INTRODUCTION

Five systems were evaluated at the Plutonium Finishing Plant (PFP), using the Criteria and Review Approach Document (CRAD) produced in support of Commitment 3 of the Department of Energy Implementation Plan (PLAN) for Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2000-2, Configuration Management, Vital Safety Systems. The methodology used to complete the assessment was a round-table discussion held at PFP. Participants were the PFP senior management, line management, the responsible Design Authorities (System Engineers), the facility Chief Engineer, the OSR Subject Matter Expert, the Fire Protection Safety Engineer, the Authorization Basis Team Leader. Observers were the Department of Energy Richland Office (RL) Facility Representative, several RL Function Area Representatives, and the DNFSB Field Representative. This report is the product of that meeting.

PFP DESIGN AUTHORITIES

The PFP has established system Design Authorities in compliance with Hanford Site procedure HNF-PRO-1819, *PHMC Engineering Requirements*. In short, the Site procedure requires that a qualified engineer be delegated responsibility for each Structure, System, and Component (SSC) at each facility. The Site requirement makes no distinction between Safety Related and non-Safety Related SSCs. The qualification requirements mirror DOE Order 5480.20A. The five Design Authorities who are responsible for the systems assessed were interviewed in the round-table discussion. Their answers, as well as the responses from management and other subject matter experts from PFP form the basis for this report.

PFP SAFETY DOCUMENTATION HIERARCHY

The highest-level safety document at the PFP is HNF-SD-CP-SAR-021, Revision1, *Plutonium Finishing Plant Final Safety Analysis Report* (FSAR). The operational safety requirements of the FSAR are implemented by WHC-SD-CP-OSR-010, Revision 0-P, *Plutonium Finishing Plant Operational Safety Requirements* (OSR). Section 4.2 of the OSR credits additional supporting documents, site-wide procedures, working level surveillance procedures, corrective maintenance procedures, the surveillance scheduling system, the records disposition program, and administrative procedures with completing the implementation of the OSR program. Most notable of the supporting documents are the System Design Documents (SDDs), which describe the definition and means of maintaining the applicable safety envelope. Throughout this report, the applicable references from the Appendices of the OSR, applicable SDDs, and implementing procedures will be used in the discussion of results to document answers.

ORGANIZATION OF ATTACHMENTS

The ten questions or discussion points from the Review Approach of the CRAD have been “brought forward” and are answered or discussed under each applicable Criterion. Each Vital Safety System under assessment is discussed in a separate Attachment.

VITAL SAFETY SYSTEMS SELECTED FOR ASSESSMENT

All Safety Class and Safety Significant SSCs at the PFP are listed in HNF-SD-CP-TI-108, Revision 18, *Plutonium Finishing Plant Safety Systems and Equipment List* (SEL). The scope of this assessment, pursuant to Commitment 3 of the PLAN, was limited to active Safety Class SSCs, confinement ventilation systems, and fire protection systems that protect operations or process areas (vs. office building) of Defense Nuclear Facilities. Using those criteria, the following SSCs were evaluated at PFP:

Gaseous Effluent Stack Monitors and Alarms: also known as System 24A, this system is designated Safety Class to ensure that Alpha releases are continuously monitored and alarms are initiated to warn area occupants to take precautionary measures to prevent uptake. Components in this system are listed in Table 1.3 of the SEL.

HVAC Supply Fan Seismic Shutdown System: also known as System 99B, this system is designated Safety Class to ensure that a significant contamination spread does not occur should the supply fans continue to run and pressurize the building following a 0.25 Safe Shutdown Earthquake (SSE). Components in this system are listed in Table 1.4 of the SEL.

Fire Protection System: also known as System 26, this system is designated General Service, with OSR Administrative Control 5.20 in place to ensure that the program functions.

Process Vacuum Liquid Detection Interlock System: also known as System 23B, this system is designated Safety Class to ensure that plutonium bearing solutions do not reach geometrically unfavorable locations within the vacuum system. Although analysis shows that a criticality in this area would not result in an event that exceeds risk evaluation guidelines, this system provides double contingency. Components in this system are listed in Table 1.5 of the SEL.

HEPA Filter, Secondary and Final Stages; and Confinement Ventilation Systems: the HEPA Filters and ductwork from the final stage of HEPA filters to the building exterior surface are in System 25 and are designated Safety Class to ensure that significant amounts of contamination is not released to the site boundary. Components in this system are listed in Table 1.2 of the SEL. Confinement Ventilation Systems are also in System 25 and are designated Safety Significant to protect the on-site worker from airborne contamination. These components are listed in Table 3.0 of the SEL.

VITAL SAFETY SYSTEMS NOT SELECTED FOR ASSESSMENT

Passive Safety Class SSCs and all other Safety Significant SSCs are not included in this assessment. These SSCs are listed in HNF-SD-CP-TI-108, Revision 18, *Plutonium Finishing Plant Safety Systems and Equipment List* (SEL). The Safety Class SSCs are the Building Structural Features, Table 1.1; Glovebox Criticality Design Features, Table 1.6; and Plutonium Storage Arrays, Table 1.7. The Safety Significant SSCs are the Criticality Alarm System, Table 2.0 and all other Safety Significant Systems and Related Equipment, Table 3.0.

Criteria and Review Approach Document for Assessment of Operational Readiness of Vital Safety Systems: Gaseous Effluent Stack Monitors and Alarms, System 24A

Site:	Hanford
Facility:	Plutonium Finishing Plant
System:	24A: Gaseous Effluent Stack Monitors and Alarms
Systems Classification:	Safety Class
System Safety Function:	The Effluent Stack Air Monitors ensure that the release of alpha emitting radio nuclides to the environment via the building exhaust stacks is continuously monitored and alarms are initiated if the release exceeds identified limits. The Effluent Stack Air Monitors and Alarms provide continuous verification of HEPA filter integrity and ensure prompt detection of elevated plutonium concentrations in effluent air. (Excerpted from HNF-SD-CP-SDD-006, Rev. 3, *Definition and Means of Maintaining the Effluent Stack Air Monitors Portion of the PFP Safety Envelope*)

OBJECTIVE:

This vital safety system is operational and personnel and processes are in place that ensure its continued operational readiness.

<u>Criteria and Discussion of Results</u>

VSS-1.1 VSS safety functions are defined and understood by responsible line managers, and supporting information/documentation is available and adequate. System testing is adequate to ensure operability.

Review Approach Items:

1. Using the DOE-approved facility safety analysis (i.e., SAR, BIO, etc.), identify: a) the system safety function(s); b) the normal, abnormal, and accident conditions under which the system is intended to perform its safety function(s); and, c) relevant system functional requirements and performance criteria.

ANSWER: The system's Design Authority answered that the Final Safety Analysis Report, HNF-SD-CP-SAR-021, Revision1, *Plutonium Finishing Plant Final Safety Analysis Report*

(FSAR) and WHC-SD-CP-OSR-010, Revision 0-P, *Plutonium Finishing Plant Operational Safety Requirements* (OSR) adequately describe the system safety function. The system function is further described in HNF-SD-CP-SDD-006, Rev. 3, *Definition and Means of Maintaining the Effluent Stack Air Monitors Portion of the PFP Safety Envelope* [SDD-006].

2. Identify the acceptance criteria from the surveillance tests used to verify that the system is capable of accomplishing its safety function(s). Review the acceptance criteria against the function(s), conditions, requirements, and performance criteria identified in Question 1 above.

ANSWER: The OSR Subject Matter Expert answered that surveillance tests, for example, ZSE-24A-001, *Monthly 291-Z-1 (291-Z) Stack Effluent Monitor Functional Test,* contain asterisked items that carry a note that requires satisfactory completion of the step to demonstrate that the acceptance criteria in the OSR was satisfied. These surveillance procedures are listed in SDD-006 and Appendix A of FSP-PFP-5-8, Volume 2, Chapter 13, Section 3, *Operational Safety Requirements Compliance*.

3. At what frequency are the tests identified in Question 2 above performed? Determine whether these tests and inspections are required by Technical Safety Requirement, Operational Safety Requirements (OSRs), or other Authorization Basis or Authorization Agreement requirements.

ANSWER: The OSR Subject Matter Expert answered that the frequency for testing is specified in Appendix A of FSP-PFP-5-8, Section 13.3, *Operational Safety Requirements Compliance*. For the Effluent Stack Air Monitors and Alarms, the flow rate of the continuous air monitors (CAM) is verified shiftly (minimum daily), the CAM alarm set point is verified shiftly (minimum daily), the systems functional test is performed monthly (minimum) and/or as part of corrective maintenance, and the system components are calibrated annually or as part of corrective maintenance.

7. Are drawings that document system configuration available? If so, identify the types of drawings (e.g., piping and instrumentation diagrams, electrical one-line, wiring, or schematic diagrams, installation drawings).

ANSWER: The Design Authority answered that the system drawings are listed on Hanford Site Drawing H-2-99480 under the table for System 24A. These drawings are listed as Essential Drawings, which means that changes to the drawings must be incorporated (drawing physically changed) within 30 days of the change being completed in the field. Where no field change is required, the drawing must be changed within 30 days of approval of the change. Review of H-2-99480 revealed that there are nineteen Essential Drawings and that all System 24A drawings are CAD. The Design Authority said that he believes the drawings accurately reflect the field condition of the system.

Discussion of Results – (List information/documentation that was available or inadequate. Indicate whether the criterion was met).

ANSWER: Based on interviews and review of documentation, the safety functions of the Gaseous Effluent Stack Monitors and Alarms, System 24A, at the Plutonium Finishing Plant are defined and understood by plant management and engineers. System testing requirements are adequate to ensure operability of the system and performance of its safety function. No deficiencies or inadequacies were identified.

Supporting Documentation:

HNF-SD-CP-SAR-021, Revision 1, *Plutonium Finishing Plant Final Safety Analysis Report* (FSAR)

WHC-SD-CP-OSR-010, Revision 0-P, *Plutonium Finishing Plant Operational Safety Requirements* (OSR) Limiting Condition for Operation (LCO) 3.2.2 "Effluent Stack Air Monitors and Alarms" and LCO 3.2.2 Bases.

HNF-SD-CP-SDD-006, Rev. 3, *Definition and Means of Maintaining the Effluent Stack Air Monitors Portion of the PFP Safety Envelope*

FSP-PFP-5-8, Volume 2, Section 13.3, *Operational Safety Requirements Compliance*, Appendix A, Revision 8, Change 0, OSR Data Sheet Compliance Matrix

H-2-99480, Sheets 1-6, Essential & Support Drawing List

VSS-1.2 The backlog for surveillances, tests, inspections, maintenance, repair, upgrades, or other work on the system is managed and kept to an appropriate minimum.

Review Approach Items:

6. Identify the current backlog for the system for items such as preventive maintenance, modifications, surveillances, tests, inspections, and corrective actions.

ANSWER: The Design Authority answered that there was no backlog of preventive maintenance for the system and that there were a few corrective maintenance items and minor modifications that do not affect the safety function of the system. The Facility Director added that there was an active program to validate the results of the 291-Z stack (main stack) monitoring results and that weekly discussion with the Washington State Department of Health have increased the visibility of the system. Results to-date indicates that the main stack probe has been performing as designed and continues to provide its safety function.

Discussion of Results – (Provide a discussion indicating whether the criterion was met).

ANSWER: The Design Authority said that he believed the maintenance and modification backlog (the only backlog carried on this system) was managed and kept to a minimum.

VSS-1.3 Configuration Management and Maintenance programs effectively ensure operational availability of the system.

Review Approach Items:

5. Identify formally scheduled activities, in addition to those addressed in Item 2 above, that are intended to help ensure reliable performance of the system. Include preventive maintenance, walkdowns, inspections, and assessments as appropriate.

ANSWER: The OSR Subject Matter Expert said that when there were related procedures to improve the reliability of the system, they would be identified in the applicable System Design Document, usually as "ZO" (Z-Plant Operating) procedures or maintenance procedures. Review of SDD-006 revealed three ZO procedures and three maintenance procedures. In general, they were for the surveillance, operation, or maintenance of support equipment.

8. Review the processes used to ensure that work on the system and changes to the system are properly controlled (i.e., formally reviewed, approved, implemented, tested, USQ review performed if required, documents updated, and work/change accepted).

ANSWER: The Design Authority answered that at the facility level, PFP uses several procedures to control work and ensure compliance with Site and DOE requirements. In addition to the procedures listed below that correlate activities to procedures, there are Hanford Site procedures from which these procedures were derived.

Work Control: FSP-PFP-5-8, Volume 2, Chapter 13.4, *Work Management Process Description and Job Control System Process*

USQ Process: FSP-PFP-5-8, Volume 1, Chapter 2.23, *Identification and Resolution of Unreviewed Safety Questions*

Procedure Changes: FSP-PFP-5-8, Volume 2, Chapters 13.5, *Processing PFP Documents*; 13.6, *PFP Document Control System*; and 13.7, *PFP Technical Document Use Policy*

Drawing Changes: FSP-PFP-0848, Chapter 1.12, *PFP Facility Drawing Management*

9. Determine whether the procedures identified in items 2 and 5 above, and the drawings identified in item 7 above, are controlled under a formal document control process, and indicate whether the process requires that documents be updated as necessary to maintain their accuracy.

ANSWER: See Answer to question 8, above.

Discussion of Results – (Address the maintenance program, document control, identification of system requirements and their bases, change control/work control, and assessments of the system. Indicate whether responsibility for operational readiness of this system is formally assigned).

ANSWER: Both the configuration management and maintenance programs ensure that this system is available to perform its intended safety function. The recent Facility Evaluation Board (FEB) report said, "Facility modifications are properly approved and controlled using ECNs and work packages." The responsibility for operational readiness of this system has been assigned to the Safety Systems Team, which includes the Design Authority as an integral member of the team.

VSS-1.4 The system is operable and available to fulfill its safety function when required.

Review Approach Items:

4. For each of the past three years: a) identify the number of times that the system has failed to meet its test acceptance criteria; b) identify the number of times that the system has failed in response to facility operating conditions (i.e., failed on demand); and, c) estimate the percentage of time that the system was not capable of accomplishing its safety function(s) when required to be operable.

ANSWER: The OSR Subject Matter Expert said that because this is a Safety Class system, any failure of the system to perform its intended safety function, as well as percent availability would have been recorded in the monthly report that he produces. These reports are available in MS-Word format for review. The Design Authority said that he knew on no instances when the system failed to perform its safety function and identified several instances when the system was challenged and performed as designed. The Design Authority, when questioned directly, said that the system has demonstrated high reliability.

10. Identify any systems and equipment (e.g., electric power, instrument or control air, diesel fuel transfer, vacuum, heat tracing, etc.) that directly support the operation of the vital safety system being assessed (i.e., where the support systems/equipment are essential for the safety system to perform its safety functions) that are not included within the defined system boundary.

ANSWER: The OSR Subject Matter Expert said that all equipment that supports the safety system are described in the System Design Document along with the rationale for not including the support equipment in the Safety Envelope. SDD-006 was reviewed and it described the alarm system wiring in room 714, the electrical distribution system, and the building vacuum system and local vacuum pumps.

Discussion of Results – (Provide a discussion indicating whether the criterion was met).

ANSWER: Review of documentation and interviews with knowledgeable facility personnel confirm that the Gaseous Effluent Stack Monitors and Alarms, System 24A, are operable and available to perform their intended safety function.

Criteria and Review Approach Document for Assessment of Operational Readiness of Vital Safety Systems: HVAC Supply Fan Seismic Shutdown System, System 99B

Site:	Hanford
Facility:	Plutonium Finishing Plant
System:	99B: HVAC Supply Fan Seismic Shutdown System
Systems Classification:	Safety Class
System Safety Function:	The Supply Ventilation System Seismic Shutdown ensures that the 234-5Z building supply fans and the dry air process fans are shut down following a seismic event; the Seismic Shutdown will also ensure that power to the Laboratory Prototype Calciner is shut down, and that the compressed air supply to the calciner is blocked. The 234-5Z building in the Plutonium Finishing Plant (PFP) has been analyzed to determine the consequences of a 0.20 g safe shutdown earthquake (SSE). WHC-SD-SQA-TI-013, *Safety and Risk Assessment Technical Information to Support PFP Restart* concluded that the most serious spread of contamination from a SSE would occur if the building were pressurized by the main supply fans while the exhaust fans no longer functioned. In accordance with HNF-PRO-704, *Hazard and Accident Analysis Process*, the supply ventilation system seismic shutdown system is designated Safety Class. The supply ventilation system seismic shutdown is provided to mitigate the consequences of exhaust fan failures during a seismic event that breaches the structural confinement barriers, and of potential releases from the Laboratory Prototype Calciner following a seismic event. On a change of state from either of two accelerometers located at Corridor 14A, the ventilation control circuits must remove electrical power from fans which may pressurize the building. Each accelerometer has two sensors with one mounted in each of the east-west and north-south directions. A vertical sensor is not included[1]. Each accelerometer is set to actuate (open a circuit) if it detects an acceleration greater than 0.07g. (Excerpted from HNF-SD-CP-SDD-004, Rev. 7, *Definition and Means of Maintaining the Supply Ventilation System Seismic Shutdown Portion of the PFP Safety Envelope*)

[1] A vertical sensor was not included for the following two reasons. First, seismic analyses determined that building damage that would result in a loss of containment are caused by the horizontal (only) components of earthquakes (URS/John A. Blume and Associates, Engineers, 1987, "Seismic (SSE) Evaluation for the 234-5Z Building at the Hanford Site"). Second, tests determined that construction and general operating activities cause primarily vertical accelerations. Thus, nuisance trips could be minimized without missing a potentially damaging earthquake by not including a vertical sensor.

OBJECTIVE:

This vital safety system is operational and personnel and processes are in place that ensure its continued operational readiness.

Criteria and Discussion of Results

VSS-1.1 VSS safety functions are defined and understood by responsible line managers, and supporting information/documentation is available and adequate. System testing is adequate to ensure operability.

Review Approach Items:

1. Using the DOE-approved facility safety analysis (i.e., SAR, BIO, etc.), identify: a) the system safety function(s); b) the normal, abnormal, and accident conditions under which the system is intended to perform its safety function(s); and, c) relevant system functional requirements and performance criteria.

ANSWER: The system's Design Authority answered that the Final Safety Analysis Report, HNF-SD-CP-SAR-021, Revision1, *Plutonium Finishing Plant Final Safety Analysis Report* (FSAR) and WHC-SD-CP-OSR-010, Revision 0-P, *Plutonium Finishing Plant Operational Safety Requirements* (OSR) adequately describe the system safety function. The system function is further described in HNF-SD-CP-SDD-004, Rev. 7, *Definition and Means of Maintaining the Supply Ventilation System Seismic Shutdown Portion of the PFP Safety Envelope* [SDD-004].

2. Identify the acceptance criteria from the surveillance tests used to verify that the system is capable of accomplishing its safety function(s). Review the acceptance criteria against the function(s), conditions, requirements, and performance criteria identified in Question 1 above.

ANSWER: The OSR Subject Matter Expert answered that surveillance tests, for example, ZSE-99B-001, *Seismic Fan Shutdown System In-Service Test*, contain asterisked items that carry a note that requires satisfactory completion of the step to demonstrate that the acceptance criteria in the OSR was satisfied. These surveillance procedures are listed in SDD-004 and Appendix A of FSP-PFP-5-8, Volume 2, Chapter 13, Section 3, *Operational Safety Requirements Compliance*.

3. At what frequency are the tests identified in Question 2 above performed? Determine whether these tests and inspections are required by Technical Safety Requirement, Operational Safety Requirements (OSRs), or other Authorization Basis or Authorization Agreement requirements.

ANSWER: The OSR Subject Matter Expert answered that the frequency for testing is specified in Appendix A of FSP-PFP-5-8, Section 13.3, *Operational Safety Requirements Compliance*. For the Seismic Fan Shutdown System, both seismic shutdown system accelerometers are verified to be on-line and in service once every 24 hours, each accelerometer channel is calibrated annually, and the functional test of the accelerometer-activated ventilation shutdown is performed annually.

7. Are drawings that document system configuration available? If so, identify the types of drawings (e.g., piping and instrumentation diagrams, electrical one-line, wiring, or schematic diagrams, installation drawings).

ANSWER: The Design Authority answered that the system drawings are listed on Hanford Site Drawing H-2-99480 under the table for System 99B. These drawings are listed as Essential Drawings, which means that changes to the drawings must be incorporated (drawing physically changed) within 30 days of the change being completed in the field. Where no field change is required, the drawing must be changed within 30 days of approval of the change. Review of H-2-99480 revealed that there are thirteen Essential Drawings and that all System 99B drawings are CAD. The Design Authority said that he believes the drawings accurately reflect the field condition of the system.

Discussion of Results – (List information/documentation that was available or inadequate. Indicate whether the criterion was met).

ANSWER: Based on interviews and review of documentation, the safety functions of the HVAC Supply Fan Seismic Shutdown System, System 99B, at the Plutonium Finishing Plant are defined and understood by plant management and engineers. System testing requirements are adequate to ensure operability of the system and performance of its safety function. No deficiencies or inadequacies were identified.

Supporting Documentation:

HNF-SD-CP-SAR-021, Revision 1, *Plutonium Finishing Plant Final Safety Analysis Report* (FSAR)

WHC-SD-CP-OSR-010, Revision 0-P, *Plutonium Finishing Plant Operational Safety Requirements* (OSR) Limiting Condition for Operation (LCO) 3.2.3 "Supply Ventilation System Seismic Shutdown" and LCO 3.2.3 Bases.

HNF-SD-CP-SDD-004, Rev. 7, *Definition and Means of Maintaining the Supply Ventilation System Seismic Shutdown Portion of the PFP Safety Envelope*

FSP-PFP-5-8, Volume 2, Section 13.3, *Operational Safety Requirements Compliance*, Appendix A, Revision 8, Change 0, OSR Data Sheet Compliance Matrix

H-2-99480, Sheets 1-6, Essential & Support Drawing List

VSS-1.2 The backlog for surveillances, tests, inspections, maintenance, repair, upgrades, or other work on the system is managed and kept to an appropriate minimum.

Review Approach Items:

6. Identify the current backlog for the system for items such as preventive maintenance, modifications, surveillances, tests, inspections, and corrective actions.

ANSWER: The Design Authority answered that there was no backlog of preventive maintenance for the system and that there were a few corrective maintenance items that do not affect the safety function of the system and no modifications pending for the system.

Discussion of Results – (Provide a discussion indicating whether the criterion was met).

ANSWER: The Design Authority said that he believed the maintenance backlog (the only backlog carried on this system) was managed and kept to a minimum.

VSS-1.3 Configuration Management and Maintenance programs effectively ensure operational availability of the system.

Review Approach Items:

5. Identify formally scheduled activities, in addition to those addressed in Item 2 above, that are intended to help ensure reliable performance of the system. Include preventive maintenance, walkdowns, inspections, and assessments as appropriate.

ANSWER: The OSR Subject Matter Expert said that when there were related procedures to improve the reliability of the system, they would be identified in the applicable System Design Document, usually as "ZO" (Z-Plant Operating) procedures or maintenance procedures. Review of SDD-004 revealed six ZO procedures and two maintenance procedures. In general, they were for the surveillance, operation, or maintenance of support equipment.

8. Review the processes used to ensure that work on the system and changes to the system are properly controlled (i.e., formally reviewed, approved, implemented, tested, USQ review performed if required, documents updated, and work/change accepted).

ANSWER: The Design Authority answered that at the facility level, PFP uses several procedures to control work and ensure compliance with Site and DOE requirements. In addition to the procedures listed below that correlate activities to procedures, there are Hanford Site procedures from which these procedures were derived.

Work Control: FSP-PFP-5-8, Volume 2, Chapter 13.4, *Work Management Process Description and Job Control System Process*

USQ Process: FSP-PFP-5-8, Volume 1, Chapter 2.23, *Identification and Resolution of Unreviewed Safety Questions*

Procedure Changes: FSP-PFP-5-8, Volume 2, Chapters 13.5, *Processing PFP Documents*; 13.6, *PFP Document Control System*; and 13.7, *PFP Technical Document Use Policy*

Drawing Changes: FSP-PFP-0848, Chapter 1.12, *PFP Facility Drawing Management*

9. Determine whether the procedures identified in items 2 and 5 above, and the drawings identified in item 7 above, are controlled under a formal document control process, and indicate whether the process requires that documents be updated as necessary to maintain their accuracy.

ANSWER: See Answer to question 8, above.

Discussion of Results – (Address the maintenance program, document control, identification of system requirements and their bases, change control/work control, and assessments of the system. Indicate whether responsibility for operational readiness of this system is formally assigned).

ANSWER: Both the configuration management and maintenance programs ensure that this system is available to perform its intended safety function. The recent Facility Evaluation Board (FEB) report said, "Facility modifications are properly approved and controlled using ECNs and work packages." The responsibility for operational readiness of this system has been assigned to the Safety Systems Team, which includes the Design Authority as an integral member of the team.

VSS-1.4 The system is operable and available to fulfill its safety function when required.

Review Approach Items:

4. For each of the past three years: a) identify the number of times that the system has failed to meet its test acceptance criteria; b) identify the number of times that the system has failed in response to facility operating conditions (i.e., failed on demand); and, c) estimate the percentage of time that the system was not capable of accomplishing its safety function(s) when required to be operable.

ANSWER: The OSR Subject Matter Expert said that because this is a Safety Class system, any failure of the system to perform its intended safety function, as well as percent availability would have been recorded in the monthly report that he produces. These reports are available in MS-Word format for review. The Design Authority said that he knew on no instances when the system failed to perform its safety function. The Design Authority, when questioned directly, said that the system has demonstrated very high reliability.

10. Identify any systems and equipment (e.g., electric power, instrument or control air, diesel fuel transfer, vacuum, heat tracing, etc.) that directly support the operation of the vital safety system being assessed (i.e., where the support systems/equipment are essential for the safety system to perform its safety functions) that are not included within the defined system boundary.

ANSWER: The OSR Subject Matter Expert said that all equipment that supports the safety system are described in the System Design Document along with the rationale for not including the support equipment in the Safety Envelope. SDD-004 was reviewed and it described the 120 volt dedicated seismic shutdown uninterruptible power supply, seismic status and corridor 14 horns and alarm lights, several relays and contacts, several small supply fans, wiring and junction boxes, and miscellaneous switches.

Discussion of Results – (Provide a discussion indicating whether the criterion was met).

ANSWER: Review of documentation and interviews with knowledgeable facility personnel confirm that the HVAC Supply Fan Seismic Shutdown System, System 99B, is operable and available to perform its intended safety function.

Criteria and Review Approach Document for Assessment of Operational Readiness of Vital Safety Systems: Fire Protection System, System 26

Site:	Hanford
Facility:	Plutonium Finishing Plant
System:	26: Fire Protection System
Systems Classification:	General Service, compliant with NFPA
System Safety Function:	The Plutonium Finishing Plant Operational Safety Requirements, WHC-SD-CP-OSR-010 (Ref. 2) contains no Limiting Conditions for Operations (LCOs) associated with the PFP fire suppression and alarm systems. However the OSR Administrative Control (AC) Section AC 5.20 "Fire Protection", requires that "A program shall be established, implemented, and maintained for facility Fire Protection". As described in Section 9.2.2 of the FSAR, fire mitigation features of the PFP buildings are categorized as either "passive", that is they are built in to the building as part of its construction features, or as "active". Many of these passive fire protection features are categorized as Safety Envelope Equipment due to their dual function as confinement barriers or ventilation boundaries. WHC-SD-CP-SDD-007, Definition and Means of Maintaining the Structural Confinement Features Portion of the PFP SE contains a complete description of passive barriers. The most important active feature is the supervised wet pipe sprinkler systems and associated alarms. Based on the FSAR analysis, failure of the system to operate would <u>not</u> result in onsite or offsite personnel exceeding the exposure allowed by the Risk Acceptance Guidelines (FSAR, 9.4-1). As a result, the system is neither Safety Class (SC) nor Safety Significant (SS). Furthermore, the fire systems are classified as General Service (GS) per HNF-PRO-704, Table 5. (Excerpted from HNF-SD-CP-SDD-010, Rev. 3, *Definition and Means of Maintaining the Fire Protection System Portion of the PFP Safety Envelope*)

OBJECTIVE:

This vital safety system is operational and personnel and processes are in place that ensure its continued operational readiness.

Criteria and Discussion of Results

VSS-1.1 VSS safety functions are defined and understood by responsible line managers, and supporting information/documentation is available and adequate. System testing is adequate to ensure operability.

Review Approach Items:

1. Using the DOE-approved facility safety analysis (i.e., SAR, BIO, etc.), identify: a) the system safety function(s); b) the normal, abnormal, and accident conditions under which the system is intended to perform its safety function(s); and, c) relevant system functional requirements and performance criteria.

ANSWER: The system's Design Authority answered that the Final Safety Analysis Report, HNF-SD-CP-SAR-021, Revision1, *Plutonium Finishing Plant Final Safety Analysis Report* (FSAR) adequately describes the system safety function. The system function is further described in HNF-SD-CP-SDD-010, Rev. 3, *Definition and Means of Maintaining the Fire Protection System Portion of the PFP Safety Envelope* [SDD-010]. The facility Fire Hazards Analysis (FHA), HNF-SD-CP-FHA-004, Rev. 0, *Fire Hazard Analysis for the Plutonium Finishing Plant,* also describes the controls necessary to protect the facility. An additional FHA, HNF-6385, *Fire Hazard Analysis for the Plutonium Finishing Plant 2736-Z Complex*, has been developed to include construction project, W-460, Plutonium Stabilization and Handling (PuSH). As this FHA was being prepared, it became apparent that the original FHA contained inadequacies. These inadequacies resulted in declaration of an occurrence and a potential Unreviewed Safety Question. Formal correspondence from R. D. Hanson, FH, to K. L. Klein, RL, *Unreviewed Safety Question "Fire Hazard Analysis for the Plutonium Finishing Plant (Occurrence Report RL-PHMC-PFP-20001-001)"*, letter number FH-0100367, was transmitted on January 19, 2001. An Unreviewed Safety Question was declared by RL and HNF-7616, *Justification for Continued Operation for the 2736-ZB Building at the Plutonium Finishing Plant,* has been prepared and is being implemented at the writing of this report.

2. Identify the acceptance criteria from the surveillance tests used to verify that the system is capable of accomplishing its safety function(s). Review the acceptance criteria against the function(s), conditions, requirements, and performance criteria identified in Question 1 above.

ANSWER: The Design Authority answered that the surveillance tests and frequencies are specified in the Hanford Site procedure, HNF-PRO-351, which complies with NFPA requirements. This Site procedure is specified, along with facility-specific administrative and operating procedures, in SDD-010 and Appendix C, <u>OSR Administrative Control Programs Matrix</u>, of FSP-PFP-5-8, Volume 2, Chapter 13, Section 3, *Operational Safety Requirements Compliance*.

3. At what frequency are the tests identified in Question 2 above performed? Determine whether these tests and inspections are required by Technical Safety Requirement, Operational Safety Requirements (OSRs), or other Authorization Basis or Authorization Agreement requirements.

ANSWER: See answer to question 2, above.

7. Are drawings that document system configuration available? If so, identify the types of drawings (e.g., piping and instrumentation diagrams, electrical one-line, wiring, or schematic diagrams, installation drawings).

ANSWER: The Design Authority answered that the system drawings are listed on Hanford Site Drawing H-2-99480 under the table for System 26. These drawings are listed as Essential Drawings, which means that changes to the drawings must be incorporated (drawing physically changed) within 30 days of the change being completed in the field. Where no field change is required, the drawing must be changed within 30 days of approval of the change. Review of H-2-99480 revealed that there are ninety-nine Essential Drawings and most are CAD drawings. The Design Authority noted that there are also Certified Vendor Information (CVI) drawings of the sprinkler system in 2736-ZB Building and that he believes both the CVI drawings and the facility drawings accurately reflect the field condition of the system.

Discussion of Results – (List information/documentation that was available or inadequate. Indicate whether the criterion was met).

ANSWER: Based on interviews and review of documentation, the safety functions of the Fire Protection System, System 26, at the Plutonium Finishing Plant are defined and understood by plant management and engineers. System testing requirements are adequate to ensure operability of the system and performance of its safety function. No deficiencies or inadequacies were identified.

Supporting Documentation:

HNF-SD-CP-SAR-021, Revision 1, *Plutonium Finishing Plant Final Safety Analysis Report* (FSAR)

WHC-SD-CP-OSR-010, Revision 0-P, *Plutonium Finishing Plant Operational Safety Requirements* (OSR) Administrative Control AC 5.20, "Fire Protection"

HNF-SD-CP-SDD-010, Rev. 3, *Definition and Means of Maintaining the Fire Protection System Portion of the PFP Safety Envelope*

HNF-SD-CP-FHA-004, Rev. 0, *Fire Hazard Analysis for the Plutonium Finishing Plant*

HNF-6385, REV. 0, ***Fire Hazard Analysis for the Plutonium Finishing Plant 2736-Z Complex***

Letter R. D. Hanson, FH, to K. L. Klein, RL, ***Unreviewed Safety Question "Fire Hazard Analysis for the Plutonium Finishing Plant (Occurrence Report RL-PHMC-PFP-20001-001)",*** **dated January 19, 2001, FH-0100367**

HNF-7616, ***Justification for Continued Operation for the 2736-ZB Building at the Plutonium Finishing Plant***

FSP-PFP-5-8, Volume 2, Section 13.3, ***Operational Safety Requirements Compliance,*** **Appendix C, Revision 5, Change 0, OSR Administrative Control Programs Matrix**

H-2-99480, Sheets 1-6, Essential & Support Drawing List

HNF-PRO-351, Rev. 3, Fire Protection System Testing/Inspection and Maintenance

HNF-PRO-360, Rev. 2, Fire Protection/Prevention for Construction, General Occupancy, and Demolition Activities

VSS-1.2 The backlog for surveillances, tests, inspections, maintenance, repair, upgrades, or other work on the system is managed and kept to an appropriate minimum.

Review Approach Items:

6. Identify the current backlog for the system for items such as preventive maintenance, modifications, surveillances, tests, inspections, and corrective actions.

ANSWER: The Design Authority answered that there are four preventive maintenance activities that have entered the "grace" period. The activities are not delinquent and no system restrictions have been declared. The Design Authority reiterated that he did not believe that these overdue activities affected the safety function of the system and gave the following examples: overdue testing of some fire dampers, smoke detectors, and dry chemical fire suppression systems. He identified a few system modifications that that have not been performed because of funding limitations. Most notable are the parts of the system that are being operated under an equivalency agreement with RL until funding can be made available to modify the system. Corrective actions are underway to correct a deficiency that has been identified with the surveillance methods for a dry chemical suppression system. Four items concerning the Fire Protection System are being tracked in the Site Deficiency Tracking System and are on schedule for closure.

Discussion of Results – (Provide a discussion indicating whether the criterion was met).

ANSWER: The Design Authority said that he believed the preventive maintenance and modification backlog for this system was being aggressively managed and kept to a minimum.

VSS-1.3 Configuration Management and Maintenance programs effectively ensure operational availability of the system.

Review Approach Items:

5. Identify formally scheduled activities, in addition to those addressed in Item 2 above, that are intended to help ensure reliable performance of the system. Include preventive maintenance, walkdowns, inspections, and assessments as appropriate.

ANSWER: The OSR Subject Matter Expert said that when there were related procedures to improve the reliability of the system, they would be identified in the applicable System Design Document, usually as "ZO" (Z-Plant Operating) procedures or maintenance procedures. Review of SDD-010 revealed no ZO procedures or maintenance procedures. However, ZO-170-160, "Fire Surveillance," is identified in FSP-PFP-5-8, Volume 2, Section 13.3, *Operational Safety Requirements Compliance*, Appendix C, Revision 5, Change 0, OSR Administrative Control Programs Matrix.

8. Review the processes used to ensure that work on the system and changes to the system are properly controlled (i.e., formally reviewed, approved, implemented, tested, USQ review performed if required, documents updated, and work/change accepted).

ANSWER: The Design Authority answered that at the facility level, PFP uses several procedures to control work and ensure compliance with Site and DOE requirements. In addition to the procedures listed below that correlate activities to procedures, there are Hanford Site procedures from which these procedures were derived.

Work Control: FSP-PFP-5-8, Volume 2, Chapter 13.4, *Work Management Process Description and Job Control System Process*

USQ Process: FSP-PFP-5-8, Volume 1, Chapter 2.23, *Identification and Resolution of Unreviewed Safety Questions*

Procedure Changes: FSP-PFP-5-8, Volume 2, Chapters 13.5, *Processing PFP Documents*; 13.6, *PFP Document Control System*; and 13.7, *PFP Technical Document Use Policy*

Drawing Changes: FSP-PFP-0848, Chapter 1.12, *PFP Facility Drawing Management*

9. Determine whether the procedures identified in items 2 and 5 above, and the drawings identified in item 7 above, are controlled under a formal document control process, and indicate whether the process requires that documents be updated as necessary to maintain their accuracy.

ANSWER: See Answer to question 8, above.

Discussion of Results – (Address the maintenance program, document control, identification of system requirements and their bases, change control/work control, and assessments of the system. Indicate whether responsibility for operational readiness of this system is formally assigned).

ANSWER: Both the configuration management and maintenance programs ensure that this system is available to perform its intended safety function. The recent Facility Evaluation Board (FEB) report said, "The overall level of performance for the NMS Project Occupational Safety, Health and Fire Protection program (OSH&FP) has significantly improved since the last FEB Assessment in August 1997. A review of 42 safety and health programs revealed few issues. In general, OSH&FP programs meet governing OSHA, U.S. Department of Energy (DOE), National Fire Protection Association, and Project Hanford requirements. Several areas were noted where improvement is needed: the asbestos program, safety-related procedure compliance, laboratory chemical management, resolution of long-term fire protection issues, fire extinguisher management, and control and maintenance of portable eye washes." The responsibility for operational readiness for this system has been assigned to the Safety Systems Team, which includes the Design Authority as an integral member of the team.

VSS-1.4 The system is operable and available to fulfill its safety function when required.

Review Approach Items:

4. For each of the past three years: a) identify the number of times that the system has failed to meet its test acceptance criteria; b) identify the number of times that the system has failed in response to facility operating conditions (i.e., failed on demand); and, c) estimate the percentage of time that the system was not capable of accomplishing its safety function(s) when required to be operable.

ANSWER: The Design Authority said that he knew on no instances when the system failed to perform its safety function. The Design Authority, when questioned directly, said that the system has demonstrated good reliability. System Restrictions and System Impairments, both planned and unplanned, are tracked by the Hanford Fire Department and were not readily available (within a day) for this assessment.

10. Identify any systems and equipment (e.g., electric power, instrument or control air, diesel fuel transfer, vacuum, heat tracing, etc.) that directly support the operation of the vital safety system being assessed (i.e., where the support systems/equipment are essential for the safety system to perform its safety functions) that are not included within the defined system boundary.

ANSWER: The OSR Subject Matter Expert said that all equipment that supports the safety system are described in the System Design Document along with the rationale for not including the support equipment in the Safety Envelope. SDD-010 was reviewed and it excluded the fire protection systems in office buildings and single-story structures that are easily exited from the safety envelope. The FHA for Project W-460, also indicates that the Site sanitary water system is outside the safety envelope, but verifies that it meets the requirements from NFPA for a fire water supply, e.g., the Site Water System meets minimum fire water storage and the gravity system provides adequate head to the PFP complex for fire-fighting.

Discussion of Results – (Provide a discussion indicating whether the criterion was met).

ANSWER: Review of documentation and interviews with knowledgeable facility personnel confirm that the Fire Protection System, System 26, is operable and available to perform its intended safety function.

Criteria and Review Approach Document for Assessment of Operational Readiness of Vital Safety Systems: Process Vacuum Liquid Detection Interlock System, System 23B

Site:	Hanford
Facility:	Plutonium Finishing Plant
System:	23B: Process Vacuum Liquid Detection Interlock System
Systems Classification:	Safety Class
System Safety Function:	The Process Vacuum Liquid Detection Interlock System prevent intrusion of process liquids into the HEPA filters downstream of demisters #6 and #7 during 26” 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. 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. (Excerpted from HNF-SD-CP-SDD-013, Rev. 3, *Definition and Means of Maintaining the Process Vacuum Liquid Detection Interlock System Portion of the PFP Safety Envelope*)

OBJECTIVE:

This vital safety system is operational and personnel and processes are in place that ensure its continued operational readiness.

Criteria and Discussion of Results

VSS-1.1 VSS safety functions are defined and understood by responsible line managers, and supporting information/documentation is available and adequate. System testing is adequate to ensure operability.

Review Approach Items:

1. Using the DOE-approved facility safety analysis (i.e., SAR, BIO, etc.), identify: a) the system safety function(s); b) the normal, abnormal, and accident conditions under which the system is intended to perform its safety function(s); and, c) relevant system functional requirements and performance criteria.

ANSWER: The system's Design Authority answered that the Final Safety Analysis Report, HNF-SD-CP-SAR-021, Revision1, *Plutonium Finishing Plant Final Safety Analysis Report* (FSAR) and WHC-SD-CP-OSR-010, Revision 0-P, *Plutonium Finishing Plant Operational Safety Requirements* (OSR) adequately describe the system safety function. The system function is further described in HNF-SD-CP-SDD-013, Rev. 3, *Definition and Means of Maintaining the* *Process Vacuum Liquid Detection Interlock System* *Portion of the PFP Safety Envelope* [SDD-013]. WHC-SD-SQA-CSA-20159, Rev 0-A, *Criticality Safety Analysis Report (CSAR) for the 26-inch Hg Vacuum System*, provides additional functional safety requirements, because this system provides a criticality safety function.

2. Identify the acceptance criteria from the surveillance tests used to verify that the system is capable of accomplishing its safety function(s). Review the acceptance criteria against the function(s), conditions, requirements, and performance criteria identified in Question 1 above.

ANSWER: The OSR Subject Matter Expert answered that surveillance tests, for example, ZSE-23B-001, *Semi-Annual Process Vacuum Liquid Detector Functional Test*, contain asterisked items that carry a note that requires satisfactory completion of the step to demonstrate that the acceptance criteria in the OSR was satisfied. These surveillance procedures are listed in SDD-013 and Appendix A of FSP-PFP-5-8, Volume 2, Chapter 13, Section 3, *Operational Safety Requirements Compliance*.

3. At what frequency are the tests identified in Question 2 above performed? Determine whether these tests and inspections are required by Technical Safety Requirement, Operational Safety Requirements (OSRs), or other Authorization Basis or Authorization Agreement requirements.

ANSWER: The OSR Subject Matter Expert answered that the frequency for testing is specified in Appendix A of FSP-PFP-5-8, Section 13.3, *Operational Safety Requirements Compliance*. For the Process Vacuum Liquid Detection Interlock System, operability of the supervisory circuit is tested once within 24 hours prior to startup of the 26" process vacuum system AND daily thereafter while the 26"process vacuum system is operating. A semi-annual functional test is performed.

7. Are drawings that document system configuration available? If so, identify the types of drawings (e.g., piping and instrumentation diagrams, electrical one-line, wiring, or schematic diagrams, installation drawings).

ANSWER: The Design Authority answered that the system drawings are listed on Hanford Site Drawing H-2-99480 under the table for System 23B. These drawings are listed as Essential Drawings, which means that changes to the drawings must be incorporated (drawing physically changed) within 30 days of the change being completed in the field. Where no field change is required, the drawing must be changed within 30 days of approval of the change. Review of H-2-99480 revealed that there are eighteen Essential Drawings for System 23B. The Design Authority said that he believes the drawings accurately reflect the field condition of the system.

Discussion of Results – (List information/documentation that was available or inadequate. Indicate whether the criterion was met).

ANSWER: Based on interviews and review of documentation, the safety functions of the Process Vacuum Liquid Detection Interlock System, System 23B, at the Plutonium Finishing Plant are defined and understood by plant management and engineers. System

testing requirements are adequate to ensure operability of the system and performance of its safety function. No deficiencies or inadequacies were identified.

Supporting Documentation:

HNF-SD-CP-SAR-021, Revision 1, *Plutonium Finishing Plant Final Safety Analysis Report* (FSAR)

WHC-SD-CP-OSR-010, Revision 0-P, *Plutonium Finishing Plant Operational Safety Requirements* (OSR) Limiting Condition for Operation (LCO) 3.1.1 "Criticality Prevention System" and LCO 3.1.1 Bases.

HNF-SD-CP-SDD-013, Rev. 3, *Definition and Means of Maintaining the Process Vacuum Liquid Detection Interlock System Portion of the PFP Safety Envelope*

WHC-SD-SQA-CSA-20159, Rev 0-A, *Criticality Safety Analysis Report (CSAR) for the 26-inch Hg Vacuum System*

FSP-PFP-5-8, Volume 2, Section 13.3, *Operational Safety Requirements Compliance*, Appendix A, Revision 8, Change 0, OSR Data Sheet Compliance Matrix

H-2-99480, Sheets 1-6, Essential & Support Drawing List

VSS-1.2 The backlog for surveillances, tests, inspections, maintenance, repair, upgrades, or other work on the system is managed and kept to an appropriate minimum.

Review Approach Items:

6. Identify the current backlog for the system for items such as preventive maintenance, modifications, surveillances, tests, inspections, and corrective actions.

ANSWER: The Design Authority answered that there was no backlog of preventive maintenance, corrective maintenance, modifications, surveillances, tests, inspections, or corrective actions to the system.

Discussion of Results – (Provide a discussion indicating whether the criterion was met).

ANSWER: The Design Authority said that he believed the backlog was managed and kept to a minimum.

VSS-1.3 Configuration Management and Maintenance programs effectively ensure operational availability of the system.

Review Approach Items:

5. Identify formally scheduled activities, in addition to those addressed in Item 2 above, that are intended to help ensure reliable performance of the system. Include preventive maintenance, walkdowns, inspections, and assessments as appropriate.

ANSWER: The OSR Subject Matter Expert said that when there were related procedures to improve the reliability of the system, they would be identified in the applicable System Design Document, usually as "ZO" (Z-Plant Operating) procedures or maintenance procedures. Review of SDD-013 revealed three ZO procedures and no maintenance procedures. In general, they were for the surveillance and operation of support equipment.

8. Review the processes used to ensure that work on the system and changes to the system are properly controlled (i.e., formally reviewed, approved, implemented, tested, USQ review performed if required, documents updated, and work/change accepted).

ANSWER: The Design Authority answered that at the facility level, PFP uses several procedures to control work and ensure compliance with Site and DOE requirements. In addition to the procedures listed below that correlate activities to procedures, there are Hanford Site procedures from which these procedures were derived.

Work Control: FSP-PFP-5-8, Volume 2, Chapter 13.4, *Work Management Process Description and Job Control System Process*

USQ Process: FSP-PFP-5-8, Volume 1, Chapter 2.23, *Identification and Resolution of Unreviewed Safety Questions*

Procedure Changes: FSP-PFP-5-8, Volume 2, Chapters 13.5, *Processing PFP Documents*; 13.6, *PFP Document Control System*; and 13.7, *PFP Technical Document Use Policy*

Drawing Changes: FSP-PFP-0848, Chapter 1.12, *PFP Facility Drawing Management*

9. Determine whether the procedures identified in items 2 and 5 above, and the drawings identified in item 7 above, are controlled under a formal document control process, and indicate whether the process requires that documents be updated as necessary to maintain their accuracy.

ANSWER: See Answer to question 8, above.

Discussion of Results – (Address the maintenance program, document control, identification of system requirements and their bases, change control/work control, and assessments of the system. Indicate whether responsibility for operational readiness of this system is formally assigned).

ANSWER: Both the configuration management and maintenance programs ensure that this system is available to perform its intended safety function. The recent Facility Evaluation Board (FEB) report said, "Facility modifications are properly approved and controlled using ECNs and work packages." The responsibility for operational readiness of this system has been assigned to the Water, Air, Vacuum, and Steam Team, which includes the Design Authority as an integral member of the team.

VSS-1.4 The system is operable and available to fulfill its safety function when required.

Review Approach Items:

4. For each of the past three years: a) identify the number of times that the system has failed to meet its test acceptance criteria; b) identify the number of times that the system has failed in response to facility operating conditions (i.e., failed on demand); and, c) estimate the percentage of time that the system was not capable of accomplishing its safety function(s) when required to be operable.

ANSWER: The OSR Subject Matter Expert said that because this is a Safety Class system, any failure of the system to perform its intended safety function, as well as percent availability would have been recorded in the monthly report that he produces. These reports are available in MS-Word format for review. The Design Authority said that he knew on no instances when the system failed to perform its safety function and identified several instances when the system was challenged and performed as designed. The Design Authority, when questioned directly, said that the system has demonstrated very high reliability.

10. Identify any systems and equipment (e.g., electric power, instrument or control air, diesel fuel transfer, vacuum, heat tracing, etc.) that directly support the operation of the vital safety system being assessed (i.e., where the support systems/equipment are essential for the safety system to perform its safety functions) that are not included within the defined system boundary.

ANSWER: The OSR Subject Matter Expert said that all equipment that supports the safety system are described in the System Design Document along with the rationale for not including the support equipment in the Safety Envelope. SDD-013 was reviewed and it described indicator lights and wiring that because of the way the could fail (fail safe) do not affect the function of the system.

Discussion of Results – (Provide a discussion indicating whether the criterion was met).

ANSWER: Review of documentation and interviews with knowledgeable facility personnel confirm that the Process Vacuum Liquid Detection Interlock System, System 23B, are operable and available to perform its intended safety function.

Criteria and Review Approach Document for Assessment of Operational Readiness of Vital Safety Systems: Ventilation System Confinement, System 25

Site:	Hanford
Facility:	Plutonium Finishing Plant
System:	25: Ventilation System Confinement
Systems Classification:	Safety Class
System Safety Function:	The Plutonium Finishing Plant Heating Ventilation and Cooling system provides for the confinement of radioactive releases to the environment and provides for the confinement of radioactive contamination within designated zones inside the facility. The PFP HVAC system provides two distinctly different safety envelope functions: It provides for the confinement of radioactive releases from the environment by virtue of the high efficiency particulate air (HEPA) filters in the facility E-3 and E-4 exhaust systems and it provides for confinement of radioactive material and contamination control within the facility by establishing control of air flows. (Excerpted from HNF-SD-CP-SDD-005, Rev. 3, *Definition and Means of Maintaining the Ventilation System Confinement Portion of the PFP Safety Envelope*)

OBJECTIVE:

This vital safety system is operational and personnel and processes are in place that ensure its continued operational readiness.

<u>Criteria and Discussion of Results</u>

VSS-1.1 VSS safety functions are defined and understood by responsible line managers, and supporting information/documentation is available and adequate. System testing is adequate to ensure operability.

Review Approach Items:

1. Using the DOE-approved facility safety analysis (i.e., SAR, BIO, etc.), identify: a) the system safety function(s); b) the normal, abnormal, and accident conditions under which the system is

intended to perform its safety function(s); and, c) relevant system functional requirements and performance criteria.

ANSWER: The system's Design Authority answered that the Final Safety Analysis Report, HNF-SD-CP-SAR-021, Revision1, *Plutonium Finishing Plant Final Safety Analysis Report* (FSAR) and WHC-SD-CP-OSR-010, Revision 0-P, *Plutonium Finishing Plant Operational Safety Requirements* (OSR) adequately describe the system safety function. The system function is further described in HNF-SD-CP-SDD-005, Rev. 3, *Definition and Means of Ventilation System Confinement Portion of the PFP Safety Envelope* [SDD-005].

2. Identify the acceptance criteria from the surveillance tests used to verify that the system is capable of accomplishing its safety function(s). Review the acceptance criteria against the function(s), conditions, requirements, and performance criteria identified in Question 1 above.

ANSWER: The OSR Subject Matter Expert answered that this system has eighty surveillance tests, for example, ZSE-25A-001, *Annual Aerosol Test of E4 Filter Room 309, FR-309, Building 234-5Z,* contain asterisked items that carry a note that requires satisfactory completion of the step to demonstrate that the acceptance criteria in the OSR was satisfied. These surveillance procedures are listed in SDD-005 and Appendix A of FSP-PFP-5-8, Volume 2, Chapter 13, Section 3, *Operational Safety Requirements Compliance*.

3. At what frequency are the tests identified in Question 2 above performed? Determine whether these tests and inspections are required by Technical Safety Requirement, Operational Safety Requirements (OSRs), or other Authorization Basis or Authorization Agreement requirements.

ANSWER: The OSR Subject Matter Expert answered that the frequency for testing is specified in Appendix A of FSP-PFP-5-8, Section 13.3, *Operational Safety Requirements Compliance*. For the Ventilation System Confinement, all HEPA filter systems are subjected to leak testing to verify that particle removal efficiency is greater than or equal to 99.95% removal. This testing is conducted upon being placed into service for the first time and annually thereafter for all designated HEPA filters at PFP.

7. Are drawings that document system configuration available? If so, identify the types of drawings (e.g., piping and instrumentation diagrams, electrical one-line, wiring, or schematic diagrams, installation drawings).

ANSWER: The Design Authority answered that the system drawings are listed on Hanford Site Drawing H-2-99480 under the table for System 25. These drawings are listed as Essential Drawings, which means that changes to the drawings must be incorporated (drawing physically changed) within 30 days of the change being completed in the field.

Where no field change is required, the drawing must be changed within 30 days of approval of the change. Review of H-2-99480 revealed that there are ninety-seven Essential Drawings and all System 25 Essential drawings are CAD. The Design Authority said that he believes the drawings accurately reflect the field condition of the system.

Discussion of Results – (List information/documentation that was available or inadequate. Indicate whether the criterion was met).

ANSWER: Based on interviews and review of documentation, the safety functions of the Ventilation System Confinement, System 25, at the Plutonium Finishing Plant are defined and understood by plant management and engineers. System testing requirements are adequate to ensure operability of the system and performance of its safety function. No deficiencies or inadequacies were identified.

Supporting Documentation:

HNF-SD-CP-SAR-021, Revision 1, *Plutonium Finishing Plant Final Safety Analysis Report* (FSAR)

WHC-SD-CP-OSR-010, Revision 0-P, *Plutonium Finishing Plant Operational Safety Requirements* (OSR) Limiting Condition for Operation (LCO) 3.2.1 "Filtered Exhaust from Zones 3 & 4" and LCO 3.2.1 Bases

HNF-SD-CP-SDD-005, Rev. 3, *Definition and Means of Maintaining the Ventilation System Confinement Portion of the PFP Safety Envelope*

FSP-PFP-5-8, Volume 2, Section 13.3, *Operational Safety Requirements Compliance*, Appendix A, Revision 8, Change 0, OSR Data Sheet Compliance Matrix

HNF-6389, Rev. 0, *Degradation Vulnerability Assessment of Safety-Related HEPA Filters in WMP, RCP, and NMS Facilities*

H-2-99480, Sheets 1-6, Essential & Support Drawing List

VSS-1.2 The backlog for surveillances, tests, inspections, maintenance, repair, upgrades, or other work on the system is managed and kept to an appropriate minimum.

Review Approach Items:

6. Identify the current backlog for the system for items such as preventive maintenance, modifications, surveillances, tests, inspections, and corrective actions.

ANSWER: The Design Authority answered that there was no backlog of preventive maintenance for the system and that there were a few corrective maintenance items that do not affect the safety function of the system and no modifications pending for the system.

Discussion of Results – (Provide a discussion indicating whether the criterion was met).

ANSWER: The Design Authority said that he believed the maintenance backlog (the only backlog carried on this system) was managed and kept to a minimum.

VSS-1.3 Configuration Management and Maintenance programs effectively ensure operational availability of the system.

Review Approach Items:

5. Identify formally scheduled activities, in addition to those addressed in Item 2 above, that are intended to help ensure reliable performance of the system. Include preventive maintenance, walkdowns, inspections, and assessments as appropriate.

ANSWER: The OSR Subject Matter Expert said that when there were related procedures to improve the reliability of the system, they would be identified in the applicable System Design Document, usually as "ZO" (Z-Plant Operating) procedures or maintenance procedures. Review of SDD-006 revealed four ZO procedures and sixteen maintenance procedures. In general, they were for the surveillance, operation, or maintenance of support equipment. The Design Authority noted that a Site-wide HEPA filter vulnerability assessment (see HNF-6389, Rev. 0, *Degradation Vulnerability Assessment of Safety-Related HEPA Filters in WMP, RCP, and NMS Facilities*) had been conducted. The conclusion of the report was, "This assessment did not identify any situations where safety-related HEPA filter systems within PHMC facilities would not perform their required safety function due to the predicted degradation caused by aging, wetting, high temperature, radiation, or chemical exposure."

8. Review the processes used to ensure that work on the system and changes to the system are properly controlled (i.e., formally reviewed, approved, implemented, tested, USQ review performed if required, documents updated, and work/change accepted).

ANSWER: The Design Authority answered that at the facility level, PFP uses several procedures to control work and ensure compliance with Site and DOE requirements. In addition to the procedures listed below that correlate activities to procedures, there are Hanford Site procedures from which these procedures were derived.

Work Control: FSP-PFP-5-8, Volume 2, Chapter 13.4, *Work Management Process Description and Job Control System Process*

USQ Process: FSP-PFP-5-8, Volume 1, Chapter 2.23, *Identification and Resolution of Unreviewed Safety Questions*

Procedure Changes: FSP-PFP-5-8, Volume 2, Chapters 13.5, *Processing PFP Documents*; 13.6, *PFP Document Control System*; and 13.7, *PFP Technical Document Use Policy*

Drawing Changes: FSP-PFP-0848, Chapter 1.12, *PFP Facility Drawing Management*

Discussion around the table then focused on the phrase "work on the system," above. While the facility and Site procedures clearly identify the programmatic requirements for control of work, PFP management has become sensitive to recent trends related to the maintenance and operation of the ventilation systems that may indicate lapses in system knowledge, conduct of maintenance, and conduct of operations. Several of these instances have been captured in the occurrence reporting process and the facility is making a concerted effort to improve the training program for maintenance and operations personnel who work on or operate these systems.

9. Determine whether the procedures identified in items 2 and 5 above, and the drawings identified in item 7 above, are controlled under a formal document control process, and indicate whether the process requires that documents be updated as necessary to maintain their accuracy.

ANSWER: See Answer to question 8, above.

Discussion of Results – (Address the maintenance program, document control, identification of system requirements and their bases, change control/work control, and assessments of the system. Indicate whether responsibility for operational readiness of this system is formally assigned).

ANSWER: Both the configuration management and maintenance programs ensure that this system is available to perform its intended safety function. The recent Facility Evaluation Board (FEB) report said, "Facility modifications are properly approved and controlled using ECNs and work packages." The responsibility for operational readiness of this system has been assigned to the HVAC Team, which includes the Design Authority as an integral member of the team.

VSS-1.4 The system is operable and available to fulfill its safety function when required.

Review Approach Items:

4. For each of the past three years: a) identify the number of times that the system has failed to meet its test acceptance criteria; b) identify the number of times that the system has failed in response to facility operating conditions (i.e., failed on demand); and, c) estimate the percentage of time that the system was not capable of accomplishing its safety function(s) when required to be operable.

ANSWER: The OSR Subject Matter Expert said that because this is a Safety Class system, any failure of the system to perform its intended safety function, as well as percent availability would have been recorded in the monthly report that he produces. These reports are available in MS-Word format for review. The Design Authority said that he knew on no instances when the system failed to perform its safety function and identified several instances when the system was challenged and performed as designed. The Design Authority, when questioned directly, said that the system has demonstrated high reliability.

10. Identify any systems and equipment (e.g., electric power, instrument or control air, diesel fuel transfer, vacuum, heat tracing, etc.) that directly support the operation of the vital safety system being assessed (i.e., where the support systems/equipment are essential for the safety system to perform its safety functions) that are not included within the defined system boundary.

ANSWER: The OSR Subject Matter Expert said that all equipment that supports the safety system are described in the System Design Document along with the rationale for not including the support equipment in the Safety Envelope. SDD-005 was reviewed and it directed the reader to HNF-3955, Rev. 0, Definition and Means of Maintaining the PFP Non-Safety HVAC Equipment, for all non-safety related HVAC equipment. Appendix D of SDD-005 contains a listing of support equipment that is outside the HVAC safety envelope.

Discussion of Results – (Provide a discussion indicating whether the criterion was met).

ANSWER: Review of documentation and interviews with knowledgeable facility personnel confirm that the Ventilation System Confinement, System 25, is operable and available to perform its intended safety function.