ENGINEERING CHANGE NOTICE

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1. ECN 653591

Proj. ECN S

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [ ] Direct Revision [x] Change ECN [ ] Temporary [ ] Standby [ ] Supersedure [ ] Cancel/Void [ ]	M. K. Ullah, 15510, T4-20, 6-2944	[X] Yes [ ] No	3/26/99
	6. Project Title/No./Work Order No. PFP	7. Bldg./Sys./Fac. No. 234-5Z/23B/PFP	8. Approval Designator SQ
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-~~HNF~~-SD-CP-SDD-~~9~~013, rev 2	10. Related ECN No(s). NA	11. Related PO No. None

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

13a. Description of Change

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

1. Delete all references to vacuum trap alarms, and interlocks related to HC-227-S, HC-4, and HC-7 from the Safety Envelope as per the Safety quipment List (SEL), HNF-SD-CP-TI-108, Rev 16.
2. Delete all references to sump alarms associated to HC-7C, HC-9B, HC-4, H-7A, H-9A, HC-227-S, HC-6, and HC-46F from the Safety Envelope as per the SEL.

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

14b. Justification Details

Update the SDD to reflect the current changes to FSAR and SEL.

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

See Distribution List

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UNREVIEWED SAFETY QUESTION (USQ) SCREENING AND EVALUATION		ECN 653591 Page 3 of 4
1. Identification Number: ~~WHC-SD-CP-SDD-013 Rev. 3~~ ECN 653591	USQ SCREENING	Page 1 of

2. Title: DEFINITION AND MEANS OF MAINTAINING THE PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEM PORTION OF THE PFP SAFETY ENVELOPE

DESCRIPTION: The changes proposed to WHC-SD-CP-SDD-013 Rev.3 involve the removal from the document all references that indicate HC-4, HC-227S, HC-7 and the tank 50 High Liquid Level detection Interlock system as being within the PFP Safety Envelope. The Plutonium Finishing Plant Safety Systems and Equipment List, HNF-SD-CP-TI-108, Rev. 16, Table 1.5, Liquid Detector and Interlock in 26" Vacuum System, does not include these systems.

INTRODUCTION: The HC-4, HC-7, HC-227S and the tank 50 High Level Liquid detection interlock systems detect the potential for a liquid up take into the 26" Vacuum Headers. All of the detectors are well upstream of the 26" Vacuum Liquid Detection system that is designed to prevent a criticality due to liquid uptake. Failure of any of the four glovebox liquid detection systems would not impact the operation of the 26" Vacuum Liquid Detection system. The systems are completely separate.

The liquid detectors and interlocks were installed after an incident in HC-227S resulted in a significant volume of RMC feed grade plutonium solution to be drawn out of the glovebox and into the vacuum header. The vacuum trap liquid detection interlock system operability is verified by a weekly functional test per maintenance procedure 2Z22124. Removal of the HC-7 Liquid Detection Interlock system from the WHC-SD-CP-SDD-013 document will not impact this maintenance procedure.

SCOPE: The changes suggested in this document revision will impact WHC-SD-CP-SDD-013 only. ZO-060-602, Operation of the 26" Vacuum System, addresses testing the operability of the 26" vacuum system liquid detection interlock system prior to use and daily while the 26" vacuum system is operating. This procedure does not address the glovebox liquid detection interlock systems so no change to the ZO will be required.

AUTHORIZATION BASIS: The list of Authorization Basis documents were reviewed in Appendix A of FSP-PFP-5-8 Section 2.23. It was determined that the following authorization documents apply to this SDD revision:

WHC-SD-CP-SAR-021, Rev.0-~~J~~, PFP Safety Analysis Report, Sections 4.3.4.1.3, 5.4.5.1.1, 9.2.3.1.3

WHC-SD-CP-OSR-010, Rev. 0-I, PFP Operational Safety Requirements

ECN 649558, Page 5&6, Item #8

Review of the above documents indicated that an Authorization Basis change is not required because of this change.

CONCLUSION: This change does not represent an Unreviewed Safety Question.

REFERENCES: HNF-SD-CP-SAR-021 Rev.1, PFP Final Safety Analysis Report

INSTRUCTIONS: Respond to each question and provide justification for each response. A restatement of the question does not constitute a satisfactory justification or basis. An adequate justification provides sufficient explanation such that an independent reviewer could reach the same conclusion based on the information provided [DOE 5480.21, 10.e.1].

QUESTIONS

1. Does the proposed change or occurrence represent a change to the facility or procedures as described in the Authorization Basis?

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2. Title: DEFINITION AND MEANS OF MAINTAINING THE PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEM PORTION OF THE PFP SAFETY ENVELOPE

[] N/A [X] No [] Yes/Maybe

BASIS: Section 5.4.5.1.1 of WHC-SD-CP-SAR-021 describes the 26" vacuum system in PFP including the Liquid Detection System. Removing the liquid detection interlocks from HC-4, HC-7, HC-227S and tank 50 will not represent a change to what is described in the Authorization Basis. The piping that makes up the 26" vacuum system is designed critically safe up to the room 308 HEPA filters. The 26" vacuum operating procedure, ZO-060-602, will not be revised due to approval of this SDD revision.

2. Does the proposed change or occurrence represent conditions that have not been analyzed in the Authorization Basis?
[] N/A [X] No [] Yes/Maybe

BASIS: The revised WHC-SD-CP-SDD-013 will not refer to the liquid detection interlock systems in HC-4, HC-7, HC-227S and tank 50. The portion of the SDD that involves the safety envelope will not be affected by this change. All conditions associated with the safety envelope analyzed in the Authorization Basis remain the same.

3. Does the proposed change represent a test or experiment NOT described in the Authorization Basis that may affect the safe operation of the facility?
[] N/A [X] No [] Yes/Maybe

BASIS: No experiments or tests are involved with this change.

4. Does the proposed change or occurrence represent a change to the Technical Safety Requirements or a reduction in the margin of safety defined in the Technical Safety Requirements?
[] N/A [X] No [] Yes/Maybe

BASIS: All changes are made to make the SDD conform to the Safety Equipment List and the Authorization Basis, therefore there is no reduction in the safety margin in the TSR/OSR.

USQE #1 RJ THOMAS (Print Name)

R.J. Thomas Signature Date: 3/30/99

USQE #2 L.E. EDVALSON (Print Name)

L.E. Edvalson Signature Date: 3/31/99

If there is a YES/MAYBE response to questions 1, 2, 3, or 4, then a USQ Evaluation must be completed.

The following guidance should be considered when completing this screening. This guidance should not be considered all-inclusive; additional factors may need to be considered depending on the nature of the proposed change.

Does the proposed change:

1) Modify, add, or delete a safety class function of a structure, system or component stated in the authorization basis?
2) Alter the design of a structure, system or component as described in the authorization basis?
3) Modify, add, or delete the description of operation, operating environment, or analyses of any system or component described in the authorization basis?
4) Modify, add, delete or conflict with any of the design bases stated in the authorization basis?
5) Conflict with the principle or general design criteria stated in the authorization basis?
6) Modify, add, or delete any plant design features described in the authorization basis?
7) Modify, add, or delete a flow diagram or facility drawing provided in the authorization basis?
8) Create the potential for new system or component interactions (e.g., seismic, electrical breaker coordination)?

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	M. K. Ullah	Date 3/30/99
Project Title/Work Order		EDT No.
HNF-SD-CP-SDD-013, Rev. 3 Definition and Means of Maintaining the Process Vacuum Liquid Detection Interlock Sys Portion PFP Safety Env		ECN No. 653591

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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S

DEFINITION AND MEANS OF MAINTAINING THE PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEMS PORTION OF THE PFP SAFETY ENVELOPE

R. J. Thomas
B&W Hanford Co., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 653591 UC: UC-721
Org Code: 15510 Charge Code: 101418
B&R Code: EW7003000 Total Pages: 22

Key Words: PFP, Process Vacuum System, Liquid Detection, Criticality Prevention, Safety Envelope Definition, Authorization Basis

Abstract: The Process Vacuum Liquid Detection interlock systems prevent intrusion of process liquids into the HEPA filters downstream of demisters #6 and #7 during Process Vacuum System operation. This prevents liquid intrusion into the filters, which could cause a criticality. The Safety Envelope (SE) includes the equipment, which detects the presence of liquids in the vacuum headers; isolates the filters; shuts down the vacuum pumps; and alarms the condition. This report identifies the equipment in the SE; operating, maintenance, and surveillance procedures needed to maintain the SE equipment; and rationale for exclusion of some equipment and testing from the SE.

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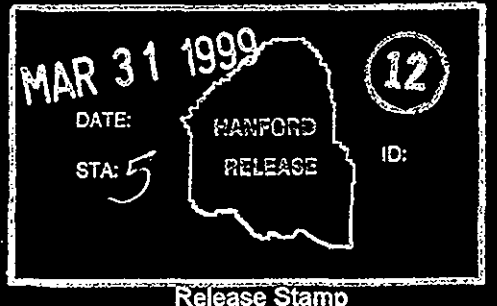

Release Approval 3/31/99 Date

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RECORD OF REVISION	(1) Document Number HNF-SD-CP-SDD-013	Page 1

(2) Title
DEFINITION AND MEANS OF MAINTAINING THE PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEMS PORTION OF THE PFP SAFETY ENVELOPE

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog. Engr.	(6) Cog. Mgr.
1	7) This is a total rewrite; therefore, revision bars have not been used to indicate changes. EDT 166686 WHC-SD-CP-SDD-013, Rev. 0 EDT 141531, 2/9/93	GE Navarro	GA Glover
2	General update of SDD to reflect Safety Equipment List revisions. Ref: ECN 637682	RJ Thomas	GA Glover
RS 3	INCORPORATE ECN 625328 · 3/31/99 General update of SDD to reflect Safety Equipment List revision 16. ECN 653591.	RJ Thomas R.J. Thomas	GA Glover 3/31/99

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1.0 PURPOSE

The purpose of this document is to record the technical evaluation of the Operational Safety Requirements described in the Plutonium Finishing Plant (PFP) Operational Safety Requirements, WHC-SD-CP-OSR-010, Rev. 0-I, Section 3.1.1, "Criticality Prevention System." This document also defines the Safety Envelope (SE) for the liquid detection interlock system in the Process Vacuum System. The SE is derived from information in the Plutonium Finishing Plant Final Safety Analysis Report (PFP FSAR), WHC-SD-CP-SAR-021, Rev 0-H, and the Criticality Safety Analysis Report (CSAR) for the 26-inch Hg Vacuum System, WHC-SD-SQA-CSA-20159, Rev 0-A. This document, with its appendices, provides the following:

1. The system functional requirements for determining system operability (Section 3).

2. Evaluations of equipment to determine the safety envelope boundary for the system (Section 4 list of SE boundary drawings).

3. A list of the safety envelope equipment (Appendix B).

4. Functional requirements for the individual safety envelope equipment, including appropriate set points and process parameters (Section 4).

5. A list of the operational and surveillance procedures necessary to operate and maintain the system equipment within the safety envelope (Sections 5 and 6 and Appendix A).

2.0 BACKGROUND

The 26-inch process vacuum system provides high capacity vacuum service to the PFP for vacuum transfer of liquids and other high vacuum requirements. The system has two vacuum pumps, operated one at a time. High Efficiency Particulate Air (HEPA) filters are located upstream of the pumps. Because this system is used to transfer liquids, there is a potential for liquid intrusion into the HEPA filters. If this were to occur, a criticality event could occur in the filters due to the unfavorable geometry of the filters, and the presence of fissile material and moderator. The remainder of the system upstream of the HEPA filters has been designed with favorable geometry to preclude criticality events.

HNF-PRO-334, " Criticality Safety: General Requirements," requires that two contingencies be provided to prevent the occurrence of an accidental criticality. In the 26-inch process vacuum system, these two contingencies take the form of an engineered barrier and administrative controls governing the use of the vacuum system for transfers.

The engineered barrier preventing liquid intrusion into the 26-inch vacuum HEPA filters is the liquid detection interlock system in each of the two headers upstream of the demisters. The 26-inch vacuum header liquid detection interlock system is designed to detect the intrusion of liquid in the vacuum headers upstream of demisters #6 and #7, which are upstream of the HEPA filters. Upon detection of liquid, the system isolates flow to the filters by closing redundant valves (two in series) located between the demisters and HEPA filters and shutting down the vacuum pumps. Because it has a criticality prevention function, i.e., provides one of the two contingencies required to prevent the possibility of criticality in the HEPA filters, the 26-inch vacuum header liquid detection interlock system is included in the safety envelope. The process vacuum system itself is non-safety class, and is not included in the safety envelope.

Administrative and procedural controls provides the other contingency preventing accidental criticality in the 26-inch vacuum system HEPA filters. Operating procedures require operators to monitor vacuum transfers for liquid intrusion into branch vacuum lines and isolate the system upon detection of liquid in these lines. Detection of liquid intrusion into the vacuum system is monitored by visual inspection of vacuum traps, monitoring weight factor changes in sending and receiving locations, and monitoring liquid level limits in sending and receiving locations. Operating procedures governing vacuum transfers are summarized in Section 5.1 of this document.

3.0 SYSTEM FUNCTIONAL REQUIREMENTS

The function of the process vacuum liquid detection interlock systems is to prevent criticality events by precluding the intrusion of PFP process liquids into the HEPA filters during operation of the vacuum system. This is accomplished in the vacuum headers by detection of liquids upstream of demisters #6 and #7, isolation of the filters from the upstream vacuum lines, and shutting down the operating process vacuum pump.

3.1 SAFETY ENVELOPE (SE) REQUIREMENTS AND SYSTEM OPERATION, DEMISTERS 6 & 7

CPS-Z-165-80141 requires that "Safety features, alarms, and interlocks designed to prevent liquid uptake or mitigate the effects of liquid addition shall be operable whenever the 26-inch vacuum system is in use." The vacuum header liquid detection interlock system is one of the primary features for preventing liquid uptake and must be operable. Operating procedure ZO-060-602 verifies the operability of the 26-inch vacuum system liquid detection interlock system prior to use and daily while the 26" vacuum system is operating. Procedure ZSE-23B-001 performs a semi-annual functional test of the vacuum header liquid detection interlock system.

Operability of the vacuum header liquid detection interlock system depends on the operability of two liquid detection circuits; one for each vacuum header. The two

circuits are not redundant. Each one monitors a different vacuum header. Therefore, both detector circuits must be operable for the liquid detection interlock system to be operable.

The vacuum header isolation/shutdown system is not redundant, except for the two isolation valves in the vacuum header between the demisters and HEPA filters. However, with the exception of the leak detection circuits, a deenergized state results in performance of the isolation and shutdown functions. This, in conjunction with the administrative controls providing the second contingency for criticality prevention, satisfies the safety class redundancy requirements for this system.

The process vacuum liquid detection supervisory panel is located in the room 321 control room in the 234-5Z Building.

4.0 SAFETY ENVELOPE EQUIPMENT

The liquid detection interlock system components necessary to prevent liquid intrusion into the 26-inch Vacuum System HEPA filters includes 26-inch Vacuum Liquid Detection Interlock System.

4.1 VACUUM LIQUID DETECTION INTERLOCK SYSTEMS (SAFETY CLASS) EQUIPMENT

4.1.1 26-inch Vacuum Header Liquid Detection Interlock System

The following equipment is required to detect and alarm the presence of liquid in the vacuum header upstream of demisters #6 or #7, isolate the vacuum lines upstream of the HEPA filter, and shut down the operating vacuum pump.

Note: the system for the vacuum header upstream of demister #7 contains the same components as the system upstream of demister #6.

a) Conductivity Probe CE-1LD-23B, demister #6 header, [CE-2LD-23B, demister # 7 header] detects presence of liquid and conducts a signal from probe to induction relay.

b) Induction Relay CR-1LD1-23B [CR-2LD1-23B] opens and closes the necessary contacts to activate the vacuum line, vacuum pump, and annunciator relays.

c) Relay CR-1K1-23B [CR-2K1-23B] activates the solenoid valve and annunciator circuit.

d) Solenoid Valve EV-PVLDL-1 [EV-PVLDL-2] vents air from the butterfly isolation valves. Note: each solenoid valve vents air from both butterfly valves.

e) Butterfly Valves CV-PVLDL-1 and CV-PVLDL-2 isolate vacuum line upstream of HEPA filters. Valves are in series and either butterfly valve will isolate the HEPA filters.

f) Relay CR-1K3-23B [CR-2K3-23B] removes power from the vacuum pumps' motor controllers.

g) Motor Controllers MC-VPP1-23B and MC-VPP2-23B open and close power circuits for vacuum pumps PVVP-1 and PVVP-2 motors respectively.

h) Annunciator CA-1LDA-23B [CA-2LDC-23B] alarms liquid intrusion into vacuum lines upstream of demister #6 [#7].

4.1.2 26-inch Vacuum Liquid Detection Interlock System Testing and Trouble Alarms

The following equipment is required to test the 26-inch vacuum leak detection interlock system and alarm if the liquid detection circuit is inoperable.

a) Relay CR-1LD2-23B [CR-2LD2-23B] energizes circuit trouble indicator light for test or indication of open circuit.

b) Relay CR-1K2-23B [CR-2K2-23] activates annunciator for liquid detection circuit trouble.

c) Switch HS-1LD-23B [HS-2LD-23B] tests liquid detection circuit trouble indicator light and annunciate.

d) Rectifier BR-1LD-23B [BR-2LD-23B] changes 220 VAC to 220 VDC for liquid detection interlock system trouble indicator circuit.

e) Resistor R-1LD-23B [R-2LD-23B] reduces voltage in liquid detection trouble circuit from 220 VDC to 110 VDC across relay coil.

f) Annunciator CA-1LDB-23B [CA-2LDD-23B] alarms on liquid detection circuit trouble (open circuit).

4.2 NON-SE COMPONENTS

4.2.1 26-inch Vacuum Liquid Detection Interlock System

Indicator lights L-1LD-23B and L-2LD-23B are not included in the safety envelope; they are used for testing of the system but are not monitored or required to function in order for the liquid detection interlock system to be operable.

Failure (open short) of all electrical wiring and passive hardware, except for the wiring connecting the conductivity probes to the induction relay, would result in the isolation and shutdown of the vacuum system. Therefore, this wiring and associated hardware (terminal boards, connectors) are not included in the safety envelope.

5.0 SAFETY ENVELOPE PROCEDURES

CPS-Z-165-80141, Criticality Prevention Specification 26-inch Hg Vacuum System, requires that "safety features, alarms, and interlocks designed to prevent liquid uptake shall be operable whenever the 26-inch vacuum system is in use." The procedure which addresses the prevention of liquid uptake into the vacuum system and the operability of the liquid detection interlock system is contained in the following section.

5.1 SE OPERATING PROCEDURES

5.1.1 26-inch Vacuum Liquid Detection Interlock System Procedures

ZO-060-602, Operate 26 in. Process Vacuum, provides instructions for start up and operation of the Process Vacuum System. It is included in the SE because it determines the operability of the liquid detection interlock system before start up and during operation of the Process Vacuum system. The portions of ZO-060-602, which are included in the SE and pertain to operability, are as follows:

Section 6.2. Preliminary Test and Sample Requirements - requires that both leak detection alarm/test circuits be successfully tested before startup of either vacuum pump.

Section 6.10. Process Vacuum System Surveillance - requires that both leak detection alarm/test circuits be successfully tested once per shift during operation of the Process Vacuum System. If the test is not successful, the procedure requires that the Process Vacuum System be shut down.

5.2 SE ALARM RESPONSE PROCEDURES

5.2.1 26-inch Vacuum Liquid Detection Interlock System Alarm Response

ZO-060-814, "Alarm Responses for Panel L Alarms," is included in the SE because it identifies the actions, which need to be taken if alarms associated with the liquid detection interlock system are actuated. Attachments 2, 3, 4 and 5, Respond to Panel L Alarms, identifies the actions to be taken for the annunciators (alarms) as follows:

Annunciator 1, 26-inch Vac. #1 Moisture Detection; requires the operator to verify shut down or immediately shut down the Process Vacuum System. This response assures system shut down if liquid is detected in the vacuum lines upstream of demister #6.

Annunciator 2, Liquid Detector No. 1 Trouble; requires the operator to shut down or verify shut down of the Process Vacuum System. This response assures that the Process Vacuum System is not operating if the operability of the liquid detector in the vacuum line up stream of demister #6 is not verified.

Annunciator 3, 26-inch Vac. #2 Moisture Detection; requires the operator to verify shut down or immediately shut down the Process Vacuum System. This response assures shut down if liquid is detected in the vacuum lines upstream of demister #7.

Annunciator 4, Liquid Detector No. 2 Trouble; requires the operator to shut down or verify shut down of the Process Vacuum System. This response assures that the Process Vacuum System is not operating if the operability of the liquid detector in the vacuum line up stream of demister #7 is not verified.

5.3 SE MAINTENANCE PROCEDURES

5.3.1 26-inch Vacuum Liquid Detection Interlock System Maintenance Procedures

Maintenance procedure ZSE-23B-001 satisfies the LCO Surveillance Requirement (SR 3.1.1.1.2) to perform semi-annual functional testing of the liquid detection interlock system. This procedure ensures that the entire liquid detection system downstream of the detector probes operates as designed.

6.0 SAFETY ENVELOPE SURVEILLANCE REQUIREMENTS

Only two Surveillance Requirements (SR) are specified in WHC-SD-CP-OSR-010 for any of the vacuum transfer liquid detection systems. These SRs require verifying the operability of the 26-inch vacuum liquid detection interlock system prior to use and daily during operation and a semi-annual functional test of the same system.

The operability requirement for the 26-inch vacuum liquid detection interlock system is met by implementation of both ZO-060-602 and ZSE-23B-001.

Operating procedure ZO-060-602, "Operate 26 in. Process Vacuum," requires that the leak detector circuit alarm be tested prior to operation of the Process Vacuum System and shiftly during operation of the system. The test assures that trouble with the liquid detection circuit alarm will be identified allowing operators to shut down the Process Vacuum System, thereby implementing the criticality prevention specification.

Functional testing of the liquid detection interlock system is performed once every six months by ZSE-23B-001. The functional test verifies the proper operation of the liquid detection interlock system from the conductivity probes to the alarms, isolation valves, and vacuum pumps. A six month interval is sufficient for the functional test due to the daily test of the detection circuit alarm and the design of the liquid detection interlock system which performs its isolation and shut down function when deenergized down stream of the induction relays (see section 4.3).

The only portions of the liquid detection interlock system not physically checked by the surveillance tests are the electrodes (XE-1LDA-23B, 1LDB, 2LDA, and 2LDB). However, this is not considered to significantly impact verification of the operability of the system for two reasons. First, the electrodes are passive items. They are 1/4" Stainless Steel bolts 1" long, which complete the liquid detection circuit in the presence of liquid. Second, these bolts are attached to two plugs in each conductivity probe. The plugs alone would complete the circuit in the presence of liquid.

7.0 REFERENCES

CPS-Z-165-80141, REV. B-3, "Criticality Prevention Specification; Plutonium Finishing Plant; PFP Facilities, 234-5Z Building, 200 West Area; 26-inch Hg. Vacuum System"

HNF-PRO-334, "Criticality Safety: General Requirements"

WHC-SD-CP-OSR-010, REV. 0-I, "Plutonium Finishing Plant Operational Safety Requirements"

WHC-SD-CP-SAR-021, REV. 0-H, "Plutonium Finishing Plant Final Safety Analysis Report"

WHC-SD-SQA-CSA-20159, REV. 0-A, 9/17/92, CSER 78-013, "Criticality Safety Analysis Report For RHO-MA-165, Criticality Prevention Specification 80.14-1; 26-Inch Hg Vacuum System"

WHC-SD-SQA-CSA-20160, REV. 0, 1/18/90, "Addendum to CSER 78-013"

WHC-SD-SQA-CSA-20337, REV. 0, 5/17/91, "Addendum 2 to CSER 78-013: Demister Legs in the Plutonium Finishing Plant"

APPENDIX A - PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEMS SE DATA SHEET

OSR LCO COMPLIANCE SHEET

APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):

3.1.1 Criticality Prevention System

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-4	HC-9B
HC-6	HC-227S
HC-7	HA-23S
HC-227T	

Pu Process Support Laboratories Gloveboxes

188-1
179-10
179-12

Engineering Laboratory Glovebox

522 (Room 152)

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 Section 3.0):

3.1.1 Criticality Prevention System

ACTIONS:

CONDITION	ACTION	COMPLETION TIME
A. Process Vacuum Liquid Detection Interlock System is inoperable.	A.1 hut down 26-Inch Process VacuumSystem AND A.2 Enter MODE 2, Limited Plutonium Handling Operations. Prohibit all liquid transfers using 26" vacuum system.	Immediately Immediately
B. Criticality Drain is inoperable.	B.1 Suspend operations in affected glovebox. AND ----------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. ---------- B.2 Restore Criticality Drain to OPERABLE condition in accordance with RECOVERY PLAN.	Immediately Immediately
C. Criticality safety feature required by LCO 3.1.1.3 is not present.	C.1 Suspend operations in affected glovebox(es). AND C.2 Restore criticality safety features in accordance with RECOVERY PLAN.	Immediately Immediately

OSR LCO COMPLIANCE SHEET

APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):

3.1.1 Criticality Prevention System

SURVEILLANCE REQUIREMENTS:

SURVEILLANCE		FREQUENCY
SR	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 AND Daily thereafter while the 26-Inch Process Vacuum System is operating
SR	Perform a FUNCTIONAL TEST of the Process Vacuum Liquid Detection Interlock System.	Semi-annually
SR	VERIFY OPERABILITY of the Criticality Drains.	Monthly
SR	VERIFY presence of the criticality safety features required by LCO 3.1.1.3.	Monthly

APPLICABLE ACCIDENT ANALYSES FSAR (WHC-SD-CP-SAR-021, CHAPTER 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 Safety

5.0 PLANT DESIGN

OSR LCO COMPLIANCE SHEET

APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):

3.1.1 Criticality Prevention System

5.4 SERVICE AND UTILITY SYSTEMS
5.4.5 Vacuum Systems
5.4.5.1 Major Components and Operating Characteristics
5.4.5.1.1 Process Vacuum System, 26-in. Mercury

BOUNDARY IDENTIFICATION DRAWINGS:

H-2-28087, Sht 3	26" Vacuum System Leak Detector Installation
H-2-28540,	Liquid Detection System 26" Hg Vacuum System
H-2-93504, Sht 1-3, 5, 6	EFD RMC Line
H-2-19405, Sht 1,	HC-6 Equipment Arrangement, ECN 500050
H-2-95607,	IEFD Glovebox HC-60
H-2-28013, Sht 1 & 3,	Process Engineering Flow Diagram Misc Treat Room MT-5 and MT-6
H-2-27135, Sht 1-4,	Criticality Drains Gloveboxes HC-7, HC-6, HC-227S, HC-227T, HC-4, HC-5B, HA-235, HC-9B, HC-1, HC-60, and ECNs 621512, 623378, 191519
H-2-28822, Sht 1-3,	Criticality Drains Screens Gloveboxes HC-6, HC-7, HC-227S, HC-227T, HC-9B, WW-2, EW-2
H-2-27145,	236-Z Gallery Glovebox Criticality Drain
H-2-26865,	Misc. Treatment Room Inter Glovebox Criticality Drain
H-2-28934, Sht 1-2,	Installation Criticality Drain Screen HC-1, HC-5, MT-5, MT-6
H-2-25598,	Room 166, HC-6, Raschig Rings
H-2-24640, Sht 1-2,	HC-7 and HC-9B Sump Filler Plates
H-2-28983,	Criticality & D-4 Drains GB 10 & 12 Room 179-B
H-2-26802,	Equipment Arrangement GB522 Room 152
H-2-28536,	Assembly - Glovebox 188-1

SYSTEM DRAWINGS:

H-2-29814 Sht 1-2	26" Vacuum Piping & Instrument Engineering Flow Diagram
H-2-93504, Sht 1-3, 5, 6	EFD RMC Line
H-2-95607	IEFD Glovebox HC-60
H-2-28013 Sht 1 & 3	Process Engineering Flow Diagram Misc Treat Room MT-5 and MT-6
H-2-27135 Sht 1-4	Criticality Drains Gloveboxes HC-7, HC-6, HC-227S, HC-227T, HC-4, HC-5B, HA-235, HC-9B, HC-1, HC-60, and ECNs 621512, 623378, 191519
H-2-28822 Sht 1-3	Criticality Drains Screens Gloveboxes HC-6, HC-7, HC-227S, HC-
H-2-27145	236-Z Gallery Glovebox Criticality Drain
H-2-26865	Misc. Treatment Room Inter Glovebox Criticality Drain
H-2-28934, Sht 1-2	Installation Criticality Drain Screen HC-1, HC-5, MT-5, MT-6
H-2-25598	Room 166, HC-6, Raschig Rings
H-2-24640 Sht 1-2	HC-7 and HC-9B Sump Filler Plates
H-2-28983	Criticality & D-4 Drains GB 10 & 12 Room 179B
H-2-26802	Equipment Arrangement GB522 Room 152
H-2-28985	Criticality Drains and Screens GB 10 and 12 Room 179-B
H-2-28536	Assembly - Glovebox 188-1
H-2-28584 Sht 1-2	Criticality Drains & Screens GB 1 Room 188-1

OSR LCO COMPLIANCE SHEET

APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):

3.1.1 Criticality Prevention System

IMPLEMENTING PROCEDURES/COMPLIANCE VERIFICATION

OPERATING:

ZO-060-602 Operate 26 in. Process Vacuum
ZO-060-814 Alarm Responses for Panel L Alarms

LABORATORY: NONE

HEALTH PHYSICS: NONE

OPERATING SPECIFICATION(S): NONE

ADMINISTRATIVE: FSP-PFP -5-8, PFP Administration Manual, Section 3.3, "Criticality Safety"

MAINTENANCE: NONE

SURVEILLANCE REQUIREMENT	PROCEDURE NUMBER	DESCRIPTION	FREQUENCY
SR 3.1.1.1.1	ZO-060-602	Perform an OPERABILITY check of the Process Vacuum Liquid Detection Interlock System supervisory circuit.	Once within 24 hours prior to startup of the 26-Inch Process Vacuum System AND Required to be performed shiftly thereafter, while the 26-Inch Process Vacuum System is operating
SR 3.1.1.1.2	ZSE-23B-001	Semi-annual 26" Vacuum Liquid Detectors Functional Test	Semi-annually
SR 3.1.1.2.1	See HNF-SD-CP-SDD-008		Monthly
SR 3.1.1.3.1	See HNF-SD-CP-SDD-008		Monthly

OSR LCO COMPLIANCE SHEET
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0): 3.1.1 Criticality Prevention System
OTHER: ZO-060-624 Process Vacuum Pumps, Routine Startup Switching and Shutdown ZO-060-602 Shutdown, Startup and Operate Process Vacuum
NOTES/COMMENTS:
PREPARED BY:

APPENDIX B - MASTER COMPONENT INDEX INPUT LIST: PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEMS

APPENDIX B - MASTER COMPONENT INDEX INPUT LIST: PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEMS SAFETY CLASS			
APPLICABLE LCO: 3.1.1.1			
PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEM SE EQUIPMENT/COMPONENT LIST			
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	MANUFACTURER PART/MODEL NUMBER	DRAWING NUMBER
BR-1LD-23B	Rectifier changes 220 VAC to 220 VDC for liquid detection trouble indicator circuit for liquid detection interlock system in header upstream of demister #6	International Rectifier # 18D82A/Stores # 16-1345-200	H-2-28087, sht 2
BR-2LD-23B	Rectifier (2): changes 220 VAC to 220 VDC for liquid detection trouble indicator circuit for liquid detection interlock system in header upstream of demister #7	International Rectifier # 18D82A/Stores # 16-1345-200	H-2-28087, sht 2
CA-1LDA-23B	Annunciator alarms liquid intrusion into vacuum lines upstream of demisters #6	Ronan # X2-1029	H-2-28087, sht 2
CA-1LDB-23B	Annunciator alarms liquid detection circuit trouble (open circuit) for liquid detection interlock system in vacuum header upstream of demister #6	Ronan # X2-1029	H-2-28087, sht 2
CA-2LDC-23B	Annunciator alarms liquid intrusion into vacuum lines upstream of demister #7	Ronan # X2-1029	H-2-28087, sht 2
CA-2LDD-23B	Annunciator alarms liquid detection circuit trouble (open circuit) for liquid detection interlock system in vacuum header upstream of demister #7	Ronan # X2-1029	H-2-28087, sht 2
CE-1LD-23B	Conductivity Probe, demister #6	B/W Controls	H-2-28540,

APPENDIX B - MASTER COMPONENT INDEX INPUT LIST: PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEMS SAFETY CLASS			
APPLICABLE LCO: 3.1.1.1			
PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEM SE EQUIPMENT/COMPONENT LIST			
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	MANUFACTURER PART/MODEL NUMBER	DRAWING NUMBER
	header, detects presence of liquid and conducts a signal from probe to induction relay.	Type E-2; W/2 # 1264	H-2-96418, sht 3
CE-2LD-23B	Conductivity Probe, demister #7 header, detects presence of liquid and conducts a signal from probe to induction relay.	B/W Controls Type E-2; W/2 # 1264	H-2-28540, H-2-96418, sht 3
CR-1K1-23B	Relay- activates liquid detection annunciator CA-1LDA-23B and deenergizes solenoid valve EV-1LD-23B	Potter & Brumfield # KRP14P120	H-2-28087, sht 2
CR-1K2-23B	Relay- activates annunciator for liquid detection circuit trouble CA-1LDB-23B	Potter & Brumfield # KRP14P120	H-2-28087, sht 2
CR-1K3-23B	Relay removes power from vacuum pump motor controllers MC-VPP1-23B and MC-VPP2-23B; each relay removes power from both controllers	Potter & Brumfield KPR11AG120	H-2-28087, sht 2 H-2-28737, sht 1
CR-2K1-23B	Relay- activates liquid detection annunciator CA-2LDC-23B and deenergizes solenoid valve EV-2LD-23B	Potter & Brumfield # KRP14P120	H-2-28087, sht 2
CR-2K2-23B	Relay- activates liquid detection circuit trouble annunciator CA-2LDD-23B	Potter & Brumfield # KRP14P120	H-2-28087, sht 2
CR-2K3-23B	Relay removes power from vacuum pump motor controllers MC-VPP1-23B and MC-VPP2-23B; each relay removes power from	Potter & Brumfield KPR11AG120	H-2-28087, sht 2 H-2-28737, sht 1

APPENDIX B - MASTER COMPONENT INDEX INPUT LIST: PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEMS SAFETY CLASS			
APPLICABLE LCO: 3.1.1.1			
PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEM SE EQUIPMENT/COMPONENT LIST			
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	MANUFACTURER PART/MODEL NUMBER	DRAWING NUMBER
	both controllers		
CR-1LD1-23B	Induction Relay- activates liquid detection circuit by deenergizing relays CR-1K1-23B and CR-1K3-23B and illuminates circuit trouble indicator light L-1LD-23B	B/W Controls Type "D"/1500-D-L1-S7-OC-X	H-2-28087, sht 2
CR-1LD2-23B	Relay- deenergizes relay CR-1K2-23B energizes circuit *trouble indicator light* L-1LD-23B	Potter & Brumfield # KCP11	H-2-28087, sht 2
CR-2LD1-23B	Induction Relay- activates liquid detection circuit by deenergizing relays CR-2K1-23B and CR-2K3-23B and illuminates circuit trouble indicator light L-2LD-23B	B/W Controls Type "D"/1500-D-L1-S7-OC-X	H-2-28087, sht 2
CR-2LD2-23B	Relay- deenergizes relay CR-2K2-23B, energizes circuit trouble indicator light L-2LD-23B	Potter & Brumfield # KCP11	H-2-28087, sht 2
EV-PVLDL-1	Solenoid Valve vents air from butterfly valves CV-PVLDL-1, CV-PVLDL-2; each solenoid vents air from both butterfly valves	ASCO CAT # 8300C72	H-2-28540, H-2-96418, sht 2
EV-PVLDL-2	Solenoid Valve vents air from butterfly valves CV-PVLDL-1, CV-PVLDL-2; each solenoid vents air from both butterfly valves	ASCO CAT # 8300C72	H-2-28540, H-2-96418, sht 2
CV-PVLDL-1	Butterfly Valve isolates vacuum line upstream of HEPA filters	Fisher Controls Model 9500 TFE	H-2-28540, H-2-96418, sht 2

APPENDIX B - MASTER COMPONENT INDEX INPUT LIST: PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEMS SAFETY CLASS			
APPLICABLE LCO: 3.1.1.1			
PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEM SE EQUIPMENT/COMPONENT LIST			
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	MANUFACTURER PART/MODEL NUMBER	DRAWING NUMBER
CV-PVLDL-2	Butterfly Valve isolates vacuum line upstream of HEPA filters	Fisher Controls Model 9500 TFE	H-2-28540, H-2-96418, sht 2
HS-1LD-23B	Switch- tests liquid detection circuit trouble indicator light L-1LD-23B and annunciator CA-1LDB-23B	GE CR2940, VA202B	H-2-28087, sht 2
HS-2LD-23B	Switch tests liquid detection circuit trouble indicator light L-2LD-23B and annunciator CA-2LDD-23B	GE CR2940, VA202B	H-2-28087, sht 2
L-1LD-23B	Indicator Light- Indicates liquid intrusion in vacuum lines upstream of demister #6 and trouble with liquid detection circuit (open circuit) for alarm and test of liquid detection circuit **NON-SAFETY ENVELOPE**	GE CR2290, VC212C2	H-2-28087, sht 2
L-2LD-23B	Indicator Light- Indicates liquid intrusion in vacuum lines upstream of demister #7 and trouble with liquid detection circuit (open circuit) for alarm and test of liquid detection circuit **NON-SAFETY ENVELOPE**	GE CR2290, VC212C2	H-2-28087, sht 2
MC-VPP1-23B	Motor Controller opens and closes power circuits for vacuum pump PVVP-1 motor	Cutler-Hammer TBD	H-2-28737, sht 1
MC-VPP2-23B	Motor Controller opens and closes power circuits for vacuum pump PVVP-2 motor	Cutler-Hammer TBD	H-2-28737, sht 1
R-1LD-23B	Resistor reduces voltage in liquid detection trouble circuit from 220 VDC to 110 VDC across relay coil	N/A 47K Ohms, 1 watt	H-2-28087, sht 2

APPENDIX B - MASTER COMPONENT INDEX INPUT LIST: PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEMS SAFETY CLASS			
APPLICABLE LCO: 3.1.1.1			
PROCESS VACUUM LIQUID DETECTION INTERLOCK SYSTEM SE EQUIPMENT/COMPONENT LIST			
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	MANUFACTURER PART/MODEL NUMBER	DRAWING NUMBER
	CR-1LD2-23B		
R-2LD-23B	Resistor reduces voltage in liquid detection trouble circuit from 220 VDC to 110 VDC across relay coil CR-2LD2-23B	N/A 47K Ohms, 1 watt	H-2-28087, sht 2