

ENGINEERING CHANGE NOTICE-2

Page 1 of 2

1. ECN 709973

Proj.
ECN

2. ECN Category (mark one)

- Supplemental ☐
 Direct Revision ☒
 Change ECN ☐
 Temporary ☐
 Standby ☐
 Supersedeure ☐
 Cancel/Void ☐

3. Originator's Name, Organization, MSIN, and Telephone No.

B.S. Mo/NMS/T5-54/
 373-6500

4. USQ Required?

☒ Yes ☐ No

5. Date

8/21/01

6. Project Title/No./Work Order No.

PFP AB
 CACN 110747

7. Bldg./Sys./Fac. No.

234-5Z

8. Approval Designator

SQ

9. Document Numbers Changed by this ECN (includes sheet no. and rev.)

HNF-SD-CP-SDO-008 R7

10. Related ECN No(s).

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11. Related PO No.

N/A

12a. Modification Work

- ☐ Yes (fill out Blk. 12b)
☒ No (NA Blks. 12b, 12c, 12d)

12b. Work Package No.

N/A

12c. Modification Work Completed

N/A

Design Authority/Cog. Engineer Signature & Date

12d. Restored to Original Condition (Temp. or Standby ECNs only)

N/A

Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? ☒ Yes ☐ No

Replace existing Revision 7 of document with Revision 8
 attached to this ECN.

Incorporate change made in ECN-659390

USQ/E PFP-2001-27 Rev 0

14a. Justification (mark one)

- Criteria Change ☒
 Design Improvement ☐
 Environmental ☐
 Facility Deactivation ☐
 As-Found ☐
 Facilitate Const. ☐
 Const. Error/Omission ☐
 Design Error/Omission ☐

14b. Justification Details

Addition of criticality drains in GBs 642-A and
 642-E to safety class equipment. Also added
 added discussion of W-460 Project
 criticality safety features.

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

JP King T5-54 1
 LE Edvalson T5-54 1
 BS Mo T5-54 1
 SE Nunn T5-S1 1

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ENGINEERING CHANGE NOTICE

Page 2 of 2

1. ECN (use no. from pg. 1)

709973

16. Design Verification Required

☐ Yes
☒ No

17. Cost Impact

ENGINEERING

Additional ☐ : N/A
Savings ☐ : N/A

CONSTRUCTION

Additional ☐ : N/A
Savings ☐ : N/A

18. Schedule Impact (days)

Improvement ☐ N/A
Delay ☐ N/A

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

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

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

Document Number/Revision

Document Number/Revision

Document Number/Revision

HNE-SD-CP-TI-108
CPS-2-165-80010

21. Approvals

Signature

Date

Signature

Date

Design Authority BSM8/21/01

Design Agent

Cog. Eng. BSM8/21/01

PE

Cog. Mgr. DG Satterwhite8/28/01

QA

QA DR Groth8-29-01

Safety

Safety SE Nuan8/23/01

Design

Environ. N/A

Environ.

Other

Other

CSE R.F. Richard8/23/01USQ #1 R. W. Merscher9/04/01USQ #2 DR Groth9-13-01

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

DEFINITION AND MEANS OF MAINTAINING THE CRITICALITY PREVENTION DESIGN FEATURES PORTION OF THE PFP SAFETY ENVELOPE

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management
Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

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DEFINITION AND MEANS OF MAINTAINING THE CRITICALITY PREVENTION DESIGN FEATURES PORTION OF THE PFP SAFETY ENVELOPE

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**DEFINITION AND MEANS OF MAINTAINING THE CRITICALITY
PREVENTION DESIGN FEATURES PORTION OF THE PFP
SAFETY ENVELOPE**

HNF-SD-CP-SDD-008

Rev. 8

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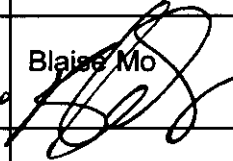
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1. PURPOSE

The purpose of this document is to record the technical evaluation of the Operational Safety Requirements described in the Plutonium Finishing Plant Final (PFP) Operational Safety Requirements, WHC-SD-CP-OSR-010, Rev. 0-N, Section 3.1.1, "Criticality Prevention System." This document, with its appendices, provides the following:

1. The results of a review of Criticality Safety Analysis Reports (CSAR), later called Criticality Safety Evaluation Reports (CSER), and Criticality Prevention Specifications (CPS) to determine which equipment or components analyzed in the CSER or CPS are considered as one of the two unlikely, independent, and concurrent changes before a criticality accident is possible.
2. Evaluations of equipment or components to determine the safety boundary for the system (Section 4).
3. A list of essential drawings that show the safety system or component (Appendix A).
4. A list of the safety envelope (SE) equipment (Appendix B).
5. Functional requirements for the individual safety envelope equipment (Sections 3 and 4).
6. A list of the operational and surveillance procedures necessary to maintain the system equipment within the safety envelope (Section 5).

2. BACKGROUND

The Criticality Safety Evaluation Reports (CSER) and associated Criticality Prevention Specifications (CPS) were reviewed to determine if an equipment or system failure considered in the analysis as one of the two unlikely, independent, and concurrent changes required before a criticality accident is possible had been included in specifications, procedures, and surveillance.

The CSERs take into consideration and use various factors as error or failure parameters. These include:

- Geometrically favorable equipment,
- Moderation control,
- Maximum total volume and mass,
- Maximum glovebox solids accumulation,
- Plutonium solution pH to control polymerization,
- Expeditious spill cleanup, and
- Maximum fissile masses,
- Maximum single container volume and mass,
- Minimum spacing between containers,
- Criticality drains,
- Maximum solids in tanks,
- Fissile material content of glovebox gloves.

The parameters are addressed in each CSER to assure that after one failure/error contingency the system will remain subcritical. These parameters and the calculations that establish their CPS limits were not inspected during this review. The review was concerned only with the identification of any specified physical or mechanical item evaluated as one of the two allowed events or contingencies and that the item identified was properly included in essential design drawings, the CSER, the CPS, and surveillance procedures.

3. SYSTEM FUNCTIONAL REQUIREMENTS

The Limiting Condition of Operation (LCO) requirements for the Criticality Prevention System are:

- 3.1. The 26-Inch Process Vacuum Liquid Detection Interlock System shall be OPERABLE whenever the 26-Inch Process Vacuum System is operating.
- 3.2. Glovebox Criticality Drains shall be OPERABLE (unobstructed) in the following locations:

234-5Z Gloveboxes

HC-1	HC-9B	HC-230C-3
HC-4	HC-227T	HC-230C-4
HC-5	HC-227S	HC-46F
HC-6	HA-21I	
HC-7	HA-23S	

Pu Process Support Laboratories Gloveboxes

188-1	179-10	179-12
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Engineering Laboratory Glovebox

522 (Room 152)

2736ZB, Project W-460

GB-642A (Room 642)	GB-642E (Room 642)
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236-Z Gloveboxes

MT-5	
MT-6	1st Floor East Cell Access
4th Floor Column	1st Floor West Cell Access
5th Floor Column (pipe chase)	2nd Floor East Cell Access
6th Floor Column (pipe chase)	2nd Floor West Cell Access

- 3.3. The following criticality safety features shall be in place.
 - Glovebox Sump Discs in gloveboxes HC-7, HC-9B
 - Glovebox Floor Filler Plates in glovebox HC-6
 - Raschig Rings in Room 166 Sump
- 3.4. Compliance with the requirements in the LCO, CPS and CSER are ensured by monthly inspections of the plant, equipment and criticality prevention postings; performance of functional tests; and compliance with procedural requirements. If the LCO, CPS or CSER requirements are not met, affected fissionable materials operations are immediately halted, specified notifications made, and a recovery plan is prepared and approved.

4. SAFETY ENVELOPE EQUIPMENT

Based on the review performed, there are several specific physical components or systems that must be present and/or operable to prevent criticality after the occurrence of a failure contingency. These are:

- Automatic shutdown and isolation features of the 26-inch Hg Process Vacuum System,
- Glovebox sump discs or floor filler plates used to limit glovebox solution depths before overflow,
- The Raschig rings used in the HC-6 overflow tank system in Room 166
- Glovebox criticality drains

Since these systems and component are considered to be present to prevent a criticality, they are Safety Class items in accordance with HNF-PRO-704. CSER evaluations have assumed that these items are present and operable. A more detailed description of these items is presented below.

4.1. 26-Inch Hg Process Vacuum System Automatic Shutdown And Isolation Features (CSER 78-013 AND CPS 80141)

Accidental criticality could occur in the 26-inch process vacuum HEPA filters if a solution containing plutonium were to enter the HEPA filterbox.

The possibility of accidental criticality is reduced by providing one engineered contingency (26-inch process vacuum interlock system) and administrative controls (PFP Operating Procedures) governing the use of the vacuum system for liquid transfers.

Further details on the 26-inch Hg Process Vacuum System, including procedures and surveillance, are provided in HNF-SD-CP-SDD-013, Definition and Means of Maintaining the Process Vacuum Liquid Detection Interlock Systems Portion of the PFP Safety Envelope.

4.2. Glovebox Sump And Floor Fillers

Glovebox sump and floor fillers have been installed to limit the solution depth to the criticality drain overflows and to fill 11-inch diameter by 2-inch deep sumps. These are Safety Class items.

4.2.1. Glovebox HC-7, Room 228-A (CSARs 79-024, 87-005, 88-001, 90-009, and CPS 80607)

The initial CSER 79-024 evaluation and a subsequent reevaluation, CSER 87-005, assumed that an 11-inch diameter, 2-inch thick stainless steel disc would be in place to fill the floor sump in glovebox HC-7. The sump filler disc is located by H-2-93504-3, EFD, RMC Line and described in H-2-24640 Sheets 1 and 2, Sump Probes for Gloveboxes. The disc's presence is verified by procedure ZSE-72-001, Perform Monthly Criticality Drain Inspection that requires a visual check that the disc is in place. If and when the glovebox is reactivated, a supplemental check of the sump filler disk check will be added to a more frequently performed procedure.

4.2.2. Glovebox HC-9B, Room 228A (CSARs 79-019 and 87-005, and CPS 80609)

A sump disc as described for HC-7 above is also required in HC-9B by the CPS. The disc is located by H-2-93504-3, EFD, RMC Line and described in drawing H-2-24640 Sheets 1 and 2. The verification surveillance is the same as for the HC-7 disc above.

4.2.3. Glovebox HC-6, Room 166 (CSAR 79-018 and 79-022 and CPS 80606)

Plates on glovebox HC-6 floor (1-1/2-inch + 1/4-inch thick Lexan¹ and stainless steel) are required by the CPS to maintain a safe slab in event of leakage. CPS 80606 and CSER 79-022 specify the plates. Drawing H-2-19405, ECN 500050 shows the plates location.

4.2.4. Inactive Gloveboxes (MT-3, H-7A and H-9A)

The CSER's for these gloveboxes require steel sump discs in the bottom to prevent exceeding a safe slab thickness before overflow to the criticality drain. All of these gloveboxes are out of service and respective CPSs are no longer needed. The gloveboxes are posted to prevent the addition, movement, storage, or removal of materials. New CSERs and CPS will be required to do any of the above or to start processing in MT-3, H-7A or H-9A.

If any of these gloveboxes are returned to service the sump fillers shall become Safety Class equipment and shall be added to the Safety Equipment List based upon the new CSER and CPS.

4.3. Raschig Rings In Glovebox HC-6, Overflow Tank System (CSER 79-018 and 79-022 and CPS 80606)

The CSER and CPS require the two HC-6 overflow tank floor pits in Room 166 near HC-6 be filled with Raschig rings to prevent criticality in case of box overflow through the criticality drains in Room 166. Drawing H-2-25598 specifies the rings. All calculations in the CSERs assumed the rings to be present. The HC-6 storage tanks are blanked off and are not presently in use but solution transfers are made through this box. The HC-4 Glovebox criticality drain is also located near the floor pits.

The ANSI/ANS Standard 8.5-1986, Use of Borosilicate Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material, requires confirmation that no liquids have been present prior to a biennial settling examination when the rings are used as secondary control. Secondary control applies when the rings are not in contact with solutions where solids buildup, ring corrosion, and ring damage from solution agitation is not possible. The rings have been physically measured and standard tests for the specifications of glass density, boron and boron-10 content and chemical corrosion resistance have been conducted in accordance with the standard.

¹ Lexan is a trademark of General Electric Co.

4.4. Criticality Drains (CSAR and CPS listed in Appendix B)

Criticality drains are provided for gloveboxes throughout 234-5Z, including the Plutonium Process Support Laboratory and the Analytical Laboratory, and in buildings 236-Z. and 2736ZB. The CSER's for many of these the gloveboxes assume the criticality drains are present, free flowing and not plugged. If the criticality drains were plugged, gloveboxes with sufficient fissile material could become critical with one additional contingency. For this reason, the criticality drains in the gloveboxes listed below are included in the safety envelope and are Safety Class equipment:

234-5Z Gloveboxes

HC-1	HC-4*	HC-227T
HC-5	HC-6*	HC-227S
HC-7*	HC-9B*	HA-21I
HA-23S	HC-230C-3	HC-230C-4
HC-46F		

Pu Process Support Laboratories Gloveboxes

188-1	179-10	179-12
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Analytical Laboratory Glovebox

522

236-Z Gloveboxes

4 TH Floor Column	1 ST Floor East Cell Access*	1 ST Floor West Cell Access*
5 TH Floor Column	2 ND Floor East Cell Access	2 ND Floor West Cell Access
6 TH Floor Column	MT-5	MT-6

2736ZB, Project W-460 Glovebox

GB-642A (Room 642)	GB-642E (Room 642)
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Gloveboxes marked with an asterisk (*) are equipped with sump alarms at approximately 1/2-inch above the floor level to alert the operators before the criticality drain overflow is reached. These sump alarms do not perform safety function, however these sump alarms are tested before liquid transfers and periodically when solutions are present under PM 2Z22134.

The MT-5 and MT-6 gloveboxes are connected to the PRF process portion of the PFP closed loop cooling system. The MT processes are currently inactive and have no future use scheduled. Should future plans require the use of the process features, technical documents will be revised and re-issued.

Several gloveboxes with criticality drains are out of service and posted to prevent the addition, movement, storage or removal of material. CPS-Z-165-80010 establishes that if any of the gloveboxes listed below are returned to service, their criticality drain(s) shall become Safety Class equipment and shall be added to the Safety Equipment List unless additional CSERs are prepared to prove the criticality drains are not required.

- H-7A
- H-9A
- MT-3
- HA-40F
- HC-60

Due to operational changes over time, alterations to Gloveboxes HC-21A and HC-21C have resulted in depressions below floor level, which have some potential to accumulate fissile materials or wastes. Like other gloveboxes connected indirectly to the criticality drains in HC-1 and HC-5, gloveboxes HC-21A and HC-21C handle only dry materials. Glovebox structure and exclusion of piping inside the gloveboxes preclude liquid entry under normal and most abnormal conditions. Material mass limits are used to ensure all areas in the gloveboxes would remain sub-critical even if fully moderated materials should accumulate. Filler blocks are in place in HC-21A to ensure liquids entering the depression drain to the HC-2 conveyor without exceeding volume limits. An isolation plate installed in HC-21C ensures that normal process materials cannot enter the depression in that glovebox. The blocks and plate are categorized as Safety Significant equipment; they are part of defense-in-depth provided by numerous criticality prevention limits and controls.

4.5. Other Criticality Safety Features Not Subject To LCO Level Control

The LCO 3.1.1 Bases Background establishes that the LCO is applicable to "active" criticality safety features (i.e., those that could readily be misconfigured during routine plant operations or by component failure). Numerous criticality safety analysis or criticality safety evaluation reports (CSARs and CSERs) credit "passive" criticality safety features such as seismic qualification of gloveboxes or spacing/geometry of tanks or vessels for preventing a criticality contingency. Control of "passive" criticality safety features is provided by OSR Administrative Controls (ACs) 5.10, "Facility Change Control", 5.11, "Unreviewed Safety Questions", and 5.15, "Nuclear Criticality Safety".

The CSERs for the magnesium hydroxide precipitation process utilize passive engineered features that provide geometrically favorable fissile material distributions within Gloveboxes HC-230C-3 and HC-230C-4. These criticality design features are Safety Class because they are relied upon to maintain double contingency protection against an accidental nuclear criticality. In particular, for Gloveboxes HC-230C-3 and HC-230C-4, the external structural framework (including floor anchors), precipitator tank and filtrate tank inner diameters, inner heights, intra-tank spacing, and filter basin diameter and height both above and below the filter plate, as well as criticality drains are identified. ECN 658096 "magnesium Hydroxide Precipitation Process Addendum to the Plutonium Finishing Plant Final Safety Analysis Report" Sections 4.3.1.1, 5.5.1.1, and Table 1 identify a limited flush water supply to the gloveboxes as a safety class feature. However, final versions of the CSERs eliminated the flush water supply limitation as a design feature needed to prevent a criticality contingency. Because the FSAR addendum identifies limited flush water as SC, the open-top gravity feed design of flush water tank TK-002 is designed as part of the safety class criticality design features until its listing is removed from the FSAR Addendum. The engineering drawings for these gloveboxes and details were designed as "Export Controlled" information during release of the SDD revision. A listing of applicable criticality safety related drawings can be obtained from the PFP Authorization Basis team.

The CSERs for the W-460 Project utilize passive engineered features that provide geometrically favorable fissile material distributions within Gloveboxes, GB-642A, GB-642B, GB-642C, GB-642D, and GB-642E. These criticality design features are Safety Class because they are relied upon to maintain double contingency protection against an accidental nuclear criticality. For Gloveboxes GB-642A, GB-642B, GB-642C, GB-642D, and GB-642E, the external structural elements (including floor anchors), as well as the criticality screen and drain in GB-642A are identified. Also, the Shielded Recessed Holders Assemblies in GB-642A and GB-642C are Safety Class and are required to have a minimum 6-inch edge-to-edge spacing. The engineering drawings for these gloveboxes and details are included in the SDD Appendix A OSR Compliance Sheet for completeness.

For Project W-460, all five gloveboxes are identified as Safety Significant. The four furnaces are constructed to only accommodate a single furnace boat layer and are therefore safety significant. In addition, the boathouse top is required to be constructed to be at least 5 inches above the glovebox floor and is therefore also safety significant. And finally, the Can Piercing Tool is also identified as Safety Significant.

5. SAFETY ENVELOPE PROCEDURES

Safety envelope (ZSE) procedures provide administrative control over the operation, maintenance, and surveillance of process equipment to maintain the operability of safety envelope components. ZSE procedures also provide for proper response to alarms resulting from abnormal conditions and/or equipment failures. In addition, the procedures identified below satisfy criticality prevention specifications and provide operators with instructions and precautions related to the presence and operation of the criticality prevention design features identified in this document.

5.1. 26-Inch Hg Vacuum System

Operation, maintenance and surveillance procedures which satisfy CPS-Z-165-80141 (26-Inch Hg Vacuum System) are provided in Definition and Means of Maintaining the Process Vacuum Liquid Detection Interlock Systems Portion of the PFP Safety Envelope, HNF-SD-CP-SDD-013.

5.2. Sump and Floor Fillers

Procedure ZO-100-400, Perform Nuclear Operations Surveillance and Responses are performed on regularly scheduled workdays. During procedure performance visual inspections of gloveboxes are made which would detect an obviously off-standard condition which would include missing sump or floor fillers in gloveboxes HC-6, HC-7 and HC-9B. This satisfies CPS-Z-165-80607, Glovebox HC-7: Feed Preparation; CPS-Z-165-80609, Glovebox HC-9B: Continuous Nitrate to Oxide Conversion; and CPS-Z-165-80606, Glovebox HC-6: Solution Transfer. If and when glovebox processes are reactivated, more detailed supplemental checks of sump and floor fillers will be added to procedures that are performed more frequently than the ZSE inspections.

Surveillance Requirement 3.1.1.3.1 is satisfied by performing ZSE-72-001, Perform Monthly Criticality Drain Inspection.

5.3. Raschig Rings-Glovebox HC-6 Overflow Tank System, Room 166

Surveillance Requirement 3.1.1.3.1 is satisfied by performing ZSE-72-001, Perform Monthly Criticality Drain Inspection.

5.4. Criticality Drains

Procedure ZO-100-400, Perform Nuclear Operations Surveillance and Responses are performed on regularly scheduled workdays. During procedure performance visual inspections of gloveboxes are made which would detect an obviously off-standard condition which would include solutions in excess of criticality prevention specification limits discovered standing in glovebox bays or on floors indicating a restricted criticality drain. This satisfies CPS-Z-165-80010, General Limits, and CPS-L-114-00010, Laboratory Uniform General Limits. If and when glovebox processes are reactivated, more detailed supplemental checks of criticality drains will be added to procedures that are performed more frequently than the ZSE inspections.

Procedure ZO-180-040, Test MT Criticality Drains, performs a monthly flow check of the MT-5 and MT-6 criticality drains to verify the drains are free flowing and not plugged. This procedure does not have to be performed to satisfy SR 3.1.1.2.1. It is an optional procedure performed to comply with good engineering practice and may not be performed when the MT-5 and MT-6 gloveboxes are not being used for processing.

Plant Operating Procedures for gloveboxes with criticality drains include criticality safety cautions concerning criticality drain operability and/or water flow limitations into the glovebox. The complete list of these procedures is provided as Attachment 1 of Appendix A.

Surveillance Requirement 3.1.1.2.1 is satisfied by performing ZSE-72-001, Perform Monthly Criticality Drain Inspection.

6. REFERENCES

1. HNF-SD-CP-SAR-021, Plutonium Finishing Plant Final Safety Analysis Report (PFP FSAR).
2. WHC-SD-CP-OSR-010, Plutonium Finishing Plant Operational Safety Requirements.
3. WHC-SD-CO84-RA-001, PFP Seismic Upgrades Review.
4. HNF-PRO-704, Hazard and Accident Analysis Process, Rev 0.
5. HNF-SD-CP-SDD-013, Rev. 3, Definition and Means of Maintaining the Process Vacuum Liquid Detection Interlock Systems Portion of the PFP Safety Envelope.
6. ANSI/ANS Standard 8.5-1986, Use of Borosilicate Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material.

APPENDIX A - OSR COMPLIANCE SHEET

OSR LCO COMPLIANCE SHEET	
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010, Rev. 0, Section 3.0):	
3.1.1 Criticality Prevention System	
LCO 3.1.1.1	The 26-Inch Process Vacuum Liquid Detection Interlock System shall be OPERABLE whenever the 26-Inch Process Vacuum System is operating
LCO 3.1.1.2	Glovebox Criticality Drains shall be OPERABLE (Unobstructed) in the following locations:
	234-5Z Gloveboxes
	HC-1 HC-7 HC-227-T HC-46F
	HC-4 HC-9B HC-227-S
	HC-5 HA-21I HC-230C-3
	HC-6 HA-23S HC-230C-4
	Pu Process Support Laboratories Gloveboxes
	188-1 179-10 179-12
	Analytical Laboratory Glovebox
	522 (Room 152)
	2736ZB, Project W-460
	GB-642A (Room 642) GB-642E (Room 642)
	236-Z Gloveboxes
	MT-5 MT-6 1st Floor East Cell Access
	4th Floor Column 1st Floor West Cell Access
	5th Floor Column 2nd Floor East Cell Access
	6th Floor Column 2nd Floor West Cell Access
LCO 3.1.1.3	The following criticality safety features shall be in place:
	Glovebox Sump Discs in gloveboxes HC-7, HC-9B
	Glovebox Floor Filler Plates in glovebox HC-6
	Raschig Rings in Room 166 Sump
APPLICABILITY:	3.1.1.1 All MODES
	3.1.1.2 All MODES
	3.1.1.3 All MODES

OSR LCO COMPLIANCE SHEET		
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010, Rev. 0, Section 3.0):		
3.1.1 Criticality Prevention System		
ACTIONS:		
CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Process Vacuum Liquid Detection Interlock System is inoperable.	A.1 Shut down 26-Inch Process Vacuum System.	IMMEDIATELY
	<u>AND</u> A.2 Enter MODE 2, Limited Plutonium Handling Operations. Prohibit all liquid transfers using 26" vacuum system.	IMMEDIATELY
B. Criticality Drain is inoperable.	B.1 Suspend operations in affected glovebox. <u>AND</u> -----NOTE----- If a criticality drain is inoperable due to an obstruction, which can be easily, and quickly cleared (e.g. debris temporarily blocking the drain entrance, item inappropriately placed on top of drain bag), the cognizant shift manager shall be notified IMMEDIATELY and the obstruction may be cleared with his concurrence. In such instances, the Required Action statement B.2 shall be considered as having been entered. Appropriate notifications and documentation shall be completed. -----	IMMEDIATELY
	B.2 Restore Criticality Drain to OPERABLE condition in accordance with a RECOVERY PLAN.	IMMEDIATELY
C. Criticality safety feature required by LCO 3.1.1.3 is not present.	C.1 Suspend operations in affected glovebox(es). <u>AND</u>	IMMEDIATELY
	C.2 Restore criticality safety features in accordance with a RECOVERY PLAN.	IMMEDIATELY

OSR LCO COMPLIANCE SHEET		
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010, Rev. 0, Section 3.0):		
3.1.1 Criticality Prevention System		
SURVEILLANCE		FREQUENCY
SR 3.1.1.1.1	VERIFY OPERABILITY of the Process Vacuum Liquid Detection Interlock System supervisory circuit.	Once within 24 hours prior to startup of the 26-Inch Process Vacuum System <u>AND</u> Daily thereafter while the 26-Inch Process Vacuum System is operating
SR 3.1.1.1.2	Perform a FUNCTIONAL TEST of the Process Vacuum Liquid Detection Interlock System.	Semi-annually
SR 3.1.1.2.1	VERIFY OPERABILITY of the Criticality Drains.	Monthly
SR 3.1.1.3.1	VERIFY presence of the criticality safety features required by LCO 3.1.1.3.	Monthly
APPLICABLE ACCIDENT ANALYSES FSAR (HNF-SD-CP-SAR-021, CH 9) SECTION/TITLE:		
9.2 ACCIDENTS 9.2.3 Criticality		
APPLICABLE PLANT/PROCESS DESIGN/OPERATION DESCRIPTION(S) [FSAR CHAPTER/SECTION]:		
4.0 PRINCIPAL DESIGN CRITERIA 4.3 SAFETY PROTECTION SYSTEMS 4.3.4 Nuclear Criticality Design Criteria		

OSR LCO COMPLIANCE SHEET
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010, Rev. 0, Section 3.0):
3.1.1 Criticality Prevention System
BOUNDARY IDENTIFICATION DRAWINGS
EXPORT CONTROLLED INFORMATION SEE DOCUMENT AUTHOR FOR DRAWING LISTING

OSR LCO COMPLIANCE SHEET
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010, Rev. 0, Section 3.0):
3.1.1 Criticality Prevention System
ESSENTIAL SYSTEM DRAWINGS
EXPORT CONTROLLED INFORMATION SEE DOCUMENT AUTHOR FOR DRAWING LISTING

OSR LCO COMPLIANCE SHEET			
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010, Rev. 0, Section 3.0): 3.1.1 Criticality Prevention System			
IMPLEMENTING PROCEDURES/COMPLIANCE VERIFICATION			
OPERATING [ZO-series]: ZO-100-400, Perform Nuclear Operations Surveillance and Responses ZO-170-046, Change Criticality Drain Tubes			
LABORATORY [ZP-, LO-, LA- series]: ZP-100-009, Change PPSL Criticality Drain Tubes			
HEALTH PHYSICS [IP-0692 series]: NONE			
SUPPORTING DOCUMENTS: HNF-SD-CP-SDD-008, Definition and Means of Maintaining the Criticality Prevention Design Features Portion of the PFP Safety Envelope			
ADMINISTRATIVE [FSP-PFP-5-8, etc]: FSP-PFP-5-8, <i>PFP Administration Manual</i> , Section 3.3 Criticality Safety.			
MAINTENANCE [2Z-, 1-ZM-, etc]: NONE			
SURVEILLANCE REQUIREMENT	PROCEDURE NUMBER	DESCRIPTION	PROCEDURE FREQUENCY
SR 3.1.1.1.1	See HNF-SD-CP-SDD-013	26" Vacuum System Design Description	Upon Demand and Daily When Operating
SR 3.1.1.1.2	See HNF-SD-CP-SDD-013	26" Vacuum System Design Description	Semi-Annual
SR 3.1.1.2.1	ZSE-72-001	Monthly Criticality Drain and Safety Feature Inspection	Monthly
SR 3.1.1.3.1	ZSE-72-001	Monthly Criticality Drain and Safety Feature Inspection	Monthly
OTHER: NONE			
NOTES/COMMENTS:			

APPENDIX B - MASTER COMPONENT INDEX LISTING

SE SYSTEMS COMPLIANCE SHEET CRITICALITY DRAINS AND SCREENS, FILLER DISCS AND RASCHIG RINGS			
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):			
3.1.1 Criticality Prevention System			
SE SYSTEM EQUIPMENT/COMPONENT LIST			
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	CRITICALITY PREVENTION SPECIFICATION NUMBER	ESSENTIAL DRAWING NUMBER
CRDR-1ST_EAST	236-Z GLOVEBOX 1st FLOOR EAST CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWINGS H-2-27145 and H-2-28822.	CPS-Z-165-80707 CPS-Z-165-80010 CSAR-80-029 CSAR-80-011, Add 2	EXPORT CONTROLLED INFORMATION. SEE DOCUMENT AUTHOR FOR DRAWING LISTING
CRDR-1ST_WEST	236-Z GLOVEBOX 1st FLOOR WEST CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWINGS H-2-27145 and H-2-28822.	CPS-Z-165-80708 CPS-Z-165-80010 CSAR-80-029 CSAR-80-011, Add 2	
CRDR-HA-21I	GLOVEBOX HA-21I CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWING H-2-99537, AND H-2-27119	CPS-Z-165-80350 CSER-99-007	
CRDR-HA-23S	GLOVEBOX HA-23S CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWINGS H-2-27135, H-2-28822, and H-2-29010.	CPS-Z-165-80090 CPS-Z-165-80010 CSAR-80-029 CSER-91-007	
CRDR-HC-1	CONVEYOR GLOVEBOX HC-1 CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, AND INSTALLATION, SEE DRAWINGS H-2-27135, H-2-28935, AND H-2-27119	CPS-Z-165-80010 CPS-Z-165-80608 CSER-00-008	
CRDR-HC-4	GLOVEBOX HC-4 CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWINGS H-2-27135, H-2-28822, AND H-2-27119.	CPS-Z-165-80604 CPS-Z-165-80010 CSAR-80-029 CSAR-79-020, Add 1	
CRDR-HC-5	GLOVEBOX HC-5B CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, AND INSTALLATION, SEE DRAWINGS H-2-27135, H-2-28935, AND H-2-27119	CPS-Z-165-80010 CPS-Z-165-80170 CSER-00-008	

SE SYSTEMS COMPLIANCE SHEET CRITICALITY DRAINS AND SCREENS, FILLER DISCS AND RASCHIG RINGS			
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):			
3.1.1 Criticality Prevention System			
SE SYSTEM EQUIPMENT/COMPONENT LIST			
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	CRITICALITY PREVENTION SPECIFICATION NUMBER	ESSENTIAL DRAWING NUMBER
CRDR-HC-6	GLOVEBOX HC-6 CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWINGS H-2-27135 and H-2-28822.	CPS-Z-165-80606 CPS-Z-165-80010 CSAR-80-029 CSAR-79-019, Add 1 CSAR-79-022, Add 1/2	
CRDR-HC-7	GLOVEBOX HC-7 CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWINGS H-2-27135 and H-2-28822.	CPS-Z-165-80607 CPS-Z-165-80010 CSAR-80-029 CSAR-79-024, Add 1 CSAR-88-005	
CRDR-HC-9B	GLOVEBOX HC-9B CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT and INSTALLATION SEE DRAWINGS H-2-27135 and H-2-28822.	CPS-Z-165-80609 CPS-Z-165-80010 CSAR-80-029 CSAR-79-019, Add 3	
CRDR-HC-46F	GLOVEBOX HC-46F CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT AND INSTALLATION, SEE ECN 659352 TO DRAWING H-2-27135.	CPS-Z-165-80010 CPS-Z-165-80320 CSER-00-001	
CRDR-HC-227S	GLOVEBOX HC-227S CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWINGS H-2-27135 and H-2-28822.	CPS-Z-165-80623 CPS-Z-165-80010 CSAR-80-029 CSAR-79-021, Add 1 CSAR-88-005	
CRDR-HC-227T	HOOD HC-227T CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWINGS H-2-27135 and H-2-28822 and ECNs 191519 and 623378	CPS-Z-165-80601 CPS-Z-165-80010 CSAR-81-001, Add 4	
CRDR-HC-230C-3C-3	MAGNESIUM HYDROXIDE GLOVEBOX 3 CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, AND INSTALLATION, SEE DRAWING H-2-829782, H-2-829784, AND H-2-82993	CPS-Z-165-80642 CSER 00-003	
CRDR-HC-230C-4	MAGNESIUM HYDROXIDE GLOVEBOX 4 CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, AND INSTALLATION, SEE DRAWING H-2-829783, H-2-29785, AND H-2-82993	CPS-Z-165-80643 CSER-00-004	

SE SYSTEMS COMPLIANCE SHEET CRITICALITY DRAINS AND SCREENS, FILLER DISCS AND RASCHIG RINGS			
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):			
3.1.1 Criticality Prevention System			
SE SYSTEM EQUIPMENT/COMPONENT LIST			
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	CRITICALITY PREVENTION SPECIFICATION NUMBER	ESSENTIAL DRAWING NUMBER
CRDR-MT-5	GLOVEBOX MT-5 CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWINGS H-2-26865, H-2-28934 and H-2-28935.	CPS-Z-165-80715 CPS-Z-165-80010 CSAR-80-029 CSAR-80-005	
CRDR-MT-6	GLOVEBOX MT-6 CRITICALITY DRAIN AND SCREEN. FOR ASSEMBLY, ARRANGEMENT, and INSTALLATION SEE DRAWINGS H-2-26865, H-2-28934 and H-2-28935.	CPS-Z-165-80716 CPS-Z-165-80010 CSAR-80-029 CSAR-78-006, Add 1	
GB-HC6-SUMP_PLATE GB-HC6-RASCHIG_RINGS	GLOVEBOX HC-6 FLOOR FILLER PLATES AND PIT RASCHIG RINGS SEE DRAWING H-2-25598 and CPS.	CPS-Z-165-80606 CSAR-79-018 CSAR-79-022	
GB-HC7-SUMP_DISC	GLOVEBOX HC-7 SUMP FILLER DISCS. FOR ASSEMBLY AND INSTALLATION SEE DRAWING H-2-24640 sheets 1 & 2.	CPS-Z-165-80607 CSAR-79-024 CSAR-87-005 CSAR-88-001 CSAR-90-009	
GB-HC9B-SUMP_DISC	GLOVEBOX HC-9B SUMP FILLER DISC. FOR ASSEMBLY AND INSTALLATION SEE DRAWING H-2-24640 sheets 1 & 2.	CPS-Z-165-80609 CSAR-79-019 CSAR-87-005	
CRDR-2ND_WEST-1 CRDR-2ND_WEST-2 CRDR-2ND_WEST-3 CRDR-2ND_WEST-4 CRDR-2ND_WEST-5 CRDR-2ND_WEST-6 CRDR-2ND_WEST-7 CRDR-2ND_WEST-8 CRDR-2ND_WEST-9 CRDR-2ND_WEST-10 CRDR-2ND_WEST-11	CRITICALITY DRAIN 2ND WEST GLOVEBOXES. FOR ASSEMBLY AND INSTALLATION SEE DRAWING H-2-29941 sheet 1.	CPS-Z-165-80710 CPS-Z-165-80010 CSAR-80-029	

SE SYSTEMS COMPLIANCE SHEET CRITICALITY DRAINS AND SCREENS, FILLER DISCS AND RASCHIG RINGS			
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):			
3.1.1 Criticality Prevention System			
SE SYSTEM EQUIPMENT/COMPONENT LIST			
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	CRITICALITY PREVENTION SPECIFICATION NUMBER	ESSENTIAL DRAWING NUMBER
CRDR-2ND_EAST-1 CRDR-2ND_EAST-2 CRDR-2ND_EAST-3 CRDR-2ND_EAST-4 CRDR-2ND_EAST-5 CRDR-2ND_EAST-6 CRDR-2ND_EAST-7 CRDR-2ND_EAST-8 CRDR-2ND_EAST-9 CRDR-2ND_EAST-10	CRITICALITY DRAIN 2ND EAST GLOVEBOXES. FOR ASSEMBLY AND INSTALLATION SEE DRAWING H-2-29941 sheet 1.	CPS-Z-165-80709 CPS-Z-165-80010 CSAR-80-029	
CRDR-10-179	CRITICALITY DRAIN FOR GB-10-179. FOR ASSEMBLY AND INSTALLATION SEE DRAWING H-2-28983 AND H-2-28985.	CPS-L-114-00020 CSAR-78-008	
CRDR-12-179	CRITICALITY DRAIN FOR GB-12-179. FOR ASSEMBLY AND INSTALLATION SEE DRAWING H-2-28983 AND H-2-28895.	CPS-L-114-00010 CSAR-78-008	
CRDR-1-188	CRITICALITY DRAIN FOR GB-1-188. FOR ASSEMBLY AND INSTALLATION SEE DRAWINGS H-2-28536 AND H-2-28551 AND ECN 621512.	CPS-L-114-00010 CPS-L-114-00050 CSAR-78-008 CSER-95-005, Add 1	
CRDR-522	CRITICALITY DRAIN FOR GB-522. FOR ASSEMBLY AND INSTALLATION SEE DRAWING H-2-26802 AND H-2-26803.	CPS-L-114-00010 CSAR-78-008	
CRDR-642A	CRITICALITY DRAIN FOR GB 642-A.	CPS-Z-165-81001	
CRDR-642E	CRITICALITY DRAIN FOR GB 642-E.	CPS-Z-165-81004	
CRDR-4TH_COLUMN	CRITICALITY DRAINS FOR 4TH FLOOR COLUMN GLOVEBOXES.	CPS-Z-165-80704 CPS-Z-165-80010 CSAR-80-029 CSAR-80-006	
CRDR-5TH_COLUMN	CRITICALITY DRAINS FOR 5TH FLOOR COLUMN GLOVEBOXES.	CPS-Z-165-80705 CPS-Z-165-80010 CSAR-80-029 CSAR-80-006	
CRDR-6TH_COLUMN	CRITICALITY DRAINS FOR 6TH FLOOR COLUMN GLOVEBOXES.	CPS-Z-165-80706 CPS-Z-165-80010 CSAR-80-029 CSAR-80-006	