip capability exists at the motor control center for each compressor.

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.5.3.15 Withdrawal Station Compressor Motor Manual Trip System (continued)

BASIS: (continued)

In order to demonstrate the reliability of the ACR compressor motor trip function (LCR at ERP), motor trips that are not required to mitigate a transient condition will be performed utilizing the "motor stop" capability, or an alternate test (i.e., tripping the motor breakers prior to compressor motor startup). Either method is satisfactory to demonstrate the operability of the motor trip function. Other available shutdown locations, such as the switchyard are considered alternate shutdown locations. Because of the number of available trip locations, these alternate locations are not tested periodically. Internal resistance of the cascade equipment slows repressurization of the shutdown equipment, allowing inleakage rather than outleakage which will mitigate the release until necessary valve evolutions can take place to isolate the system from any additional supply of UF_6 and to prepare the system for compensatory action and repair. In order to initiate a compressor motor shutdown for some withdrawal station compressor, the DC control and trip power circuit must be operable (Certain withdrawal station (second stage) compressor motor manual trip circuits are fail-safe and do not require the DC power system to perform their safety function. The TSR requirements associated with the DC power supply are not applicable to these compressors). However the failure of the local trip circuit to function on demand does not constitute a significant impact on any of the scenarios where shutdown is assumed to occur sometime during the scenario. This is due to the numerous alternate and independent means available for disrupting power, i.e., breaker manual trip, switchyard de-energization of electrical feeders, buses, transformer bays, or main switchyard lines. The battery surveillances provide additional assurance that the battery syetem will be able to deliver the power necessary to trip the compressor motor breakers as long as the system voltage is maintained above 200 volts. [SAR Sections 3.8.4.2, 4.3.2.2.1, 4.3.2.2.4, and 4.3.2.2.12]

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.4 GENERAL DESIGN FEATURES

2.5.4.1 UF_6 Cylinder Lifting Fixtures

DF: UF_6 cylinder lifting fixtures are designed with a safety factor of 5 to 1.

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.5.4.1.1 Perform load test (100% of rated capacity)
Prior to first time use during shift	SR 2.5.4.1.2 Perform inspection of cylinder lifting fixture

BASIS:

Lifting fixtures used to handle liquid filled UF_6 cylinders are credited for prevention of the liquid cylinder drop and rupture accident scenario [SAR Sections 3.8.6.2, 4.3.2.2.4, and 4.3.2.2.15]

2.5.4.2 UF_6 Cylinders

DF: Large UF_6 (2.5 Ton and greater) cylinders are as a minimum designed to a MAWP of 100 psig

SURVEILLANCE:

Frequency	Surveillance
5 Years	SR 2.5.4.2.1 Perform hydrostatic test on large UF_6 cylinder with the following exception; cylinders that are full of UF_6 but have an expired hydrostatic test date may be heated for removal of the UF_6 but shall be hydrostatic tested prior to refilling.
Prior to cylinder filling	SR 2.5.4.2.2 Inspect cylinder for defects

BASIS:

UF_6 cylinder MAWP $\geq$ 100 psig is a basic assumption in the accident analysis and relates to the overall structural integrity of the UF_6 containment barrier. [SAR Sections 3.8.6.1, 4.3.2.2.4, and 4.3.2.2.11]

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.4 GENERAL DESIGN FEATURES

2.5.4.3 UF_6 Cylinder Pigtails

DF: Newly fabricated pigtails are designed to withstand at least 400 psig

SURVEILLANCE:

Frequency	Surveillance
Prior to initial use	SR 2.5.4.3.1 Inspect and perform hydrostatic test at least to 400 psig and ensure inspection tag is attached to the pigtail

BASIS:

Structural integrity of the pigtail significantly reduces the likelihood of a catastrophic rupture [SAR Sections 3.8.4.5, 4.3.2.2.4, and 4.3.2.2.11]

2.5.4.4 Scale Pit Raschig Rings

DF: ERP, LAW and Tails scale pits shall contain Borosilicate glass Raschig rings to a minimum depth of 6 inches.

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.5.4.4.1 Verify that the surveillance requirements contained in ANSI Standard 8.5 are satisfied.

BASIS:

The scale pits contain Raschig Rings to enhance nuclear criticality safety [SAR Section 5.2, Appendix A, section 1.4]

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.4.5 Overhead Crane Capacity

DF: Cranes that transport cylinders containing liquid UF_6 are designed with a minimum lifting capacity of 18 tons.

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.5.4.5.1 Perform surveillance in accordance with SR 2.5.3.10.2.

BASIS:

Cranes used to handle liquid UF_6 cylinders are credited for prevention of a liquid cylinder drop and rupture [SAR Sections 3.8.6.2, 4.3.2.2.4, and 4.3.2.2.15].

SECTION 2.5 SPECIFIC TSRs FOR X-326 ERP, X-333 LAW, AND X-330 TAILS WITHDRAWAL STATIONS

2.5.4.6 Liquid UF_6 Cylinder Handling Scale Carts

DF: The scale carts that carry liquid UF_6 cylinders are designed and maintained not to fail in a manner to cause primary system integrity failure.

SURVEILLANCE:

Frequency	Surveillance
Biennially	SR 2.5.4.6.1 Perform a visual inspection of the scale cart for structural damage.

BASIS:

The scale carts are designed and maintained to handle weight loads appropriate for their usage to minimize the potential of cylinder failure during handling of cylinders containing greater than 500 lbs. of liquid UF_6 . [SAR Sections 3.8.6.3, 4.3.2.2.4, and 4.3.2.2.15]

SECTION 2.6 SPECIFIC TSRs

FOR

X-705 FACILITY

SECTION 2.6 SPECIFIC TSRs FOR X-705 DECONTAMINATION FACILITY

2.6.1 X-705 OPERATIONAL MODES

I	**Preparation**	Equipment/system being prepared for processing.
II	**Standby**	Equipment/system not operating but still may retain inventory of processed material.
III	**Operational**	Material is being processed through equipment/system.
IV	**Shutdown**	Equipment/system not functional, only residual amounts of processed material remain.

SECTION 2.6 SPECIFIC TSRs FOR X-705 DECONTAMINATION FACILITY

2.6.2 SAFETY LIMITS

2.6.2.1 SL: Calciner internal temperature ≤ 2000 °F

APPLICABILITY: All X-705 Operational Modes

BASIS:

It has been determined that the calciner tubes could fail at a temperature exceeding 2000 °F. Therefore, to prevent a tube failure or distortion that could lead to the leaking of highly concentrated (uranyl nitrate) solutions or oxide into the unfavorable geometry of the calciner tube housing, the temperature shall not exceed 2000 °F.

2.6.2.2 SL: Microfiltration Effluent pH ≥ 6.5

APPLICABILITY: Mode III

BASIS:

The microfiltration unit permeate effluent tank, T-105 and downstream lines are geometrically unfavorable. If the pH of the solution being processed through the microfiltration is not adjusted to a pH value greater than or equal to 6.5, the uranium will remain in solution and will pass through the microfiltration unit to the effluent tank. If the U^{235} concentration is great enough a nuclear criticality could occur.

2.6.2.3 SL: Microfiltration Effluent Bag Filter Pressure Differential ≤ 30 psid

APPLICABILITY: All X-705 Operational Modes

BASIS:

The microfiltration system removes uranium and other heavy metals by precipitation/filtering. The microfiltration effluent tank and sanitary sewer lines do not provide a favorable geometry for all the various solutions that are processed. If a microfiltration membrane failed and the bag filters were not in place precipitated uranium bearing solids could reach the effluent tank. A large deposit of solids with significant U^{235} content could present a nuclear criticality problem. The safety limit is based on the design maximum high side pressure that will not cause the filter to rupture.

SECTION 2.6 SPECIFIC TSRs FOR X-705 DECONTAMINATION FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.1 Calciner High High Temperature Shutoff System

APPLICABILITY: X-705 Operational Mode III and Mode II when heaters are energized

LCS: ≤ 1800 °F.

LCO: Calciner high high temperature shutoff system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. Calciner High High Temperature Shutoff System inoperable	A.1 Close the inlet feed valve if it is not already closed and de-energize calciner heaters	30 Minutes

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.6.3.1.1 Perform channel functional test to verify that the inlet feed valve closes and the heaters are de-energized when temperature set point is exceeded.
Semiannually	SR 2.6.3.1.2 Calibrate the high high temperature shutoff instrumentation set point to ≤ 1800 °F
	Note: Allowable test tolerance to cover instrument drift and uncertainties during normal operation = +36 °F
500 hours at operating temperature	SR 2.6.3.1.3 Ultrasonically test the calciner tube to verify tube thickness is ≥ 0.4 inch

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.1 Calciner High High Temperature Shutoff System (continued)

BASIS:

The calciner high high temperature limiting set point of 1800 °F will prevent the exceedance of the safety limit. The 200 °F safety margin takes into account instrument loop inaccuracies, drift etc. and any residual heat added to the calciner during the system response time to de-energize the heaters. When taking the calciner out of service under normal conditions it is necessary to allow the heaters to remain energized after the inlet feed valve is closed in order to facilitate the emptying of the calciner tube. This will facilitate the holdup solution conversion to oxide and subsequent collection in the receiving can. Once the tube is emptied the heaters will be de-energized [SAR Section 3.8.10.4.4 and 5.2, Appendix A, scetion 3.9]. The LCS value corresponds to the trip set point established under DOE 5481.1B in 1985 with a 36 °F(2% of scale) tolerance that complies with the definition of "Allowable Value" in ANSI/ISA-S67.04-1988.

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.2 Calciner Discharge Collector Probe Detection

APPLICABILITY: X-705 Operational Modes II, III

LCO: Both channels of the calciner discharge collector probe detection system shall be operable.

ACTIONS:

Condition		Required Actions		Completion Time
A.	One channel inoperable	A.1	Complete the batch calciner operation and restore operability	Prior to initiating a new heat cycle
B.	Both channels inoperable	B.1	Close inlet feed valve	30 Minutes

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.6.3.2.1 Perform channel functional test to verify that the inlet feed valve closes and the alarm sounds when the probe is contacted with oxide material or substitute

BASIS:

If the uranium oxide leaving the calciner would back up into the calciner discharge throat which is an unfavorable geometry, a criticality could occur if the U^{235} assay and the amount of moderation were high enough [SAR Sections 3.8.10.4.5 and 5.2 Appendix A, section 3.9].

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.3 Calciner Can Level Probe Detection

APPLICABILITY: X-705 Operational Modes II, III, except when calciner discharge chute valve is closed

LCO: Calciner can level probe detection system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. Can level probe system inoperable	A.1 Close the inlet feed valve	30 Minutes

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each calciner startup	SR 2.6.3.3.1 Verify the receiving can is in place prior to introducing flow into the calciner
Quarterly	SR 2.6.3.3.2 Perform channel functional test to verify that the inlet feed valve closes and the alarm sounds when probe is contacted with oxide material or substitute
Semiannually	SR 2.6.3.3.3 Verify probe actuates at a can height of 80%.

BASIS:

If the uranium oxide would overflow out of the can collar into an unfavorable geometry in the glove box, a criticality could occur if the U^{235} assay and the moderation were high enough [SAR Sections 3.8.10.4.6 and 5.2 Appendix A, section 3.9].

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.4 Criticality Accident (Radiation) Alarm Systems

LCO 2.6.3.4a: Criticality accident detection shall be operable.

APPLICABILITY: In areas, equipment, or processes which contain greater than 700 grams of ^{235}U at an enrichment ≥ 1.0 wt% ^{235}U.

ACTIONS:

Condition	Required Action	Completion Time
A. Areas, equipment, or processes not covered by criticality accident detection.	A.1 Discontinue operations with fissionable material. AND A.2.1 Evacuate area within the area not covered by criticality accident detection which could result in a maximum foreseeable dose exceeding 12 rad. AND A.2.2 Restrict access to area evacuated in A.2.1. AND A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate.	Immediately Immediately Immediately
B. Areas, equipment, or processes not covered by criticality accident detection.	B.1.1 Restore criticality accident detection by installing portable CAAS unit providing required criticality accident detection and same alarms as fixed unit. OR B.1.2 Restore criticality accident detection to operable status. TSR 1.6.2.2d is not applicable.	Prior to reinitiating activities

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.4 Criticality Accident (Radiation) Alarm Systems (continued)

LCO 2.6.3.4b: Criticality accident alarm shall be operable (audible).

APPLICABILITY: In areas where the maximum foreseeable absorbed dose in free air exceeds 12 rad.

ACTIONS:

Condition		Required Action		Completion Time
A.	Area does not have an audible criticality accident alarm.	A.1	Discontinue operations with fissionable material.	Immediately
		AND		
		A.2.1	Evacuate area of inaudibility	Immediately
			AND	
		A.2.2	Restrict access to the area of inaudibility.	
		AND		
		A.3	Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate, or a radio in constant communication with the Plant Control Facility.	Immediately
B.	Area does not have an audible criticality accident alarm.	B.1.1	Restore criticality accident alarm to operable status. TSR 1.6.2.2d is not applicable.	Prior to reinitiating activities

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.4 Criticality Accident (Radiation) Alarm Systems (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Semiannually	SR 2.6.3.4.1 Calibrate radiation clusters to a set point of 5 mRad/hr. in air.
	SR 2.6.3.4.2 Verify that the cluster nitrogen horn and X-300 alarm sounds when two out of three channels in a cluster are tripped.
Quarterly	SR 2.6.3.4.3 Verify nitrogen supply pressure is at least 900 psig for each CAAS horn.

BASIS:

Each cluster consists of three neutron-sensitive detection units. Clusters are designed and calibrated to detect and alarm on a minimum credible criticality accident of concern, defined as producing an integrated total dose of 20 Rads. in one minute at two meters from the reacting material. This system will provide an audible signal in the event of a criticality that will alert personnel to evacuate the immediate work areas. The minimum acceptable length of time for the CAAS horn to sound is 2 minutes. [SAR Sections 3.8.7.1 and 4.3.2.6].

SECTION 2.6 SPECIFIC TSRs FOR X-705 DECONTAMINATION FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.5 Microfiltration pH Shutdown System

APPLICABILITY: X-705 Operational Mode III

LCS: pH ≥ 7.0.

LCO: Microfiltration pH shutdown system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. One of three channels inoperable	A.1 Complete the batch operation in progress and restore operability	Prior to initiating a new batch run
B. Two or more channels inoperable	B.1 Close the inlet valve to the effluent tank	30 Minutes

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.6.3.5.1 Perform a channel functional test to verify the pH shutdown system will stop the flow of solution to the effluent tank when pH drops below set point.
Quarterly	SR 2.6.3.5.2 Calibrate the microfiltration pH shutdown instrumentation to a set point of ≥ pH 7.0

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.5 Microfiltration pH Shutdown System (continued)

BASIS:

The LCS pH value of ≥ 7.0 is established at a point sufficiently below the optimum operating range to prevent false trips yet above the breakpoint where no precipitation will occur. While the solution pH is between 7.0 and 6.5 there is not a sufficient amount of uranium contained in the effluent stream entering the effluent tank to cause a critical reaction [SAR Sections 3.8.10.4.1 and 5.2, Appendix A, section 3.5].

SECTION 2.6 SPECIFIC TSRs FOR X-705 DECONTAMINATION FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.6 Microfiltration Permeate Effluent Bag Filter System

APPLICABILITY: X-705 Operational Mode III

LCS: ≤ 17 psi differential pressure

LCO: Both channels of the microfiltration permeate effluent bag filter system shall be operable.

ACTIONS:

Condition	Required Actions	Completion Time
A. One or two channels inoperable	A.1 Close the inlet valve to the effluent tank	30 Minutes

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.6.3.6.1 Perform a channel functional test to verify the effluent bag filter differential shutdown system will stop the flow of solution to the effluent tank when the pressure differential set point is exceeded
Quarterly	SR 2.6.3.6.2 Calibrate the effluent bag filter differential shutdown system instrumentation to a set point of 17 psi
Note: Allowable test tolerance to cover instrument drift and uncertainties during normal operation = + 0.4 psi	

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.6 Microfiltration Permeate Effluent Bag Filter System (continued)

BASIS:

As the effluent bag filter collects solids the differential pressure will increase and at the LCS a filter discharge valve will close to prevent solids from reaching the effluent tank.

The LCS is based on a differential pressure that will prevent the exceedance of the safety limit and is still above the highest expected differential pressure due to solution flow, without solids, through the filter [SAR Sections 3.8.10.4.2 and 5.2, Appendix A, section 3.5]. The LCS value corresponds to the trip set point established under DOE 5481.1B in 1985 with a + 0.4 psi (2% of scale) tolerance that complies with the definition of "Allowable Value" in ANSI/ISA-S67.04-1988.

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.7 Calciner Tube Rotation Interlock

APPLICABILITY: X-705 Operational Mode III

LCO: Calciner tube rotation interlock shall be operable.

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Quarterly	SR 2.6.3.7.1 Perform channel functional test to verify that the tube rotation interlock will de-energize the heaters and close the inlet valve when tube rotation stops

BASIS:

The calciner tubes are heated electrically to temperatures in excess of 1500 °F. If the tube would stop rotating, uneven heating would be placed on one location of the tube and a crack could develop due to warpage, resulting in a leak of concentrated uranyl nitrate and uranium oxide into the geometrically unfavorable calciner heating cavity that could lead to a criticality [SAR Section 5.2, Appendix A, section 3.9].

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.8 Truck Alley Oil and Grease Removal Unit (OGRU)

APPLICABILITY: X-705 Operational Modes II, III

LCO: A. Each batch to be processed shall contain ≤ 350 grams U^{235}.

B. OGRU waste receiving container shall contain ≤ 350 grams U^{235}.

ACTIONS:

Condition	Required Actions	Completion Time
A. Processed batch potentially contains >350 grams U-235 **OR** The receiving container plus the processed batch potentially contain >350 grams U-235	A.1 Enter Mode II or IV **AND**	Immediately
	A.2 Initiate action to restore OGRU to a safe condition	Immediately

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each batch to be processed prior to entering Mode III	SR 2.6.3.8.1 Inspect OGRU permeate tray for material buildup AND remove
	SR 2.6.3.8.2 Double sample batch AND calculate total amount of U^{235}
	SR 2.6.3.8.3 Verify batch U^{235} total PLUS receiving container U^{235} accumulation is ≤ 350 grams U^{235}
	SR 2.6.3.8.4 Verify additional solutions have not been added to the batch for the OGRU after sampling

BASIS:

The OGRU and waste container are not of favorable geometry. The NCS limit of 350 grams U^{235}, which corresponds to the Maximum Safe Mass for 100% enrichment (per GAT 225 R4, table 1), must be verified and maintained [SAR Section 5.2, Appendix A, section 3.14].

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.9 Microfiltration Effluent Filter Press Operation

APPLICABILITY: X-705 Operational Modes II, III

LCO: A. Each batch to be processed shall contain ≤ 350 grams U^{235}.

B. Effluent filter press waste receiving container shall contain ≤ 350 grams U^{235}.

ACTIONS:

Condition	Required Actions	Completion Time
A. Processed batch potentially contains >350 grams U-235 **OR** The receiving container plus the processed batch potentially contain >350 grams U-235	A.1 Enter Mode II or IV **AND**	Immediately
	A.2 Initiate action to restore filter press to a safe condition	Immediately

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each batch to be processed prior to entering Mode III	SR 2.6.3.9.1 Inspect filter press for material buildup AND remove
	SR 2.6.3.9.2 Double sample batch AND calculate total amount of U^{235}
	SR 2.6.3.9.3 Verify batch U^{235} total PLUS receiving container U^{235} accumulation is ≤ 350 grams U^{235}

BASIS:

The filter presses and waste container are not of favorable geometry, the NCS limit of 350 grams U^{235}, which corresponds to the Maximum Safe Mass for 100% enrichment (per GAT 225 R4, table 1), must be verified and maintained [SAR Section 5.2, Appendix A, section 3.5].

SECTION 2.6 SPECIFIC TSRs FOR X-705 FACILITY

2.6.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.6.3.10 Moderation Control

APPLICABILITY: Upon receipt of a PEH component

LCO: 1. Equipment classified as PEH shall be decontaminated to ≤ safe mass within 72 hours of removal and post PEH classification
2. Prior to opening PEH equipment for decontamination, the sprinkler system protecting the area where the equipment is located, shall be isolated and drained.

ACTIONS:

Conditions	Required Actions	Completion Time
A. PEH equipment not decontaminated to ≤ safe mass within 72 hours	A.1 Ensure openings remain covered or closed except during the actual decontamination evolution **AND**	Immediately
	A.2 Reinitiate a dry air or nitrogen atmosphere	Immediately
B. Area sprinkler system not isolated and drained	B.1 Cover exposed PEH deposits with a waterproof cover(s) and/or isolate and drain sprinkler system	Immediately

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Daily	SR 2.6.3.10.1 Inspect equipment to ensure openings are covered or closed except when being decontaminated

BASIS

These controls minimize the potential for exposure of the uranium deposits to external moderating sources such as water that could result in a critical reaction by ensuring that there exists a barrier to any external water sources. The decontamination evolution involves any actual disassembly and deposit removal that can be temporarily interrupted due to work area levels of HF but will proceed to completion once initiated. [SAR Section 5.2, Appendix A, section 3.11]

SECTION 2.6 SPECIFIC TSRs FOR X-705 DECONTAMINATION FACILITY

2.6.4 GENERAL DESIGN FEATURES

2.6.4.1 Handtable Overflows

DF: Handtables shall have a ≤ 1.5 inch high overflow.

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.6.4.1.1 Verify that ≤ 1.5 inch high overflow is not obstructed and that a 5 inch overflow receiving container is used

BASIS:

Potential solution criticality from an "unsafe" slab thickness in a handtable is prevented by overflow drains [SAR Section 5.2, Appendix A, section 3.4].

2.6.4.2 Air Gaps

DF: Air gaps shall be installed at all "B" area drains and water-to-process connections that connect to geometrically unsafe systems as required by a NCSA

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.6.4.2.1 Verify and document the presence of air gaps required by NCSAs.

BASIS:

Air gaps are used by design for piping to drains to prevent backflow to geometrically unsafe systems [SAR Section 5.2, Appendix A, section 3.20].

SECTION 2.6 SPECIFIC TSRs FOR X-705 DECONTAMINATION FACILITY

2.6.4 GENERAL DESIGN FEATURES

2.6.4.3 Diked Areas

DF: Dike height surrounding storage of uranium bearing solutions shall not exceed 1.5 inches

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.6.4.3.1 Verify and document that dike height does not exceed a height of 1.5 inches

BASIS:

Potential solution criticality from an "unsafe" slab thickness in a containment dike is prevented by limiting dike height to 1.5 inches [SAR Section 5.2, Appendix A, section 2.4].

2.6.4.4 Tank Covers

DF: Tanks T-100, T-104, T-105, T-106 AND T-107 shall have covers closed, except during inspections or other manned activities

SURVEILLANCE:

Frequency	Surveillance
Annually	SR 2.6.4.4.1 Verify tank covers are in place

BASIS:

Tanks of an unfavorable geometry which are open to the atmosphere are susceptible to receiving either uranium bearing or moderating solutions from over head lines that might leak and therefore result in a criticality. The tank covers, which are normally to be closed, will reduce the likely hood of any contaminants entering the tanks and causing a criticality [SAR Section 5.2, Appendix A, sections 1.11, 3.6, and 7.5].

SECTION 2.7 SPECIFIC TSRs

FOR

X-326 CASCADE FACILITY

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.1 X-326 CASCADE OPERATIONAL MODES:

I	**Startup/Checkout**	Cell/equipment motors ready to be energized and cell/equipment made ready for startup.
II	**Operating**	Motors energized and Cell/Equipment pressurized with UF_6 to > Cascade Minimum Suction Pressure.
III	**Standby**	Motors energized, UF_6 at ≤ Cascade Minimum Suction Pressure.
IV	**Treatment**	Cell/Equipment isolated from Cascade, initial charge of ClF_3/F_2 fed into cell/equipment.
V	**Floating**	Motors de-energized and isolation block valve(s) open and UF_6 pressure ≥ Cascade Minimum Suction Pressure.
VI	**Shutdown**	Cell/Equipment motors de-energized, block/boundary valves closed.
VII	**Venting**	Purge Cascade is venting non-UF_6 gases to atmosphere.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.2 SAFETY LIMITS

APPLICABILITY: All Cascade Operational Modes

2.7.2.1 SL: Cell coolant pressure shall be ≤ 440 psig

BASIS:

Overpressurization and rupture (multiple tubes) of the coolant system into the UF_6 system could result in the subsequent release of UF_6 due to overpressurization of the UF_6 enrichment system. The Safety Limit has been established at 110% of the MAWP based on the ASME Pressure Vessel Code, Division I, Section VIII. While not directly applicable to this application, the 110% overpressurization value does indicate that there is a high degree of confidence that the vessel pressure boundary will not fail at 110% of the stated MAWP.

APPLICABILITY: All Cascade Operational Modes (except during maintenance)

2.7.2.2 SL: Cascade pressures shall be ≤ 16 psia

BASIS:

Overpressurization and rupture of the cascade system could result in a release of UF_6 to the cell housing and potentially to the atmosphere.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.1 Coolant High Pressure Relief System

APPLICABILITY: Cascade Operational Modes II, III

LCS: ≤ 400 PSIG.

LCO: Coolant high pressure relief system shall be operable.

ACTIONS:

Conditions	Required Actions	Completion Time
A. Rupture disk inoperable	A.1 Place cell/equipment in Mode VI	30 Minutes
B. Isolation block valve closed or seal broken	B.1 Open or verify open valve **AND**	Immediately
	B.2 Reseal valve	8 Hours

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to entering Mode II or III from any of Modes I, IV, or VI	SR 2.7.3.1.1 Verify isolation block valve sealed open

BASIS:

The 1995 ASME Pressure Vessel Code, Division I, Section VIII requires that overpressure relief be provided by a device stamped at or below the MAWP and sized such that the subsequent transient pressure will be limited to a maximum of 110% of MAWP. ASME Code allows rupture disks to have a 5% burst tolerance. Rupture disks stamped at MAWP will therefore burst at or below 105% of MAWP. The LCS is set at 100% of MAWP. To comply with these standards, pressure relief devices are purchased and installed on the Cascade cell coolant condensers with stamped ratings at or below the MAWP [SAR Section 3.8.3.4].

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.2 Criticality Accident (Radiation) Alarm Systems

LCO 2.7.3.2a: Criticality accident detection shall be operable.

APPLICABILITY: In areas, equipment, or processes which contain greater than 700 grams of ^{235}U at an enrichment ≥ 1.0 wt % ^{235}U.

ACTIONS:

Condition	Required Action	Completion Time
A. Areas, equipment, or processes not covered by criticality accident detection.	A.1 Implement the following for areas, equipment, or processes applicable to this LCO and that are not otherwise covered by criticality accident detection.	Immediately
	A.1.1 Discontinue cell maintenance activities that require breach of the containment boundary of cells containing UF_6 enriched to ≥ 1 wt % ^{235}U.	
	AND	
	A.1.2 Monitor temperatures/pressures in the cascade cells containing UF_6 enriched to ≥ 1 wt % ^{235}U hourly to maintain UF_6 in the gaseous state.	
	AND	
	A.1.3 Waste containing uranium enriched to ≥ 1 wt % ^{235}U shall not be handled.	
	AND	
	A.1.4 Monitor temperature and pressure of surge drums containing UF_6 enriched to ≥ 1 wt % ^{235}U hourly to maintain inventory in gaseous state.	
	AND	
	A.2.1 Evacuate the area not covered by detection capability.	Immediately
	AND	
	A.2.2 Restrict access to area evacuated in A.2.1.	
	AND	
	A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate.	Immediately
B. Areas, equipment, or processes not covered by criticality accident detection.	B.1.1 Restore criticality accident detection by installing portable CAAS unit providing required criticality accident detection and same alarms as fixed unit.	48 Hours
	OR	
	B.1.2 Restore criticality accident detection to operable status.	48 Hours
	TSR 1.6.2.2(d) is not applicable.	

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.2 Criticality Accident (Radiation) Alarm Systems (continued)

LCO 2.7.3.2b: Criticality accident alarm shall be operable (audible).

APPLICABILITY: In areas where the maximum foreseeable absorbed dose in free air exceeds 12 rad.

ACTIONS:

Condition	Required Action	Completion Time
A. Area does not have an audible criticality accident alarm.	A.1 Implement the following for areas, equipment, or processes where a criticality accident could result in a maximum foreseeable dose exceeding 12 rad in the area of inaudibility and LCO 2.7.3.2a applies. A.1.1 Discontinue cell maintenance activities that require breach of the containment boundary of cells containing UF_6 enriched to ≥ 1 wt % ^{235}U. AND A.1.2 Monitor temperatures/pressures in the cascade cells containing UF_6 enriched to ≥ 1 wt % ^{235}U hourly to maintain UF_6 in the gaseous state. AND A.1.3 Waste containing uranium enriched to ≥ 1 wt % ^{235}U shall not be handled. AND A.1.4 Monitor temperature and pressure of surge drums containing UF_6 enriched to ≥ 1 wt % ^{235}U hourly to maintain inventory in gaseous state. AND A.2.1 Evacuate area of inaudibility. AND A.2.2 Restrict access to area evacuated in A.2.1. AND A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate, or a radio in constant communication with the Plant Control Facility.	Immediately Immediately Immediately
B. Area does not have an audible criticality accident alarm.	B.1.1 Restore criticality accident alarm to operable status. TSR 1.6.2.2(d) is not applicable.	48 Hours

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.2 Criticality Accident (Radiation) Alarm Systems (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Semiannually	SR 2.7.3.2.1 Calibrate radiation clusters to a set point of 5 mRad/hr. in air
	SR 2.7.3.2.2 Verify that the cluster nitrogen horn and X-300 alarm sounds when two out of three channels in a cluster are tripped.
Quarterly	SR 2.7.3.2.3 Verify that the nitrogen supply pressure to the cluster horns is at least 900 psig.

BASIS:

Within the cluster, three neutron-sensitive detection units are provided to detect radiation from a criticality accident. Clusters will actuate an alarm within 0.5 seconds after activation by a minimum credible criticality accident of concern, defined as producing an integrated total dose of 20 Rads. in one minute at two meters from the reacting material. This system will provide an audible signal in the event of a criticality which will alert personnel to evacuate the immediate work areas. The minimum acceptable length of time for the CAAS horn to sound is 2 minutes [SAR Sections 3.8.7.1 and 4.3.2.6].

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.3 High Pressure Fire Water System

APPLICABILITY: Cascade Operational Modes I through VII, Mode VI is not applicable when the lube oil is valved off or removed from the cells covered by a specific sprinkler system

LCO: The high pressure fire water system shall be operable.

ACTIONS: **Note:** TSR 1.6.2.2(d) does not apply

Condition	Required Actions	Completion Time
A. No water flow capability at individual sprinkler system	A.1 Halt hot work activities in the affected area **AND**	Immediately
	A.2 Restore water flow capability	4 Hours
	A.3 Obtain special Fire Services approval, provide appropriate portable fire suppression equipment, and a continuous fire watch	Prior to resuming any hot work activities in the affected area
B. Condition A.2 required actions and/or completion time not accomplished	B.1 Initiate fire patrols every 4 hours for the affected area	4 Hours
C. ≤ 16,000 gpm but ≥ 4,000 gpm available for 4 hours	C.1 Restore water supply capability	8 Hours
D. Condition C. required actions and/or completion time not accomplished	D.1 Initiate expedited repairs to restore water supply capability	Immediately
E. < 4,000 gpm available for 4 hours	E.1 Initiate expedited repairs to restore water supply capability **AND**	Immediately
	E.2 Halt hot work activities in the affected area **AND**	Immediately
	E.3 Initiate fire patrols every 4 hours for the affected areas	4 Hours

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.3 High Pressure Fire Water System (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Monthly	SR 2.7.3.3.1 Manually start electric and diesel fire water pumps
Monthly	SR 2.7.3.3.2 Verify X-640-2 Fire Water Storage Tank contains at least 270,000 gallons of water (filled to at least 90% of capacity).
Monthly	SR 2.7.3.3.3 Verify adequate diesel supply for diesel fire water pumps in X-640-1 and X-6644 pumphouses.
Annually	SR 2.7.3.3.4 Functionally test sprinkler system at the Inspection Test Valve (ITV) for sustained water flow
Annually	SR 2.7.3.3.5 Simulate automatic start of electric fire water pumps
Annually	SR 2.7.3.3.6 Verify electric and diesel fire water pump flow is ≥ 90% of their rated capacity
Annually	SR 2.7.3.3.7 Verify sprinkler system control valves are in the desired position by viewing the "post indicator" on the valve. **AND** Operate the valves (except those that are planned to be closed) and verify the actuation of the supervisory alarm. **AND** Verify valve is left in open position by "drain" test.
Annually	SR 2.7.3.3.8 Visually inspect the exterior of X-640-2 Fire Water Storage Tank.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.3 High Pressure Fire Water System (continued)

BASIS:

The fire protection system is provided to mitigate a fire that could cause structural damage to roof purlins, trusses and columns followed by localized collapse of the roof with potential onsite and off-site consequences due to the breach of the UF_6 containment boundary and the resulting UF_6 release. Surveillances for fire water pump testing apply to those pumps relied upon to meet required flow rates. These systems are designed to meet the intent of the insurance industry "improved risk" criteria as interpreted by the Authority Having Jurisdiction (AHJ) as described in SAR Section 5.4. The sprinkler system will minimize the potential for, and mitigate the effects of a large fire. The fire water system flow requirement is conservative with respect to the system evaluation presented in the SAR [SAR Sections 3.8.7.2 and 4.3.2.1.9].

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.4 Coolant Removal

APPLICABILITY: Cascade Operational Mode IV

LCO: Cell coolant systems shall be drained of coolant before addition of oxidants for cell treatment.

ACTIONS:

Condition	Required Actions	Completion Time
A. Failure to drain coolant prior to adding oxidants and there are no indications of a reaction	A.1 Evacuate cell contents	1 Hour
B. Failure to drain coolant prior to adding oxidants and there are indications of a reaction	B.1 Stop cell/equipment motors AND	Immediately
	B.2 Drain coolant	1 Hour

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each cell treatment	SR 2.7.3.4.1 Verify and document the removal of cell coolant prior to the initial charge of oxidants.

BASIS:

In the event of a leak from the coolant system to the process gas, the failure to control the concentrations of coolant and ClF_3/F_2 within the cell can form explosive mixtures that in the presence of an ignition source could over pressure the cell and release toxic materials. The draining of coolant includes the evacuating of the coolant system to between 18 and 30 inches of Hg for the X-27 and X-29 size equipment. The other equipment sizes have no specific coolant evacuation requirement other than for the system pressure to be below atmospheric pressure. The indications of an exothermic reaction are usually rapid pressure spikes and/or a rapid increase in temperature.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.5 Cell Treatment Monitoring

APPLICABILITY: Cascade Operational Mode IV

LCO: Cell treatments shall be monitored with an Infrared Analyzer.

ACTIONS: Note: TSR 1.6.2.2(d) does not apply

Condition	Required Actions	Completion Time
A. Infrared Analyzer inoperable	A.1 Initiate sampling for free ClF_3 and the presence of hydrocarbons	30 Minutes
B. Above condition required actions and/or completion time are not accomplished	B.1 Evacuate cell contents	30 Minutes

SURVEILLANCE:

Frequency	Surveillance
Each cell treatment	SR 2.2.3.5.1 Verify and document the installation of an Infrared Analyzer prior to the initial charge of treatment gas

BASIS:

Failure to maintain an adequate amount of ClF_3 within the cell can lead to the formation of reaction products that will result in highly exothermic reactions upon the re-introduction of ClF_3/F_2. In addition, the Infrared Analyzer is used to detect the presence of hydrocarbon materials that could also react violently with ClF_3/F_2 under the right conditions. Replacing an inoperable analyzer can take up to three hours. For this reason sampling is initiated within thirty minutes and continued until an operable analyzer is hooked up and operating properly.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.6 Cell Inverse Recycle Treatment

APPLICABILITY: Cascade Operational Mode IV

LCO: Individual cells shall be isolated from each other when the cell inverse recycle treatment method is used.

SURVEILLANCE:

Frequency	Surveillance
Each cell inverse recycle treatment	SR 2.7.3.6.1 Verify and document an inverse recycle treatment cell is not tied together with any other cell prior to the initial charge of treatment gas

BASIS:

Due to the inverse recycle treatment method there is no assurance that an adequate supply of ClF_3 would be present in the second cell tied to the parent cell. The lack of a sufficient amount of ClF_3 allows the formation of ClO_2 on the interior cell surfaces that upon contact with a new supply of ClF_3 will react violently and could cause a breach in the cell containment; thereby releasing toxic materials and spreading contamination.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.7 Oxidant Control

APPLICABILITY: Cascade Operational Modes II, VII

LCO: Oxidant addition to the Cascade shall be administratively controlled to prevent explosive mixtures in the Purge Cascade.

ACTIONS:

Conditions	Required Actions	Completion Time
A. Oxidant addition administrative control assumptions(Side Purge venting, Freon Degrader reaction not occurring and Drum bleed back of oxidants controlled) violated	A.1 Re-establish control assumptions	1 Hour
B. Condition A Required Actions and/or Completion Time not accomplished	B.1 Stop oxidant additions AND restore oxidant addition control	Prior to re-instituting any oxidant additions

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Twice a shift	SR 2.7.3.7.1 Ensure drum bleed back rate of oxidants is ≤ to the calculated rate determined by the control model

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.7 Oxidant Control (continued)

BASIS:

Failure to control the concentrations of ClF_3/F_2 within the Cascade can result in the formation of highly exothermic mixtures with coolant, that in the presence of an ignition source may have the potential to cause a breach in the cell containment; thereby releasing toxic materials and spreading contamination.

The prevention of these highly exothermic reactions is based on controlling the amount of oxidants that are available to react with the coolant that is always present in the Cascade flow. The following study, K/ET-302, Safety Guidelines For Cascade Treatment Materials, established the safe concentrations for ClF_3/F_2. An administrative control/model for ensuring oxidant concentrations stay below the reactive level is used and has been validated through plant operations. The basic premise of the model is to maintain the ClF_3/F_2 concentrations in the Top Purge Cascade to ≤ 16 mole%. This is achieved by controlling drum bleed back (LCO 2.7.3.7) and Freon Degrader operations (LCO 2.7.3.8 & 2.7.3.9) and by ensuring proper operation of the Side Purge (venting).

Previous and current studies have determined that a potentially reactive mixture is not achieved until the oxidant concentrations exceed 19 mole% at 2.9 psia.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.8 Freon Degrader

APPLICABILITY: X-326 Cascade Operational Mode II (i.e., F_2 and coolant flow into reactor)

LCO: No more than 1 Freon Degrader in operation at a time.

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Once per shift	SR 2.7.3.8.1 Verify and document that no more than one Freon Degrader is operating

BASIS:

The combined addition of unreacted F_2 from 2 Freon Degraders on the Cascade is not an assumption in the administrative modeling method for ensuring safe oxidant concentrations and therefore could cause the exceedance of the safe oxidant limit.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.9 Freon Degrader Fluorine Flow

APPLICABILITY: X-326 Cascade Operational Mode II (i.e., F_2 and coolant flow into reactor)

LCO: Fluorine addition to Freon Degrader shall be ≤ 400 scfd.

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Annually	SR 2.7.3.9.1 Calibrate four Cell Floor Freon Degrader F_2 supply capillaries to 25, 50, 100, 200 scfd, respectively, at 5.0 psig fore pressure
Annually	SR 2.7.3.9.2 Calibrate one Operating Floor Freon Degrader F_2 supply capillary to 265 scfd at 0 psig fore pressure
Annually	SR 2.7.3.9.3 Perform functional test of the Cell Floor Freon Degrader to verify that F_2 high high pressure will shutoff F_2 supply to the Freon Degrader
Semiannually	SR 2.7.3.9.4 Calibrate the Cell Floor Freon Degrader high high pressure F_2 trip at ≤ 5.0 psig
Annually	SR 2.7.3.9.5 Perform functional test of the Operating Floor Freon Degrader to verify that F_2 high pressure will shutoff F_2 supply to the Freon Degrader
Semiannually	SR 2.7.3.9.6 Calibrate the Operating Floor Freon Degrader high pressure F_2 trip at ≤ 0 psig

BASIS:

Oxidant concentration can build up in the Top Purge and therefore could form a highly exothermic reacting mixture that in the presence of an ignition source will react and has the potential to create an overpressure situation that may result in breaching the process system and the release of process gas to the environment. Previous studies have determined that an the highly exothermic reaction is not achieved until the oxidant concentration exceeds 19 mole%.

The addition of 400 scfd unreacted F_2 on the cascade would not exceed the assumptions made in the administrative model for ensuring safe oxidant concentrations in the Purge Cascade.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.10 Side Feed Cylinders

APPLICABILITY: X-326 Cascade Operational Mode II, side feeding of 5,8 and 12 inch cylinders containing LEU material.

LCO: Heat applied to cylinder body shall not exceed 500 watts

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Prior to side feed cylinder being fed in which heat is being utilized	SR 2.7.3.10.1 Verify that the heater rating is ≤ 500 watts

BASIS:

The limiting of the heating rate to 500 watts provides the assurance that the solid UF_6 will not liquify. Side feed operations may use a heat lamp, a heat ring, or no heat.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.11 UF_6 Plugs

APPLICABILITY: All Cascade Operational Modes

LCO: Direct heat sources shall not be applied to solid UF_6 plugs until line clarity in the system has been assured.

ACTIONS:

Condition	Required Actions	Completion Time
A. Direct heat source being applied to a solid UF_6 plug	A.1 Discontinue direct heat application to the UF_6 plug **AND**	Immediately
	A.2 Ensure line clarity	Prior to reapplying direct heat

BASIS:

The application of an external heat source directly to a UF_6 plug can liquify the UF_6 within the center of the plug and thereby cause sufficient hydraulic forces to rupture the pipe containing the plug. The primary concern over the direct application of heat (i.e., steam tracing, heat tape, etc.) to the plug versus indirect heating (i.e., heated housings) is due to the fact that the energy is added to the plug at such a high rate that it is not evenly distributed over the entire plug and therefore does not allow for the sublimation of the plug before a portion of it liquefies. The secondary concern is that even though the UF_6 plug stays as a solid it must have room to expand. The consequences of a release of UF_6 from this type of failure mechanism would be minimal due to the fact that the UF_6 plug would remain as a solid and therefore, the release rate would be slow as the UF_6 sublimes into the atmosphere.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.12 Cascade Pressure Limitation

APPLICABILITY: Cascade Operational Modes II and V

LCO: Cascade cell high side pressures shall be ≤ 14.45 psia for X-25 and X-27 size cells.

ACTIONS:

Condition	Required Actions	Completion Time
A. Cascade cell pressure discovered > LCO value for specified cell size	A.1 Reduce cell pressure to ≤ the LCO value for the specified cell size	Immediately

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Daily	SR 2.7.3.12.1 Verify that each cell is operating at ≤ the LCO value for the specified cell size
Prior to cascade physical inventory	SR 2.7.3.12.2 Calibrate the cell datum when utilized in place of the unit datum
Annually	SR 2.7.3.12.3 Calibrate the unit datum

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.12 Cascade Pressure Limitation (continued)

BASIS:

The accident analysis provided in SAR Section 4.3.2 assumes that cascade high pressure accidents proceed to their conclusion which, in some cases, results in some form of breach in the cascade system. It is at this point that the consequences are evaluated and the identification of any mitigating actions takes place. Maintaining cascade steady state pressure at or below 14.45 psia establishes an initial condition assumed in the evaluation of scenario consequences. The cascade was not designed to directly measure cell pressures in the ACR or to measure pressures that approach 40 psia. Motor load and other process indicators in the ACR alert the operator to significant cascade transients which require appropriate actions be taken, including cell shutdown, to preclude cascade pressures from exceeding 40 psia which is the postulated rupture pressure of cascade piping. The monitoring of cell pressures from the local cell panels is sufficient to ensure that the steady state pressures do not exceed 14.45 psia. Due to the ability to perform a channel check across the 4 or 6 stage pressure indicating controllers (PICs) per cell and the fact that within an operating cell any stage high side pressure increase will quickly cascade through the cell (i.e., raise the other stage high side pressure), it is not necessary that all the PICs are functional to determine the cell pressure. The calibration of the unit and cell datums will ensure an adequate level of accuracy (cell averaging) and therefore the calibration of individual PICs is not necessary. As part of the cascade inventories there are several data comparisons made that provide the information needed to identify any out of tolerance PIC without doing a calibration. The cascade inventory data comparison includes analyzing stage compression ratios and the comparison of motor amperage verses stage high side pressure against known process relationships.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.13 Cascade DC Control Power

APPLICABILITY: Cascade Operational Modes II and III

LCO: DC control (cell trip) power for UF_6 stage motors shall be operable.

ACTIONS:

Conditions	Required Actions	Completion Time
A. DC voltage potential < 200 at cascade unit battery room **OR** No DC power at the cell breaker	A.1 Notify Cascade Control of potential need to utilize alternate means for cell shutdown **AND**	Immediately
	A.2 Restore DC voltage potential	48 Hours
B. Condition A.2 required actions and/or completion time not accomplished	B.1 Shutdown affected cascade compressors	8 Hours
C. Battery system conditions (other than voltage) found outside surveillance parameters	C.1 Restore individual battery parameters to within limits	90 Days

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.13 Cascade DC Control Power (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Daily	SR 2.7.3.13.1 Verify cascade unit DC voltage ≥ 200
Each scheduled cell trip	SR 2.7.3.13.2 Utilize the ACR "motor stop" button for each scheduled cell trip. Monitor expected cell block valve closures and any required recycle valve actuation.
Quarterly	SR 2.7.3.13.3 Inspect battery terminals and racks for evidence of corrosion and for cell leakage of electrolyte.
	SR 2.7.3.13.4 Check that the specific gravity of the pilot cell is ≥ 1.180
	SR 2.7.3.13.5 Verify battery charger output is > 0 DC amps.
	SR 2.7.3.13.6 Visually check the cell electrolyte levels to verify the level is above the low level indication line and no more than 0.25 inches above the high level indication line.
Annually	SR 2.7.3.13.7 Check that the specific gravity of the cells is ≥ 1.180.

BASIS:

The accident analysis discusses the fact that large UF_6 release scenarios from the cascade can be mitigated or terminated by stopping the cell motors which allow the cascade systems to go to subatmospheric pressure [SAR Sections 3.8.3.2, 4.3.2.1.1, 4.3.2.1.2, 4.3.2.1.3, 4.3.2.1.7, and 4.3.2.1.8]. If during a release situation, this rapid reduction in cell pressure causes an "underloading" in this part of the cascade. It is at this time coupled with the internal resistance of the cascade equipment (control valves, barrier, piping, etc.) that there will be inleakage into the cascade which will mitigate the release until the necessary valve evolutions can take place to isolate the system from any additional supply of UF_6 and to prepare the system for compensatory actions and repair. The operator in response to process alarms and indications such as, two simultaneous smoke alarms in the same cell or a cell deblade will take action to shutdown the affected cell. In order to initiate a cell shutdown the

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.13 Cascade DC Control Power (continued)

BASIS (continued):

DC control and trip power circuit must be functional. However, the failure of the local cell trip circuit to function on demand does not constitute a significant impact on any of the scenarios where cell shutdown is assumed to occur at sometime during the scenario. This is due to the numerous alternate and independent means available for disrupting cell power, i.e., breaker manual trip or X-300/switchyard de-energization of electrical feeders, buses, transformer bays, main switchyard lines. In order to demonstrate the reliability of the ACR cell trip function, cell trips that are not required to mitigate a transient condition will be initiated from the ACR. Cell tripping is classified as a momentary load per IEEE Standard 485-1983, Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations, Section 4.2.3 and as such represents a small instantaneous ampere-hour load on the total battery banks. The additional battery surveillances provide additional assurances that the battery system will be able to deliver the power necessary to trip the cell breakers as long as the system voltage is maintained above 200 volts. Any failure of the cell trip action to stop the compressor motor(s) should be investigated. The 200 VDC value has been a long standing action point for establishing operability of these systems. For example, the 200 VDC value has been in the Operational Safety Requirements document since 1985. The use of available vendor information coupled with engineering evaluations provided the basis for the determination that the systems in question would perform at > than these specified parameters.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.14 Moderation Control

Applicability: Cascade Operational Modes I, II, III, IV, V, VI

LCO: Moderation Control shall be maintained when the UO_2F_2 mass is > safe mass.

ACTIONS: **Note:** TSR 1.6.2.2(d) does not apply

Condition	Required Actions	Completion Time
A. UO_2F_2 deposit > safe mass in a fluorinating (including chemical treatment) environment.	A.1 Continue to maintain a fluorinating environment for the deposit **AND** A.2 Initiate actions to determine the cause of deposit and its significance. **AND** A.3 Establish and document a plan of action **AND** A.4 Initiate SR 2.7.3.14.3	Immediately Immediately 30 Days 90 Days
B. UO_2F_2 deposit > safe mass with the deposit not in a fluorinating environment.	B.1.1 Establish a dry cover gas blanket at ≥ 14 psia except when performing maintenance or operational activities associated with remediation of the deposit, equipment removal or leak repair. **AND** B.1.2 Initiate SR 2.7.3.14.2 **AND** B.2 Remove equipment containing the UO_2F_2 deposit from the cascade **OR** Note: Upon completion of B.3, Condition A is re-entered. B.3 Initiate re-fluorinating activities	Within 72 Hours after entering Mode VI 12 Hours 180 days Within 72 hours of removal of dry cover gas blanket

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.14 Moderation Control (continued)

Condition	Required Actions	Completion Time
C. Installed equipment containing known or previously unknown deposit of UO_2F_2 deposit > safe mass opened to atmosphere.	C.1 Apply TSR 2.7.3.15 as appropriate to equipment removed **AND** C.2 A person shall be stationed to valve off local sprinkler system, if inadvertently actuated, anytime the system opening(s) remain uncovered. **AND** A fire watch, equipped with portable CO_2 and/or dry chemical fire suppression equipment, shall be established during cutting/welding **AND** Cover opening(s) with prestaged waterproof covers, if conditions develop where a moderating material can begin to enter opened equipment. **AND** C.3 Cover opening(s) that expose UO_2F_2 deposit to atmosphere when maintenance evolutions are <u>not</u> impacting equipment. **AND** C.4 Maintain dry cover gas blanket ≥ 14 psia when cascade system maintenance evolutions are <u>not</u> impacting equipment. **AND** Note: Upon completion of C.5, Condition B is re-entered. C.5 Maintain dry cover gas blanket ≥14 psia following completion of cascade system maintenance on affected equipment and UO_2F_2 deposit is not in a fluorinating environment.	Immediately Immediately Immediately after determining acceptable UF_6/HF conditions Within 72 hours after completing REQUIRED ACTION C.3 Within 72 hours after completing system maintenance
D. UO_2F_2 deposit > safe mass, not in a fluorinating environment and coolant system pressure ≤ RCW condenser pressure.	D.1.1 Increase coolant system pressure to > RCW condenser pressure. **AND** D.1.2 Initiate SR 2.7.3.14.1 **OR**	4 Hours 12 Hours
	D.2 Drain RCW from coolant condenser	20 Hours
E. UO_2F_2 deposit > safe mass with the deposit not in a fluorinating environment and required dry cover gas blanket < 14 psia.	E.1 Re-establish a dry cover gas blanket ≥ 14 psia.	12 Hours

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.14 Moderation Control (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Each shift when not in a fluorinating environment, deposit > safe mass and RCW not drained	SR 2.7.3.14.1 Verify coolant system pressure > RCW condenser pressure.
Each shift when dry cover gas blanket is required by Condition B or C	SR 2.7.3.14.2 Monitor the system pressure and adjust pressure to ≥ 14 psia.
Quarterly when in Condition A	SR 2.7.3.14.3 Monitor size of the deposit.
Quarterly	SR 2.7.3.14.4 Perform routine qualitative radiation surveys of bypass housings to check for deposits and initiate "NDA" quantitative measurements based on "radiation reading trending".

BASIS:

As used in this TSR, the term "safe mass" is defined as being 43.5% of the minimum fissionable mass for system conditions (enrichment, geometry, H/U, reflection, etc.). Cascade deposits of UO_2F_2 (and deposits of other compounds resulting from wet air inleakage) and freeze-out of UF_6 are an expected result of normal operation. It is considered non-credible for a dry criticality to occur in the Cascade. Therefore, for a freeze-out condition, criticality would not result and the UF_6 freeze-out may be remediated at the discretion of the operating organization. Any deposit that has a uranium mass less than the "always" safe mass (i.e., optimally moderated material) may be remediated at the discretion of the operating organization. In regards to those situations in which a loss of moderation control could result in criticality, it has been determined that NCSA specified controls provide double contingency against the inleakage of liquid water into the cascade. Based on additional technical evaluations it is not possible to hydrate a deposit of uranyl fluoride above a H/U ratio of 4 by exposure to ambient air within the process buildings. Therefore, there is no potential for criticality when a cascade deposit is less than the safe mass at a H/U ratio of 4 due to exposure to atmospheric water vapor in the ambient process building air.

The amount of water required for a criticality reaction varies with the enrichment and the mass. However, at any given enrichment, there is a minimum amount of water that is required for a criticality to occur. As the H/U ratio changes from this optimum level, the amount of water required overall increases. For enrichments between 3% and 7% ^{235}U the minimum amount of water occurs at an H/X ratio of about 200. The optimum H/U ratio is always greater than an H/U of 4. The TSR control time limits are established for a deposit in a buffered condition. The TSR time limits are based on the following assumptions: (1) that the equipment breathes with changes in atmospheric pressure, (2) that any atmospheric moisture entering the system remains in the system, (3) that an H/U of 4 is the maximum that can be achieved, and (4) that a minimum critical mass at an H/U of 4 is present. If the mass of the uranium deposit is greater than the minimum critical mass at an H/U of 4, it will always require more water to achieve criticality than would be required for the minimum critical mass at an H/U of 4. Therefore, the time required to reach the H/U ratio for a criticality to be possible would be greater than the time limit specified in the TSR. The only situation where the TSR controls would be in question would be for a deposit above a minimum critical mass at an H/U of 4 that had been exposed to wet air for an unknown period of time. In this event, sampling of the gas inside the equipment for moisture content and/or sampling of the deposit to determine the H/U ratio would potentially be required to establish a baseline. The deposit significance determination would provide the analysis of the adequacy of the TSR controls.

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.14 Moderation Control (continued)

UF_6, F_2, and ClF_3 react with available water more readily than UO_2F_2 absorbs water. For instance, water entering onstream cascade equipment will preferentially react with UF_6 to form more UO_2F_2 rather than react with UO_2F_2 to form hydrates (moderated forms) of UO_2F_2. HF gas formed as a byproduct of the water-UF_6 reaction cannot liquefy to moderate a deposit at the pressures encountered in the cascade. A UO_2F_2 deposit cannot become moderated if it is being continuously fluorinated and moderation is not a concern until the equipment is taken off-stream and evacuated of UF_6. Continued fluorination of the deposit provides nuclear criticality safety by preventing moderation of the deposit.

Chemical treatment processes which involve the addition of ClF_3 and/or F_2 (i.e. fluorinating agents) provide the same level of moderation control as when the deposit is exposed to UF_6. Fluorinating gas treatments have been used as a means of drying out equipment after exposure to atmospheric air and for removing/reducing uranium deposits since the enrichment plants were placed into service. It has been demonstrated that these fluorinating agents will react vigorously and preferentially with any available moisture. The presence of excess fluorinating agents will not only prevent further hydration of a deposit but will over time effectively remove any free moisture and dehydrate the exposed deposit to an H/U ratio as low as when the deposit was exposed to the UF_6 process. In addition, use of fluorinating agents will convert UO_2F_2 deposits to UF_6, thereby reducing the deposit mass. Repeated use of the fluorinating agents (i.e., chemical treatment) will proceed to reduce/eliminate the deposit which is the safest condition. Therefore, a deposit that has been hydrated to some extent due to "breathing" or during the times necessary to expose the deposit to atmosphere when maintenance functions are performed can be dehydrated by the presence of a fluorinating agent. The sustained liberation of UF_6 from the deposit during a chemical treatment is the proven indicator that the deposit has been dehydrated. Once a deposit has been dehydrated, re-entry into Condition B establishes a new initiating time for required actions. After having been exposed to a fluorinating environment in which there has been the sustained liberation of UF_6, the re-entry to the buffered condition for one year will not decrease the assumed safety margin for this condition. Chemical treatment activities as discussed in this LCO may include preparation activities such as evacuation, leakrate, seal checks and cell startup.

UO_2F_2 deposits in onstream operating equipment are not a nuclear criticality safety concern due to continuous fluorination of the deposit. Over time, sustained or large wet air inleakage in operating equipment (active process area) will readily announce itself in the form of changing motor loads, compressor surging, line recorder readings, stage control valve positions, A-suction pressures, etc. Additionally, deposit formation in operating equipment will be dispersed by the gas flow. This dispersion of UO_2F_2 can occur on the inside of process piping, across barrier tubing, on cooler fins and inside compressors on the rotor and stator. Due to this dispersion, the formation of deposits in unsafe geometries in active process areas where there is UF_6 gas flow is not likely, given the above indicators. However, the above mentioned indicators and continuous gas flow are not always available for wet air inleakage in bypass/auxiliary piping, expansion joints and valves (inactive process areas). Operational experience indicates that quarterly surveillances by NDA methods for UO_2F_2 deposits in inactive process area is appropriate for early detection and prudent remediation of the deposit. Follow up surveys are conducted to assure that the deposit does not become sufficiently large to become an operational problem or a cascade structural concern.

Upon discovery of a deposit exceeding the safe mass of uranium, the significance of the deposit is determined. The significance determination includes an assessment of the following criteria. If the mass and enrichment of the deposit, including uncertainty, is less than a minimum critical mass at an H/U of 4, the following items may have limited significance. Also, the determination of a deposit configuration and/or distribution may render further evaluation unnecessary.

a. mass and enrichment of the deposit;
b. formation mechanism and assessment of likely chemical composition of deposit;
c. distribution/configuration of the deposit relative to geometry or interaction parameters;
d. presence of a fluorinating environment during deposit formation;

SECTION 2.7 SPECIFIC TSRs FOR X-326 FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.14 Moderation Control (continued)

e. if fluorinating environment not always present, determine presence of dry gas buffer;
f. estimate length of time exposure to atmospheric moisture may have occurred;
g. evaluate mass of U at enrichment versus minimum critical mass at H/U of 4;
h. if mass of U is greater than a minimum critical mass at H/U of 4, calculate amount of water/time required to reach the H/U ratio where deposit mass equals minimum critical mass and compare to TSR controls.

Routine NDA surveillance methods are of limited value (e.g., with respect to quantification of deposit size) for active process areas which include compressors, converters, process gas coolers and freezer/sublimers. However, sustained or large wet air inleakage in active process areas will readily announce itself which will prompt corrective actions by operating personnel. Also, the formation of UO_2F_2 deposits in unsafe geometries in active process areas is not likely given the above corrective actions. The limited ability to hydrate a deposit in-place process equipment assures that these deposits will remain critically safe after shutdown. Thus the primary concern for the formation of UO_2F_2 deposits in unsafe geometries in operating equipment is if this equipment trips or is shutdown while containing UF_6 and massive wet air inleakage occurs. In this event, the wet air inleakage will be obvious from the equipment leak rate which will prompt corrective actions to limit the size of the deposit.

For shutdown equipment, moderation control can be provided by a fluorinating environment or by a dry gas (plant air or nitrogen) blanket over the deposit even if significant wet air inleakage has occurred. Once a system has been isolated from the cascade and filled to ≥ 14 psia with dry gas blanket, normal atmosphere pressure fluctuations may cause minor in and out flow through any existing system leaks. Analyses have demonstrated that this "breathing" of the cell or even the exposure to atmospheric air (diffusion) when the system is opened to allow for necessary maintenance will not significantly affect deposit moderation. Even for periods much longer than the one year limitation, moderation above an H/U ratio of 4 would not be expected. The daily surveillance demonstrates that the gas blanket is maintained as assumed in the analyses. The LCO requirements of this TSR assure nuclear criticality safety for equipment with UO_2F_2 deposits greater than a safe mass.

Maintenance evolutions or cascade system maintenance terminology, used in the Required Action statements, include other related tasks such as decontamination and sampling. Condition C is considered to be met when the UF_6 primary system is first breached. During the time frame it takes to cover the cell opening(s) created by equipment removal which would expose a greater than safe mass deposit to the atmosphere or while maintenance is being performed on the same opening(s), actions are taken to further reduce the probability of a criticality. These actions involve covering of equipment openings as soon as possible, stationing a person to valve off sprinkler water in case of an inadvertent actuation, establishing a fire watch and having waterproof covers available that can be quickly placed over the opening(s) should the sprinklers actuate under a real fire situation. The fire watch provides the capability for potentially mitigating a fire, utilizing CO_2 and/or dry chemical type of extinguishing agents, while in its early stages of development, thereby preventing any sprinkler actuation. If the normal equipment vertical opening orientation is assumed to exist, verses the SAR accident analysis assumed horizontal opening orientation, it would require a significantly long period of time to accumulate the necessary water mass to cause a criticality. The stated actions will preclude sufficient water from entering the equipment to moderate the deposit to a critical state. Also the potential for moderation from RCW system water is controlled by NCSA requirements and demonstrated to meet the double contingency principle. [SAR Section 5.2, Appendix A, sections 1.1 and 1.2]

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.15 Removed Equipment With Deposits

APPLICABILITY: Cascade Operational Mode VI, equipment removed from the Cascade with UO_2F_2 mass > safe mass

LCO: Equipment removed from the Cascade shall be handled as follows:

1. Equipment that has contained UF_6 and could contain > a safe mass of UO_2F_2 shall be surveyed prior to and after removal to determine PEH (Planned Expedious Handling) or UH (Uncomplicated Handling) classification.

2. Equipment classified as PEH shall have openings to atmosphere covered or closed.

3. Equipment classified as PEH shall be decontaminated to ≤ safe mass within 72 hours of removal and post PEH classification.

ACTIONS:

Conditions	Required Actions	Completion Time
A. Applicable equipment removed prior to classification survey	A.1 Declare the equipment PEH **AND**	Immediately
B. PEH equipment openings not covered or closed	B.1 Cover or close openings **AND**	Immediately after determination of acceptable UF_6/HF conditions
	B.2 A person shall be stationed to valve off local sprinkler system, if inadvertently actuated, during the time equipment opening(s) remain open or uncovered. **AND** Cover openings with prestaged waterproof covers, if conditions develop where a moderating material can begin to enter opened equipment	Immediately
C. PEH equipment not decontaminated to ≤ safe mass within 72 hours	C.1 Ensure equipment openings remain covered or closed **AND**	Immediately
	C.2 Reinitiate a dry air or nitrogen atmosphere	Immediately

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.3.15 Removed Equipment With Deposits (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Daily	SR 2.7.3.15.1 Inspect equipment for closed or covered openings
Prior to equipment exiting building	SR 2.7.3.15.2 Inspect equipment for closed or covered openings

BASIS:

For a criticality to occur in a piece of equipment with a uranium deposit that has been removed from the cascade would require that the deposit be moderated. Cascade deposits in operating equipment regardless of their size, at the enrichment level of ≤ 7% will remain safe as long as the deposit is unmoderated. For unmoderated deposits (H/U=0) > 7% assay but ≤ 20% assay the mass required for a criticality would exceed the amount of UF_6 available in the cascade at this enrichment range. As used in this TSR the term "safe mass" is defined as being 43.5% of the minimum fissionable mass for the assay of concern in a fully moderated and fully reflected system whether these specific conditions actually exist or not. In addition, determining the mass of any uranium deposit in the equipment allows segregation and controlled handling of equipment containing amounts of U^{235} that require additional controls to prevent the formation of an unsafe mass/geometry. It is not likely based on the chemistry of UO_2F_2 deposits for this potential mass to be moderated by diffusion of ambient air to greater than a H/U ratio of 4. The loss of moderation control as described in the SAR requires that the equipment be dropped such that an opening is tilted upwards to receive fire water (i.e. water in liquid state) and that a fire must occur simultaneously in order to actuate the sprinkler system (i.e. probability of a false actuation is $1x\ 10^{-6}$ per year, Factory Mutual) and this accident scenario meets Double Contingency. The actions that shall occur to further reduce the probability of a criticality, involve the covering of the equipment openings as soon as possible and during the time frame it takes to get covers in place, stationing a person to valve off sprinkler water in case of an inadvertent actuation and having waterproof covers available that can be quickly placed over the opening(s) should the sprinklers actuate under a real fire situation. If the normal equipment vertical opening orientation is assumed to exist, verses the SAR accident analysis assumed horizontal opening orientation, it would require a significantly long period of time to accumulate the necessary water mass to cause a criticality. Typically, the time to cover a removed piece of equipment is determined by the time necessary to lift it from the cell and the time to allow for flange cooling. However, this time frame can be extended due to UF_6/HF out gassing which is an immediate hazard to local personnel. In either case these actions will preclude sufficient water from entering the equipment to moderate the deposit to a critical state. [SAR Section 5.2, Appendix A, section 1.11].

SECTION 2.7 SPECIFIC TSRs FOR X-326 CASCADE FACILITY

2.7.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.7.4 GENERAL DESIGN FEATURES

2.7.4.1 Seal Exhaust Pump Overflows

DF: Seal exhaust pumps shall contain an overflow that limits the oil inventory in the pump

SURVEILLANCE:

Frequency	Surveillance
Prior to pump startup	SR 2.7.4.1.1 Verify that the oil overflow is in place and that the effluent valve if present is open

BASIS:

The seal exhaust pump cavities are of an unfavorable geometry in the presence of an oil moderator. The pump overflow lines ensure that the oil volume does not exceed the safe quantity when mixed with uranium of a limited enrichment that is documented in Nuclear Criticality Safety Evaluations and Approvals. [SAR Section 5.2, Appendix A, section 1.3]

SECTION 2.8 SPECIFIC TSRs

FOR

MISCELLANEOUS FACILITIES
(X-700, X-710, X-720, X-760, XT-847)

SECTION 2.8 SPECIFIC TSRs FOR MISCELLANEOUS FACILITIES (X-700, X-710, X-720, X-760, XT-847)

2.8.1 OPERATIONAL MODES

NONE

SECTION 2.8 SPECIFIC TSRs FOR MISCELLANEOUS FACILITIES (X-700, X-710, X-720, X-760, XT-847)

2.8.2 SAFETY LIMITS

NONE

SECTION 2.8 SPECIFIC TSRs FOR MISCELLANEOUS FACILITIES (X-700, X-710, X-720, X-760, XT-847)

2.8.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.8.3.1 Criticality Accident (Radiation) Alarm Systems

LCO 2.8.3.1a: Criticality accident detection shall be operable.

APPLICABILITY: In areas, equipment, or processes which contain greater than 700 grams of ^{235}U at an enrichment ≥ 1.0 wt% ^{235}U.

ACTIONS:

Condition	Required Action	Completion Time
A. Areas, equipment, or processes not covered by criticality accident detection.	A.1 Discontinue operations with fissionable material. AND A.2.1 Evacuate area within the area applicable to the LCO not covered by criticality accident detection. AND A.2.2 Restrict access to area evacuated in A.2.1. AND A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate.	Immediately Immediately Immediately
B. Areas, equipment, or processes not covered by criticality accident detection.	B.1.1 Restore criticality accident detection by installing portable CAAS unit providing required criticality accident detection and same alarms as fixed unit. OR B.1.2 Restore criticality accident detection to operable status. TSR 1.6.2.2d is not applicable.	Prior to re-initiating activities

SECTION 2.8 SPECIFIC TSRs FOR MISCELLANEOUS FACILITIES (X-700, X-710, X-720, X-760, XT-847)

2.8.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.8.3.1 Criticality Accident (Radiation) Alarm Systems (continued)

LCO 2.8.3.1b: Criticality accident alarm shall be operable (audible).

APPLICABILITY: In areas where the maximum foreseeable absorbed dose in free air exceeds 12 rad.

ACTIONS:

Condition	Required Action	Completion Time
A. Area does not have an audible criticality accident alarm.	A.1 Discontinue operations with fissionable material. AND A.2.1 Evacuate area of inaudibility AND A.2.2 Restrict access to the area of inaudibility. AND A.3 Provide personnel allowed into the area that would be restricted under Action A.2.1 with an alternate means of criticality alarm notification such as a device that will alarm on sensing a 10mr/hr dose rate, or a radio in constant communication with the Plant Control Facility.	Immediately Immediately Immediately
B. Area does not have an audible criticality accident alarm.	B.1.1 Restore criticality accident alarm to operable status. TSR 1.6.2.2d is not applicable.	Prior to re-initiating activities

SECTION 2.8 SPECIFIC TSRs FOR MISCELLANEOUS FACILITIES (X-700, X-710, X-720, X-760, XT-847)

2.8.3 LIMITING CONTROL SETTINGS, LIMITING CONDITIONS FOR OPERATION, SURVEILLANCES

2.8.3.1 Criticality Accident (Radiation) Alarm Systems (continued)

SURVEILLANCE REQUIREMENTS:

Frequency	Surveillance
Semiannually	SR 2.8.3.1.1 Calibrate radiation clusters to a set point of 5 mRad/hr. in air.
	SR 2.8.3.1.2 Verify that the cluster nitrogen horn and X-300 alarm sounds when two out of three channels in a cluster are tripped.
Quarterly	SR 2.8.3.1.3 Verify nitrogen supply pressure is at least 900 psig for each CAAS horn.

BASIS:

Each cluster consists of three neutron-sensitive detection units. Clusters are designed and calibrated to detect and alarm on a minimum credible criticality accident of concern, defined as producing an integrated total dose of 20 Rads. in one minute at two meters from the reacting material. This system will provide an audible signal in the event of a criticality which will alert personnel to evacuate the immediate work areas. The minimum acceptable length of time for the CAAS horn to sound is 2 minutes. [SAR Sections 3.8.7.1 and 4.3.2.6].

SECTION 2.8 SPECIFIC TSRs FOR MISCELLANEOUS FACILITIES (X-700, X-710, X-720, X-760, XT-847)

2.8.4 GENERAL DESIGN FEATURES

NONE

SECTION 3.0

ADMINISTRATIVE CONTROLS

SECTION 3.0 ADMINISTRATIVE CONTROLS

3.1 RESPONSIBILITY

3.1.1 The Vice President, Operations, shall have corporate responsibility for overall gaseous diffusion plant safety and shall have authority to take any measures needed to ensure acceptable performance of the staff in operating, maintaining, and providing technical support to the plant to ensure nuclear safety.

3.1.2 The General Manager shall be responsible for the overall safe operations of the plant and shall take any measures required to ensure the plant remains in a safe condition. The General Manager or his/her designee shall approve, prior to implementation, each proposed test, experiment, or modification to systems or equipment that affect nuclear safety. The General Manager shall delegate in writing the succession to this responsibility during his/her absence from plant site.

3.1.3 The Plant Shift Superintendent (PSS) shall be responsible for the operational aspects of the plant, and for the central control room command function. During any absence from the central control room while the plant is operational, an authorized designee shall be named and be present in the central control room. The term designee means a person who has been trained to execute plant emergency procedures. The designee shall have the capability to be in contact with the PSS using the plant communication systems when the PSS is absent from the central control facility.

3.1.4 The Organization Manager shall be responsible for the operations conducted within the facilities affected by this TSR for which he/she is responsible, and shall delegate in writing the succession of responsibility during absence from plant site.

3.2 ONSITE AND OFFSITE ORGANIZATION

3.2.1 Onsite and offsite organizations shall be established for facility operation and corporate management, respectively. The onsite and offsite organizations shall include the positions for activities affecting the nuclear safety of the gaseous diffusion plant and are described in Section 6.1 of the SAR.

a. Lines of authority, responsibility, and communications shall be established and defined for the highest management levels through intermediate levels to include operating organization positions. These relationships shall be documented and updated, as appropriate, in the form of organizational charts, functional descriptions of organization responsibilities and relationships, and job descriptions for positions down to and including first-line managers.

b. Individuals who perform training, health physics, quality assurance, nuclear criticality safety, and/or other safety functions shall have sufficient organizational freedom to ensure their independence from operating pressures.

3.2.2 FACILITY STAFF

a. Minimum staffing requirements for each facility are shown in Table 3.2.2-1. These staffing levels do not apply under conditions requiring facility evacuation.

b. Administrative procedures shall be developed, implemented, and maintained to limit the working hours of facility staff who perform safety functions (e.g., operators, health physics personnel, maintenance personnel), in accordance with the following guidelines.

Adequate shift coverage shall be maintained without routine heavy use of overtime. The objective shall be to have personnel work an 8-hour or 12-hour work day [i.e., a nominal 40 hour (can be as much as 48 hours) work week]. In the event that overtime must be used on a temporary basis, the following guidelines shall be used:

1. An individual should not be permitted to work more than 16 straight hours, excluding shift turnover;

2. An individual should not be permitted to work more than 16 hours in any 24 hour period, nor more than 24 hours in any 48 hour period, nor more than 72 hours in any 7 day period, all excluding shift turnover time;

3. A break of at least 8 hours should be allowed between work periods; the 8 hours may include shift turnover;

4. Except during outage periods, the use of overtime should be considered on an individual basis and not for the entire staff on a shift.

Any deviation from the above guidelines shall be authorized in advance by the General Manager or his designee, in accordance with approved administrative procedures and with documentation of the basis for granting the deviation. Routine deviation from the above guidelines is not authorized.

Management will assess on a monthly basis the application of overtime for facility staff who perform safety functions to ensure consistency with the overtime guidelines stated above.

SECTION 3.0 ADMINISTRATIVE CONTROLS

Table 3.2.2-1. On-site Functional Staffing Requirements[6]

Facility	Mode/Operation	Staffing Requirements
X-342, X-343, X-344	II, IV, V, VI	1 assigned Operator per building and 1 assigned individual in the building or surrounding cylinder yard
ERP, LAW, TAILS	II, III	1 assigned Operator per Building 1 assigned Operator per corresponding ACR 4, 1, 2 (this can be the same operator that satisfies Cascade Modes II, III, IV, V, VII)
X-300	At all times	1 assigned Operator or Cascade Coordinator and 1 Power Operator
X-300/PSS	At all times	1[3]
X-300/APSS	At all times	1[1]
X-326, X-330, X-333	II, III, IV, V, VII	1 assigned Operator each per ACR 1, 2, 3, 4, 6
X-326, X-330. X-333	II, III, IV, V, VI	1 assigned Operator per building
Freezer/Sublimers X-333	I, II	1 assigned Operator[4]
Freezer/Sublimers X-333	III	1 assigned Operator[5]
Cold Recovery X-330/X-333	III, IV, V	1 assigned Operator per building
Radiation Protection	At all times	1[1]
Utility Operations	At all times	4[1]
Power Operations	At all times	2[1, 8]
X-705	Calciner Mode III	1 assigned Operator
Fire Brigade	At all times	4[2]
Process Services/ Mass Spectrometry Analytical Functions	At all times	2[1, 7, 8]
Protective Force	At all times	4[1]

[1] These individuals are not tied to a particular duty station and are only required to be on site.
[2] Fire Brigade members making a run to deliver an individual to a local hospital are considered to be on duty and available.
[3] If the PSS needs to leave the X-300, a designee can be assigned in accordance with TSR 3.1.3.
[4] Operators must be within confines of building and may have other duties assigned.
[5] This can be the same operator assigned when F/S is in Modes I and II.
[6] Staffing may be less than the minimum requirement listed for a period of a time not to exceed four hours in order to accommodate unexpected absence of on-duty shift members provided immediate action is taken to restore the shift manning requirements to within the minimum requirements. ACRs 1, 2, 3, 4, and 6 plus the PSS position shall be manned in all applicable modes.
[7] Staff will not be on-site unless analytical support is required.
[8] Staff may be reduced to 1 individual if Cascade "Product" and "Tails" withdrawal streams are not established.

SECTION 3.0 ADMINISTRATIVE CONTROLS

3.3 FACILITY STAFF QUALIFICATION

Facility positions are filled with persons whose experience and/or training qualify them for their respective positions. The minimum qualifications, functions, and responsibilities for key staff positions are described in the Safety Analysis Report.

3.4 TRAINING

3.4.1 The Training Program shall ensure that individuals relied upon to operate, maintain, or modify the plant in a safe manner are properly trained to do so. The training program shall be based on a systems approach to training and shall consist of the following basic components:

a. Systematic analysis of jobs to be performed

b. Learning objectives derived from the analysis that describe desired performance after training

c. Training design and implementation based on the learning objectives

d. Evaluation of trainee mastery of the objectives during training

e. Evaluation and revision of the training based on the performance of trained personnel in the job setting.

The training program shall be established, implemented, and maintained as described in Section 6.6 of the SAR.

3.5 REVIEWS, ASSESSMENTS, AND AUDITS

A system of reviews, assessments, and audits shall be implemented as defined in the Quality Assurance Program and Section 6.8 of the SAR to ensure the health, safety, and environmental programs are being conducted in accordance with regulatory requirements and commitments and for on-going assurance that these programs are adequate and effectively implemented.

SECTION 3.0 ADMINISTRATIVE CONTROLS

3.6 TECHNICAL SAFETY REQUIREMENTS (TSR) BASES CONTROL

Changes to the TSR Basis statements shall be reviewed and approved in accordance with the plant change control process as described in Section 6.3 of the SAR.

3.7 EFFECTS OF NATURAL PHENOMENA

Emergency response procedures shall be established, implemented, and maintained to prescribe plant response to the following natural phenomena events:

- Earthquake
- Tornado/High Winds
- Flooding/Intense Precipitation

3.8 PROCESS VENTILATION AND OFF-GAS

Control of radioactive emissions shall be established implemented and maintained as described in Section 5.1 of the SAR.

3.9 PROCEDURES

3.9.1 SCOPE

Written procedures shall be prepared, reviewed, approved, implemented, and maintained (except for a limited time as specified in the Compliance Plan) to cover the following:

a. Activities described in SAR Section 6.11.4.1 and listed in Appendix A to SAR Section 6.11;

b. Operator actions and administrative controls described in SAR Chapter 4 to prevent or mitigate the consequences of accidents; and

c. Programs specified and described in TSRs 3.11 through 3.19, and 3.23.

3.9.2 REVIEW AND APPROVAL

a. Each new procedure required by TSR 3.9.1 shall be reviewed by the PORC in accordance with TSR 3.10.

b. Each proposed change to the procedures required by TSR 3.9.1 shall be reviewed by the PORC in accordance with TSR 3.10 if:

1. The proposed change requires a written safety analysis in accordance with 10 CFR 76.68; or

2. The proposed change results in a change to the documents listed in TSR 3.10.5.b, c, and d; or

3. The proposed change constitutes an intent change (i.e., a change in scope, method, or acceptance criteria that has safety significance).

c. Each procedure required by TSR 3.9.1 and changes thereto shall be approved in accordance with approved administrative procedures prior to implementation and reviewed periodically as set forth in administrative procedures.

3.9.3 TEMPORARY CHANGES

Temporary changes to procedures required by TSR 3.9.1 may be made provided:

a. The temporary change does not require a written safety analysis in accordance with 10 CFR 76.68; and

b. The temporary change does not result in a change to the documents listed in TSR 3.10.5.b, c, and d; and

c. The temporary change does not constitute an intent change (i.e., a change in scope, method, or acceptance criteria that has safety significance); and

d. The change is approved by two members of the plant management staff, at least one of whom is the Plant Shift Superintendent; and

e. The change is documented, reviewed, and approved in accordance with TSR 3.9.2 within 14 days of implementation.

3.10 PLANT OPERATIONS REVIEW COMMITTEE (PORC)

A Plant Operations Review Committee shall be constituted and shall function to perform multi-discipline reviews of day-to-day and proposed plant activities (as described in this TSR) to ensure that these activities are/will be conducted in a safe manner.

SECTION 3.0 ADMINISTRATIVE CONTROLS

3.10.1 MEMBERSHIP

a. The PORC shall consist of a minimum of ten people (including the chair) and designated alternates. No more than a minority of the members shall have direct responsibility for plant operations.

b. PORC membership shall be multi-disciplinary and shall have the necessary qualifications, competence and experience to provide reviews of the following functional areas:

- Cascade and Chemical Operations
- Engineering
- Maintenance
- Nuclear Safety
- Nuclear Criticality Safety Engineering
- Radiological Safety
- Chemical, Industrial, and Environmental Safety
- Quality Assurance
- Safeguards

3.10.2 QUALIFICATIONS

PORC members shall have:

a. A minimum of bachelors degree in engineering or the physical sciences, or equivalent technical experience as defined in the Safety Analysis Report.

b. Four years of nuclear experience with a minimum of 6 months experience in a gaseous diffusion plant.

c. The member which has the expertise in Nuclear Criticality Safety Engineering shall have the qualifications of a Senior Criticality Safety Engineer as defined in the Safety Analysis Report.

3.10.3 MEETING FREQUENCY AND QUORUM

a. The PORC shall meet at a minimum of once per calendar month.

b. A PORC meeting quorum shall consist of the chair plus six members, of which no more than two may be alternates. The quorum shall include members with technical competence in the following areas:

- Operations
- Engineering
- Nuclear Criticality Safety Engineering
- Radiological Safety
- Quality Assurance

3.10.4 FUNCTIONS

The PORC shall, as a minimum, incorporate functions that:

a. Advise the General Manager on matters related to nuclear safety;

b. Recommend to the General Manager approval or disapproval of items considered under TSR 3.10.5 prior to their implementation except as provided in TSR 1.6.4 and TSR 3.9.3;

c. Determine whether each item considered under TSR 3.10.5 requires prior NRC approval before implementation per 10 CFR 76.68 and 76.45.

d. Notify the Vice President, Operations, of any safety significant disagreement between the PORC and the General Manager within 24 hours. However, the General Manager shall have responsibility for resolution of such disagreements pursuant to TSR 3.1.2.

3.10.5 RESPONSIBILITIES

The PORC shall be used to conduct, as a minimum, reviews of the following:

a. All proposed procedures and procedure changes as required by TSR 3.9.2;

b. All proposed changes to the Safety Analysis Report;

c. All proposed changes to the Emergency Plan, Quality Assurance Program Description, Physical Security Plan for the Protection of Special Nuclear Material of Low Strategic Significance, Security Plan for the Transportation of Special Nuclear Material of Low Strategic Significance, Security Plan for the Protection of Classified Matter, Fundamental Nuclear Materials Control Plan, Radioactive Waste Management Program, Depleted Uranium Management Plan, Decommissioning Funding Program Description, Environmental Compliance Status

Report, and Supplemental Environmental Information Related to Compliance Plan that are included in the certification application.

d. All proposed changes to the TSRs, the TSR basis statements, the Certificate of Compliance, or the Compliance Plan;

e. All proposed changes to the plant or the plant's operations, including tests and experiments, that require a written safety analysis in accordance with 10 CFR 76.68.

f. All nuclear criticality safety evaluations and approvals except editorial changes;

g. All proposed Requests for Enforcement Discretion;

h. NRC-required event reports.

3.10.6 RECORDS

Written records of PORC reviews shall be maintained. As a minimum, these records shall include:

a. Results of the activities conducted under the provisions of TSR 3.10;

b. Recommended approval or disapproval of items considered under TSR 3.10.5;

c. Determination of whether each item considered under TSR 3.10.5 requires prior NRC approval before implementation per 10 CFR 76.68 and 76.45.

d. Minutes of PORC meetings, as approved by the chair or his/her designee.

e. Appointments of PORC members and alternates.

3.11 NUCLEAR CRITICALITY SAFETY PROGRAM

3.11.1 A Criticality Safety Program shall be established, implemented, and maintained as described in the Safety Analysis Report and shall address the following elements:

- Adherence with ANSI/ANS Standards
- Nuclear Criticality Safety Responsibilities
- Process Evaluation and Approval
- Identification of SSCs and support systems necessary to meet the double contingency principle.
- Design Philosophy and Review
- Criticality Accident Alarm System Coverage
- Procedure Requirements

- Posting and Labeling Requirements
- Change Control
- Operation Surveillance and Assessment
- Technical Aspects

3.11.2 All operations involving uranium enriched to 1.0 wt% or higher U-235 and 15 g or more of U-235 shall be based upon a documented nuclear criticality safety evaluation and shall be performed in accordance with a documented nuclear criticality safety approval.

3.11.3 A minimum margin of subcriticality of 0.02 in k_{eff}, shall be used to establish the acceptance criteria for criticality calculations.

3.11.4 The k_{eff} for criticality calculations shall be $\leq$ 0.9605 which includes the bias, uncertainty, and the margin of subcriticality.

3.11.5 The double contingency principle, as described in the Safety Analysis Report, shall be used as the basis for the design and operation of processes using fissionable materials. In those instances where double contingency is not met, TSRs shall be established, implemented, and maintained to prevent criticality from occurring.

3.12 FIRE PROTECTION PROGRAM

A Fire Protection Program shall be established, implemented, and maintained as described in SAR Section 5.4 and shall address the following elements:

- Fire Hazard Description and Evaluation
- Fixed Fire Suppression and Fire Detection Systems
- Mobile and Portable Equipment
- Testing and Inspection
- Staffing
- Fire Investigation, Permits, and Procedures

3.13 RADIATION PROTECTION PROGRAM

A Radiation Protection Program shall be established, implemented, and maintained as described in SAR Section 5.3 and shall address the following elements:

- HP Technician Training and Qualifications
- Personnel Exposure Control and Measurement
- Contamination Control

SECTION 3.0 ADMINISTRATIVE CONTROLS

- Radioactive Material Control
- Radiological Protection Instruments and Equipment
- Records and Reports

3.14 RADIOACTIVE WASTE MANAGEMENT PROGRAM

A Radioactive Waste Management Program shall be established, implemented, and maintained as described in the program description provided as a part of the Application and shall address the following elements:

- Radiological Characterization
- Waste Packaging and Labeling
- Radioactive Waste Processing and Storage
- Off-Site Waste Shipments
- Waste Disposal

3.15 MAINTENANCE

A Maintenance Program shall be established, implemented, and maintained as described in SAR Section 6.4 and shall address the following program elements:

- Training
- Maintenance Procedures
- Maintenance Programs
- Work Control
- Post Maintenance Testing
- Procurement, Receipt Inspection, Control, and Issuance of Q and AQ Items, Repair Parts, Materials and Services
- Control of Measuring and Test Equipment
- Maintenance History

3.16 ENVIRONMENTAL PROTECTION PROGRAM

An Environmental Protection Program shall be established, implemented, and maintained as described in SAR Section 5.1 and shall address the following program elements:

- Emission and Effluent Control Systems
- Air Emission Monitoring
- Meteorological Monitoring
- External Gamma Radiation Monitoring
- Water Monitoring

SECTION 3.0 ADMINISTRATIVE CONTROLS

- Biological Monitoring
- Soil and Sediment Monitoring
- Methods of Evaluation and Demonstration of Compliance

3.17 PACKAGING AND TRANSPORTATION PROGRAM

A packaging and transportation quality assurance program shall be established, implemented, and maintained as described in the NRC-approved version of UEO-1041, "Radioactive Material Packaging and Transportation Quality Assurance Program."

3.18 CHEMICAL SAFETY PROGRAM

A Chemical Safety Program shall be established, implemented, and maintained as described in SAR Section 5.6.

3.19 OPERATIONS

An Operations Program shall be established, implemented, and maintained as described in SAR Section 6.5 and shall address the following program elements:

- Shift Operations
- Cascade Operations Organization and Administration
- Chemical/Utilities/Power Organization and Administration
- Operator Responsibility, Authority and Shift Routines
- Operations Procedures and Operator Aids and System Labeling
- Permits and Logging
- Management Monitoring of Operations
- Control of Equipment

3.20 ACCIDENT ANALYSIS

The Accident Analysis is presented in SAR Chapter 4. Changes to the Accident Analysis shall be reviewed and approved in accordance with the plant design change control process in Section 6.3 of the SAR.

3.21 SHARING OF FACILITIES, STRUCTURES, SYSTEMS, AND COMPONENTS

Facilities, structures, systems, and components relied upon in Section 2 of the TSRs are controlled by USEC. The corporation is not dependent upon outside agencies to provide the level of safety described in this TSR.

SECTION 3.0 ADMINISTRATIVE CONTROLS

3.22 UTILITIES ESSENTIAL TO RADIOLOGICAL SAFETY

System boundary documents prepared as part of the Configuration Management Program shall identify utilities required by SSCs to perform their intended safety function.

3.23 WORKER PROTECTION FROM UF_6 PROCESS HAZARDS

Worker protection measures shall be established, implemented, and maintained to minimize the risk of and mitigate the consequences of releases of UF_6, UF_6 reaction products with moist air (e.g., UO_2F_2 and HF), and other associated process chemicals during normal, off-normal, and emergency conditions. Such measures shall address the radiation hazards presented by radioactive materials; the toxic (chemical) risk posed by radioactive materials and their reaction products with moist air; and plant conditions, including chemical hazards, that may adversely impact radiation risk or increase the probability of the release of radioactive materials. Other plant conditions including chemical hazards which may result in an occupational risk but which do not affect the safety of radioactive materials are subject to OSHA requirements and not addressed below. Such measures shall address the following elements:

a. Measuring workplace exposures as described in the radiation protection and chemical safety sections of the Safety Analysis Report, and maintaining those exposures at or below the levels specified in the Safety Analysis Report for soluble uranium and applicable requirements for hydrogen fluorides, fluoride, chlorides, refrigerating agents, and acid gases.

b. Implementing and maintaining contamination control measures for radioactive materials as described in the radiation protection section of the Safety Analysis Report.

c. Providing, and ensuring the use of, personal protective equipment as described in the radiation protection and chemical safety sections of the Safety Analysis Report.

d. Providing chemical hazard information and training to workers (HAZCOM) as described in the chemical safety section of the Safety Analysis Report to ensure that they will react correctly to chemical hazards and releases.

e. Training workers to comply with alarm response procedures in the event of a release of UF_6, UO_2F_2, HF or other chemicals identified in the chemical safety section of the Safety Analysis Report and ensuring their compliance with the plant "see and flee" policy as described in the Safety Analysis Report.

f. Controlling work and entry into locations where UF_6 may be present as described in the chemical safety and radiation protection sections of the Safety Analysis Report.

g. For buildings X-326, X-330, X-333, X-342, X-343, X-344, X-710, X-705, X-700:

(1) Controlling work in process areas where choice and freedom of emergency egress routes may be limited, for example, cranes or tunnels, by eliminating the source of the hazard or by providing personnel protective equipment or taking other protective measures as described in work control documents, work permits, or procedures as appropriate.

(2) Identifying and marking emergency egress routes in process areas and maintaining them free of obstruction.

(3) Providing illumination in process areas with battery backup for emergency egress. Where illumination with battery backup is not functional, not available, or not feasible, personnel shall be provided with functional portable lights.

3.24 RECORDS RETENTION

The following records will be retained for the specified durations. The administration of the records retention program is addressed in SAR Section 6.10.

3.24.1 The following records shall be retained for at least 2 years:

a. Changes in programs, plans, policies, procedures, and operations, including copies of the safety analysis on which the changes were based.

3.24.2 The following records shall be retained for at least 4 years:

a. Records of surveillance activities, inspections, and calibrations required by the TSRs

b. Records of maintenance activities associated with systems, structures, or components, related to nuclear safety.

3.24.3 The following records shall be retained until the end of the duration of the lease:

a. Records and drawing changes of plant changes made to systems and equipment described in the SAR.

b. The results of the review of any exceedance of a safety limit

c. The results of the review of any automatic alarm or protective device that does not function as required during operation

d. The results of the review of any failure to meet a limiting condition for operation.