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ECN

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13b. Justification Details For USQ Evaluation reference USQ # PFP-96-11 "MICON Control Room Panel Annunciator" Revision required to support a new system configuration created by Project B610. Also, changes from outstanding ECN's referenced in Block #9 are being incorporated.			
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A-7900-013-3 (11/94) GEF096

Definition and Means of Maintaining the Effluent Stack Monitors Portion of the PFP Safety Envelope

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Abstract: The Effluent Stack Monitors ensure that the release of alpha emitting radionuclides to the environment via the building exhaust stacks is continuously monitored and alarms are initiated if the release exceeds identified limits. This document defines the safety envelope for the Effluent Stack Monitors and identifies the operability requirements, components, and procedures which ensure this safety envelope is maintained.

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1-20-97

R. J. J. J.
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LIST OF ACRONYMS

ANSI	American National Standards Institute
CAM	continuous air monitors
DOE	U. S. Department of Energy
EP	Environmental Protection
FSAR	final safety analysis report
HEPA	high efficiency particulate air
HP	Health Physics
HPT	Health Physics Technician
LCO	limiting condition for operation
OSR	Operational Safety Requirement
PFP	Plutonium Finishing Plant
RAP	regulating air pump
SAR	safety analysis report
SE	safety envelope
SR	Surveillance Requirement
WHC	Westinghouse Hanford Company

STACK & BUILDING CROSS REFERENCE

STACK

BUILDINGS EXHAUSTED

291-Z-1	234-5Z, 236-Z, 242-Z
296-Z-3	241-Z Sumps and Tanks
296-Z-5	2736-ZB
296-Z-6	2736-Z (stack located at 2736-ZA)
296-Z-14	232-Z

1.0

PURPOSE

This document provides a description of the Effluent Stack Monitors' portion of the Plutonium Finishing Plant (PFP) Safety Envelope (SE). Included is amplification in detail of the Limited Condition for Operation (LCO) described in the Plutonium Finishing Plant Operational Safety Requirements, WHC-SD-CP-OSR-010, Rev. 0, May 1995 Section 3.2.2, "Effluent Stack Air Monitors and Alarms." This additional detail clarifies the term "OPERABLE" and defines the components in the 291-Z-1, 296-Z-3, 296-Z-5, 296-Z-6, and 296-Z-14 stack monitoring systems that comprise the system safety boundary and are essential to OSR compliance. This paper is intended to support the FSAR implementation by providing a system description and the necessary technical bases for the system.

This document, with its appendices, also provides the following:

1. A list of the safety envelope equipment (Appendix B)
2. Descriptions of the purpose and function of safety envelope equipment. (Section 4)
3. A list of the operational, alarm response, maintenance, and surveillance procedures necessary to operate and maintain the system equipment within the safety envelope. (Sections 5 and 6)

2.0

BACKGROUND

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. The WHC-SD-CP-OSR-010 requirements for the Effluent Stack Monitors system are strongly influenced by the requirements of WHC-CM-7-5, Environmental Compliance Manual, 2.0 Air Quality, Radioactive Sources which acknowledges specific time limitations for system maintenance. The accident analysis section (Chapter 9) of the PFP Final Safety Analysis Report (FSAR), WHC-SD-CP-SAR-021, Rev. 0, Jan. 1995, does not define an OPERABLE Effluent Stack Monitor system nor does it consider system downtime. Chapter 9 also does not base any accident scenario conclusions on probabilistic analysis of the Effluent Stack Monitors operability or reliability. Therefore, this document provides the definition of OPERABILITY as used in LCO 3.2.2 in terms of specific equipment, instrumentation and parameters, and it provides the technical basis for allowable system downtime for maintenance and other activities.

3.0

FUNCTIONAL REQUIREMENTS

Because the FSAR accident analysis does not define an OPERABLE Effluent Stack Monitor system, OPERABLE shall be defined to meet the intent of U.S. Department of Energy (DOE) Guide DOE/EH-0173T. The guide mandates that effluent monitor performance shall be sufficient to enable the DOE contractor to determine whether releases of airborne radioactive

materials are within the limits specified in DOE Order 5400.5. Therefore, OPERABLE must be defined by a set of criteria consistent with the safety and regulatory functions of the monitors. The essential components described in Section 4.0. provide specific functions necessary to ensure performance of each monitor. These components must be fully functional for a stack monitor to be deemed OPERABLE.

During periods when a stack monitor is not OPERABLE, equivalent alternate monitoring must be provided to comply with DOE/EH-0173T, Chapter 3.0, Section 3.3. For these abnormal periods the minimum conditions which define equivalent alternate monitoring are described in Section 3.1.

3.1 MINIMUM CONDITIONS DEFINING EQUIVALENT ALTERNATE MONITORING

During abnormal operating conditions, such as an essential component failure or failure of a monthly surveillance, the minimum conditions described below define one method of equivalent acceptable alternative monitoring. The following definition does not preclude other alternative means of monitoring which may be employed in special situations, however other methods must obtain prior approval from Air and Water Services.

3.1.1 291-Z-1, 296-Z-3, and 296-Z-5 Stack CAMs

The CAMs at the 291-Z-1 (234-Z, 236-Z and 242-Z buildings), 296-Z-3 (241-Z sumps and tanks), and 296-Z-5 (2736-ZB building) stack monitors provide equivalent alternate monitoring if the following conditions are met:

- 1) The vacuum pump for the CAM is providing adequate motive force to sample the effluent stream at the prescribed sample rate (2.0 cfm $\pm$ 20%) and a means of flow measurement is functional.
- 2) The CAM passes the inspection described in ZH-100-101, PFP Shiftly Gaseous Effluent Sampling and Monitoring System Operability Inspection.
- 3) The CAM alarms annunciate locally and remotely.

OR

The operation of all components with failed or spurious remote alarms is verified every 2 hours.

- 4) If criteria 2 and 3 above cannot be met, then perform manual counting of the CAM or Record Sample filter media at 2 hour intervals.

Basis: DOE/EH-0173T, Chapter 3.0, Section 3.3, states the performance of airborne emissions monitoring systems shall be sufficient to enable the DOE contractor to determine whether the release of radioactive materials are within the limits specified in DOE Order 5400.5.

3.1.2 296-Z-6 Stack CAMs

The 296-Z-6 (2736-ZA building) stack monitor CAMs (two, one for each filter bank) provide equivalent alternate monitoring if the following conditions are met. These conditions only apply to the CAM if its respective filter bank is active.

- 1) The 17" vacuum pump in 291-Z is providing adequate motive force to sample the effluent stream for the CAM(s) at the prescribed sample rate ($2.0 \text{ cfm} \pm 20\%$) and a means of flow measurement for the CAM is functional.
- 2) The CAM(s) pass the inspection described in ZH-100-101, PFP Shiftly Gaseous Effluent Sampling and Monitoring System Operability Inspection.
- 3) The CAM alarms annunciate locally and remotely.

OR

The operation of all components with failed remote alarms is verified every 2 hours.

- 4) If criteria 2 and 3 above cannot be met, then perform manual counting of the CAM or Record Sample filter media at 2 hour intervals.
- 5) If the criteria above cannot be met for the stack CAMs, then the facility may rely on the room CAMs if all of the room CAM's in 2736-Z satisfy criteria 1 through 3 above. Room 221-A RCT Office Annunciator Panel Windows #25 and #26 can be inspected, and the panel test button pushed, at least every 2 hours to satisfy the requirement for a continuously manned location.

Basis: DOE/EH-0173T, Chapter 3.0, Section 3.3, states the performance of airborne emissions monitoring systems shall be sufficient to enable the DOE contractor to determine whether the release of radioactive materials are within the limits specified in DOE Order 5400.5.

Basis: The alternative use of vault CAMs as backup indicators (criteria 5) for stack releases is justified because they provide early detection of the initial unmitigated release of radionuclides into the vault space due to a breach of the storage containers. The source term in the vault space is limited to sealed containers. Therefore, the CAMs located in the vault spaces provide the same function as the stack CAM, merely on the upstream side of the high efficiency particulate air (HEPA) filters.

3.1.3 296-Z-14 Stack CAMs

The CAMs at the 296-Z-14 (232-Z building) stack monitor (two, redundant) provide equivalent alternate monitoring if the following conditions are met:

- 1) At least one vacuum pump is providing adequate motive force to sample the effluent stream at the prescribed sample rate ($2.0 \text{ cfm} \pm 20\%$) for at least one CAM and a means of flow measurement is functional.
- 2) At least one CAM passes the inspection described in ZH-100-101, PFP Shiftly Gaseous Effluent Sampling and Monitoring System Operability Inspection.
- 3) The CAM alarms annunciate locally and remotely.

OR

The operation of all components with failed or spurious remote alarms is verified every 2 hours.

- 4) If criteria 2 and 3 above cannot be met, then perform manual counting of the CAM or Record Sample filter media at 2 hour intervals.

Basis: DOE/EH-0173T, Chapter 3.0, Section 3.3, states the performance of airborne emissions monitoring systems shall be sufficient to enable the DOE contractor to determine whether the release of radioactive materials is within the limits specified in DOE Order 5400.5.

Basis: The 296-Z-14 stack monitor is equipped with 2 CAMs which provide redundant service. Only one CAM is required to monitor the effluent stream in the event of a CAM failure.

3.2 FUNCTIONAL DOWNTIME CRITERIA

Many activities require some degree of freedom for testing, surveillance, operations activities, and maintenance. Brief periods of inoperability represent very low risk, yet yield great benefits in reliability and functionality. Reference WHC-CM-7-5 Section 2.5.3.2 for CAM downtime criteria. The PFP Stacks and their respective current WHC-CM-7-5 designations (defined in WHC-EP-0894) are as follows: 291-Z-1 (Category A or I), 296-Z-3, -5, -6, and -14 (Category B or II). Downtime for Category B/II stacks is not specifically defined in WHC-CM-7-5 and therefore will be managed in the same manner as PFP's Category A/I stack (291-Z-1) as a best management practice.

4.0

SAFETY ENVELOPE EQUIPMENT

The various stack monitors have many individual components. Although each component performs some role in the overall function of the Effluent Stack Monitoring system, not all are directly related to the system's safety function. The components critical to the safety function of each Stack monitor are included in the safety envelope. The safety envelope equipment common to all five stacks is identified in Section 4.1. The safety envelope equipment unique to each stack is identified in Sections 4.2 through 4.6. Equipment excluded from the safety envelope and the reasoning behind these exclusions is explained in Section 4.7.

4.1 SAFETY ENVELOPE EQUIPMENT COMMON TO ALL STACKS

Several components in the stack effluent monitoring system safety envelope are common to all five of the stacks covered by LCO 3.2.2. Each of these components and their design functions are described below. Alarm annunciator panel window identification is referenced first by window label and second, in parentheses, by the vendor reference.

- **Room 714 Alarm Annunciator Panel**

Room 714 annunciator panel provides visual and audible stimuli to critical response personnel in the event of an effluent monitoring system alarm, loss of power, or loss of continuity in the alarm wiring. The panel is in the primary continuously manned location. The specific alarms indicated on the panel are summarized in Sections 4.2 through 4.6. Only the alarm windows servicing the effluent monitoring system are included in the safety envelope.

- **Room 714 Annunciator Panel Horn**

The annunciator horn provides audible stimuli to critical response personnel for any alarm relayed to the panel. The horn provides a redundant indication of an alarm.

- **Room 714 Annunciator Panel Reset/Silence Button**

The reset/silence button silences the annunciator horn. The button also resets the alarm, if depressed after the alarm has cleared.

4.2 291-Z-1 SAFETY ENVELOPE EQUIPMENT

Components of the 291-Z-1 (234-5Z, 236-Z and 242-Z buildings) stack monitor included in the safety envelope are identified in this section. Each of these components and their design functions are described below.

- **Sample Collection Probe, Flow Splitter, and Piping**

The sample collection probe, flow splitter, and piping that make up the sample collection and delivery system are constructed in accordance with American National Standards Institute (ANSI) N13.1, 1969. The probe collects a near-isokinetic sample for delivery through the piping and to the sample heads. The piping included in the safety envelope ends at the CAM Vacuum Switch. Exhaust piping is not included.

- **Continuous Air Monitor**

The CAM provides the primary alert of elevated radionuclide emissions. This allows facility management to respond in a timely fashion to mitigate the release. The CAM's detection efficiency must be at least 7 percent and all alarms (high radiation, low count, and failure) must be functional.

- **CAM Flow Rate Indicator**

The flow rate indicator is an integral part of the CAM and is used to verify that the flow rate through the CAM meets the requirements specified in Surveillance Requirements (SR) 3.2.2.1.

- **CAM Vacuum Switch**

The vacuum switch provides an alarm signal to the annunciator panel in Room 714 of building 234-5Z if the vacuum supply fails. The switch will initiate an alarm due to either high vacuum or low vacuum conditions.

- **Room 714 Alarm Annunciator Window No. 1 (1A)**

This annunciator window provides visual stimuli to critical response personnel in the event of a CAM high radiation condition at stack 291-Z-1.

- **Room 714 Alarm Annunciator Window No. 2 (2A)**

This annunciator window provides visual stimuli to critical response personnel in the event of a CAM failure condition at stack 291-Z-1.

- **Room 714 Alarm Annunciator Window No. 3 (3A)**

This annunciator window provides visual stimuli to critical response personnel in the event of a vacuum supply failure condition relayed by the CAM vacuum switch at stack 291-Z-1.

4.3 296-Z-3 SAFETY ENVELOPE EQUIPMENT

Components of the 296-Z-3 (241-Z sumps and tanks) stack monitor included in the safety envelope are identified in this section. Each component is listed and described, and its design function is explained.

- **Sample Collection Probe, Flow Splitter, and Piping**

The sample collection probe, flow splitter, and piping that make up the sample collection and delivery system is constructed in accordance with ANSI N13.1, 1969. This probe collects a near-isokinetic sample for delivery through the piping and to the sample heads. The piping included in the safety envelope ends at the CAM Vacuum Switch. Exhaust piping is not included.

- **Continuous Air Monitor**

The CAM provides the primary alert of elevated radionuclide emissions. This allows facility management to respond in a timely fashion to mitigate the release. The CAM's detection efficiency must be at least 7 percent and all alarms (high radiation, low count, and failure) must be functional.

- **CAM Flow Rate Indicator**

The flow rate indicator is an integral part of the CAM and is used to verify that the flow rate through the CAM meets the requirements specified in SR 3.2.2.1.

- **CAM Vacuum Switch**

The vacuum switch provides an alarm signal to the annunciator panel in Rooms 714 of building 234-5Z if the vacuum supply fails. The switch will initiate an alarm due to either high vacuum or low vacuum conditions.

- **Room 714 Alarm Annunciator Window No. 6 (1B)**

This annunciator window provides visual stimuli to critical response personnel in the event of a CAM high radiation condition at stack 296-Z-3.

- **Room 714 Alarm Annunciator Window No. 7 (2B)**

This annunciator window provides visual stimuli to critical response personnel in the event of a CAM failure condition at stack 296-Z-3.

- **Room 714 Alarm Annunciator Window No. 8 (3B)**

This annunciator window provides visual stimuli to critical response personnel in the event of a vacuum supply failure condition relayed by the vacuum switches at stack 296-Z-3. Both the CAM and record sampler vacuum switches are latched and relayed together; consequently, there is no indication of which sampling loop is troubled.

4.4 296-Z-5 SAFETY ENVELOPE EQUIPMENT

Components of the 296-Z-5 (2736-ZB building) stack monitor included in the safety envelope are identified in this section. Each of these components and their design functions are described below.

- **CAM Sample Collection Probe and Piping**

The CAM sample collection probe and piping that make up the sample collection and delivery system is constructed in accordance with ANSI N13.1, 1969. This probe collects a near-isokinetic sample for delivery through the piping and to the sample head. The piping included in the safety envelope ends at the CAM and includes the piping which connects Vacuum Switch VS-CAM-Z5 in Room 600 of 2736-ZB to the 17" vacuum header piping.

- **Continuous Air Monitor**

The CAM provides the primary alert of elevated radionuclide emissions. This allows facility management to respond in a timely fashion to mitigate the release. The CAM's detection efficiency must be at least 7 percent and all alarms (high radiation, low count, and failure) must be functional.

- **CAM Flow Rate Indicator**

The flow rate indicator is an integral part of the CAM and is used to verify that the flow rate through the CAM meets the requirements specified in SR 3.2.2.1.

- **Building 2736-ZB Vacuum Switch**

This vacuum switch provides an alarm signal to the annunciator panel in building 234-5Z, Room 714. The switch will initiate an alarm due to a low vacuum condition.

- **Room 714 Alarm Annunciator Window No. 11 (6A)**

This annunciator window provides visual stimuli to critical response personnel in the event of a CAM high radiation condition at stack 296-Z-5.

- **Room 714 Alarm Annunciator Window No. 12 (7A)**

This annunciator window provides visual stimuli to critical response personnel in the event of a CAM failure condition at stack 296-Z-5.

- **Room 714 Alarm Annunciator Window No. 13 (8A)**

This annunciator window provides visual stimuli to critical response personnel in the event of a loss of vacuum condition in building 2736-ZB.

4.5 296-Z-6 SAFETY ENVELOPE EQUIPMENT

Components of the 296-Z-6 (2736-ZA building) stack monitor included in the safety envelope are identified in this section. Each of these components and their design functions are described below.

- **East and West Filter Bank CAM Sample Collection Probes**

The CAM sample collection probes and piping that make up the sample collection and delivery system are constructed in accordance with ANSI N13.1, 1969. The probes collect near-isokinetic samples for delivery through the piping to the sample heads. The piping included in the safety envelope ends at the CAM and includes the piping which connects Vacuum Switch PS-5900-23A to the 17" vacuum header piping.

- **East and West Filter Bank Alpha CAMs**

The CAMs provide the primary alert of elevated radionuclide emissions. This allows facility management to respond in a timely fashion to mitigate the release. Each CAM's detection efficiency must be at least 7 percent and all alarms (high radiation, low count, and failure) must be functional.

- **East and West Filter Bank Alpha CAM Sample Flow Indicators**

The flow rate indicators are an integral part of each CAM and are used to verify that the flow rate through the CAMs meets the requirements specified in SR 3.2.2.1.

- **East and West Filter Bank Alpha CAM Sample Flow Control Valve**

The valve on the outlet side of each CAM provides primary sample flow rate control.

- **Building 2736-ZA Vacuum Switch**

This vacuum switch provides an alarm signal to the annunciator panel in Rooms 714 of building 234-5Z if the vacuum supply fails. The switch will initiate an alarm due to a low vacuum condition.

- **Room 714 Alarm Annunciator Window No. 16 (6B)**

This annunciator window provides visual stimuli to critical response personnel in the event of an east filter bank CAM high radiation condition at stack 296-Z-6.

- **Room 714 Alarm Annunciator Window No. 17 (7B)**

This annunciator window provides visual stimuli to critical response personnel in the event of a east filter bank CAM failure condition at stack 296-Z-6.

- **Room 714 Alarm Annunciator Window No. 18 (8B)**

This annunciator window provides visual stimuli to critical response personnel in the event of a loss of instrument vacuum condition in building 2736-Z.

- **Room 714 Alarm Annunciator Window No. 21 (11A)**

This annunciator window provides visual stimuli to critical response personnel in the event of an west filter bank CAM high radiation condition at stack 296-Z-6.

- **Room 714 Alarm Annunciator Window No. 22 (12A)**

This annunciator window provides visual stimuli to critical response personnel in the event of an west filter bank CAM failure condition at 296-Z-6.

4.6 296-Z-14 SAFETY ENVELOPE EQUIPMENT

Components of the 296-Z-14 (232-Z building) stack monitor included in the safety envelope are identified in this section. Each component is listed and described, and its design function is explained.

• **CAM Sample Collection Probe, Flow Splitter, and Piping**

The CAM collection probe, flow splitter, and piping that make up the sample collection and delivery system is constructed in accordance with ANSI N13.1, 1969. This probe collects a near-isokinetic sample for delivery through the piping to the sample heads. The piping included in the safety envelope ends at the outlet side of the vacuum pumps. Exhaust piping is not included.

• **Upper and Lower Alpha CAMs**

The CAMs provide the primary alert of elevated radionuclide emissions. This allows facility management to respond in a timely fashion to mitigate the release. Each CAM's detection efficiency must be at least 7 percent and all alarms (high radiation, low count, and failure) must be functional.

• **Upper and Lower Alpha CAM Sample Flow Indicators**

The flow rate indicators are an integral part of each CAM and are used to verify that the flow rate through the CAMs meets the requirements specified in SR 3.2.2.1.

• **Upper and Lower Alpha CAM Sample Flow Switches**

The flow switches provide an alarm signal to the local annunciator panel, which relays the signal to the panel in Room 714, 234-5Z. Each switch monitors the flow rate to the associated CAM and will initiate an alarm on a low flow condition.

• **Room 714 Alarm Annunciator Window No. 25 (15A)**

This annunciator window provides visual stimuli to critical response personnel in the event of a CAM high radiation condition, CAM failure condition or a CAM or record sampler low flow condition at the 296-Z-14 stack.

• **296-Z-14 Local Alarm Annunciator Panel**

This annunciator panel provides visual indication to critical response personnel of specific stack monitor and sampler system alarms including CAM related alarms. All alarms from this panel are latched and relayed together to the Room 714 alarm panel. Consequently, there is no indication at the remote alarm panel in Room 714 of the exact cause of the alarm. Only the alarm windows and components identified below are included in the safety envelope.

- **296-Z-14 Local Alarm Annunciator Window Reset/Silence Button**

The reset/silence button silences the annunciator horn. The button also resets the alarm, if depressed after the alarm has cleared.

- **296-Z-14 Local Alarm Annunciator Window No. DS2**

This annunciator window provides visual indication to critical response personnel in the event of an upper CAM low flow rate condition.

- **296-Z-14 Local Alarm Annunciator Window No. DS3**

This annunciator window provides visual indication to critical response personnel in the event of a lower CAM low flow rate condition.

- **296-Z-14 Local Alarm Annunciator Window No. DS4**

This annunciator window provides visual indication to critical response personnel in the event of an upper CAM high radiation condition.

- **296-Z-14 Local Alarm Annunciator Window No. DS5**

This annunciator window provides visual indication to critical response personnel in the event of an upper CAM failure condition.

- **296-Z-14 Local Alarm Annunciator Window No. DS6**

This annunciator window provides visual indication to critical response personnel in the event of a lower CAM high radiation condition.

- **296-Z-14 Local Alarm Annunciator Window No. DS7**

This annunciator window provides visual indication to critical response personnel in the event of a lower CAM failure condition.

4.7 COMPONENTS EXCLUDED FROM THE SAFETY ENVELOPE

Selected components supporting the Stack Effluent Monitoring system are excluded from the safety envelope. These components are excluded because their function is not essential to the safety envelope function of the stack effluent monitoring system. A more complete description of these excluded components is provided below.

- **Alarm Signal Wiring to Annunciator Panel Room 714**

All wiring associated with the alarm signal loops is excluded from the safety envelope. The system is designed to alarm on a loss of continuity in the alarm wiring. An alarm would allow operations to establish an alternate means of surveillance while the problem was being corrected.

- **Electrical Distribution System**

All PFP Effluent Stack Monitoring systems are supplied with power equivalent to that of their associated air movers. If normal power to the plant is interrupted (loss of offsite power), the 2721-Z diesel generators start automatically to energize the back-up power distribution system, which includes the Stack Monitoring systems. Under these conditions the Stack CAM will provide monitoring capability as designed when ventilation is restarted. Therefore, Stack Effluent Monitoring is not interrupted.

If the diesel generators fail to start following a loss of offsite power (total loss of power), the monitor will be disabled while the steam-driven exhaust fans are operating. This event would initiate alarm response actions in accordance with defined procedures to place the facility in a safe shutdown mode and establish continuous monitoring capability.

Finally, if the power is lost to a specific CAM or vacuum pump, the instrument failure alarm or the loss of vacuum alarm will alert operations and management personnel of the condition. They can then take the necessary actions to return the power or vacuum to the system or provide an alternate means of monitoring the affected stack effluent.

- **Building Vacuum Systems and Local Vacuum Pumps**

Proper operation of the CAMs requires a vacuum source capable of withdrawing 2.0 cfm from the stack. Three of the Stack Effluent Monitoring CAMs include portable oilless vacuum pumps, referred to as RAPs. Two of the systems, 296-Z-5 and 296-Z-6, use the 2736-ZB and 291-Z building vacuum systems, respectively, to withdraw the sample. These RAP and building vacuum systems have been excluded from the safety envelope because each system is equipped with a vacuum failure alarm which, in the event of a failure, would notify plant operators to initiate recovery actions. These alarms allow operators to establish alternate means of stack effluent monitoring in a timely manner. The CAM pressure/ flow switches which initiate the alarms and the associated alarm circuitry are included in the safety envelope. The functional tests and calibration procedures for these alarms are also required to maintain the safety envelope.

5.0.

SAFETY ENVELOPE PROCEDURES

The following procedures are required to ensure the intent of LCO 3.2.2 is satisfied whenever ventilation is being used to exhaust the buildings. The procedures include alarm response procedures and Health Physics procedures. Each procedure included in the safety envelope and the justification for its inclusion is presented below.

5.1 SE ALARM RESPONSE PROCEDURES

ZAR-001

This procedure provides response instruction for Operations personnel in the event of a Room 714 Annunciator Panel alarm. Response to stack related alarms under this procedure is limited mainly to RCT notification of the alarm condition. The RCT organization then responds per applicable ZH procedure.

5.2 SE RADIOLOGICAL CONTROL PROCEDURES

ZH-100-101, PFP Shiftly Gaseous Effluent Sampling and Monitoring System Operability Inspection.

This procedure provides RCT personnel with instruction necessary to perform shift-wise Operability inspections of all PFP Stack Monitors.

ZH-100-102, PFP Bi-Weekly Gaseous Effluent Sampling and Monitoring System Inspection and Sample Exchange.

This procedure provides RCT personnel with instruction necessary to perform routine bi-weekly sample collection and sampler Operability inspection for all PFP Stack Monitors.

ZH-100-107: RCT Response to Room 714 Annunciator Panel Stack CAM High Radiation Alarms.

This procedure provides Stack CAM High Radiation alarm response instruction for the RCT personnel. Response occurs upon notification of the alarm condition from Operations personnel in Rooms 714 (234-5Z). Room 714 is manned 24-hours a day.

ZH-100-108: RCT Response to Room 714 Annunciator Panel Stack CAM Fail, Low Flow, Loss of Vacuum Alarms.

This procedure provides all other Stack related (e.g. CAM Fail, Low Flow) alarm response instructions for the RCT personnel. Response occurs upon notification of the alarm condition from Operations personnel in Rooms 714 (234-5Z). Room 714 is manned 24-hours a day.

6.0

SAFETY ENVELOPE SURVEILLANCE REQUIREMENTS

The OSR requires surveillance activities to verify Stack Monitor operations. These include daily operation surveillances, functional testing, and calibrations. The procedures are described below.

The following procedure verifies the sample flow rate to the gaseous effluent monitors and the CAM alarm setpoint. This procedure satisfies Surveillance Requirements SR 3.2.2.1 and SR 3.2.2.2.

- ZH-100-101, PFP Shift-Wise Gaseous Effluent Sampling and Monitoring System and Operability Inspection.

The following five procedures functionally test the gaseous effluent monitor systems servicing the stacks specified in the procedure titles.

- ZSE-24A-001, Monthly 291-Z-1 Stack Effluent Monitor Functional Test.
- ZSE-24A-003, Monthly 296-Z-3 Stack Effluent Monitor Functional Test.
- ZSE-24A-005, Monthly 296-Z-5 Stack Effluent Monitor Functional Test.
- ZSE-24A-007, Monthly 296-Z-6 Stack Effluent Monitor Functional Test.
- ZSE-24A-009, Monthly 296-Z-14 Stack Effluent Monitor Functional Test.

These procedures satisfy Surveillance Requirement SR 3.2.2.3. They may also be used after corrective maintenance activities and may be performed in part or in their entirety.

The following five procedures calibrate the gaseous effluent monitors system components servicing the stacks specified in the procedure titles. These procedures satisfy Surveillance Requirement SR 3.2.2.4 for annual calibration. These procedures can also be used after corrective maintenance activities and may be performed in part or in their entirety.

- ZSE-24A-002, Annual 291-Z-1 Stack Effluent Monitor Calibration.
- ZSE-24A-004, Annual 296-Z-3 Stack Effluent Monitor Calibration.
- ZSE-24A-006, Annual 296-Z-5 Stack Effluent Monitor Calibration.
- ZSE-24A-008, Annual 296-Z-6 Stack Effluent Monitor Calibration.
- ZSE-24A-010, Annual 296-Z-14 Stack Effluent Monitor Calibration.

7.0

REFERENCES

- 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants (NESHAPs), Subpart H."
- ANSI N13.1, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities, 1969."
- DOE 5400.1, "General Environmental Protection Program."
- DOE 5400.5, "Radiation Protection of the Public and the Environment."
- DOE 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements."
- DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance", January 1991.
- DOE/EP-0096, "A Guide for Effluent Radiological Measurements at DOE Installations", July 1983.
- DOE/EV/1830-T5, "A Guide to Reducing Radiation Exposure to as Low as Reasonably Achievable", April 1980.
- General Regulation 80-7, "Benton-Franklin-Walla Walla Counties Air Pollution Control Authority (APCA)", July 1980.
- WAC 173-400, "General Regulations for Air Pollution Sources."
- WAC 246-247, "Radiation Protection."
- WHC-CM-4-1, "Health Physics Procedures."
- WHC-CM-7-5, "Environmental Compliance."
 Section 2.0, "Air Quality."
 Section 5.0, "Records, Reporting and Response Activities."
 Appendix A, "Glossary."
 Appendix C, "Derived Concentration Guides."
- WHC-IP-0718, Rev. 0 "Health Physics Procedures."
- WHC-SD-CP-SAR-021, Rev. 0, "Plutonium Finishing Plant Final Safety Analysis Report."
- WHC-SD-CP-OSR-010, Rev. 0, "Plutonium Finishing Plant Operational Safety Requirements."

APPENDIX A - OSR LCO COMPLIANCE SHEET

OSR LCO COMPLIANCE SHEET		
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010, Rev. 0, Section 3.0):		
3.2.2 Effluent Stack Air Monitors and Alarms		
LCO 3.2.2 The alpha continuous air monitors (CAMs) for the 291-Z-1, 296-Z-3, 296-Z-14, 296-Z-5, and 296-Z-6 stacks shall be OPERABLE.		
APPLICABILITY: ALL MODES if forced exhaust ventilation is occurring		
ACTIONS:		
CONDITION	REQUIRED ACTION	COMPLETION TIME
A. A stack alpha CAM is inoperable.	A.1 Establish equivalent alternate monitoring.	2 Hours
	<u>AND</u> A.2.1 Restore Stack alpha CAM to an OPERABLE condition.	72 Hours
	<u>OR</u> A.2.2.1 Enter MODE 2, Limited Plutonium Handling Operations in the affected process area(s). Discontinue plutonium processing and handling in affected process area(s).	72 Hours
	<u>AND</u> A.2.2.2 Initiate a written RECOVERY PLAN to restore the Stack alpha CAM to an OPERABLE condition.	72 Hours

OSR LCO COMPLIANCE SHEET		
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010, Rev. 0, Section 3.0):		
3.2.2 Effluent Stack Air Monitors and Alarms		
SURVEILLANCE REQUIREMENTS:		
	SURVEILLANCE	FREQUENCY
SR 3.2.2.1	VERIFY each stack alpha CAM sample flow rate is 2.0 cfm $\pm$ 20% (1.6 - 2.4 cfm).	Daily
SR 3.2.2.2	VERIFY each stack alpha CAM alarm setpoint is less than the equivalent of 20,000 DCG-h.	Daily
SR 3.2.2.3	Perform FUNCTIONAL TEST of each stack alpha monitoring instrument and it's associated failure and high concentration alarm.	Monthly
SR 3.2.2.4	CALIBRATE each stack alpha monitoring instrument.	Annually
APPLICABLE ACCIDENT ANALYSES FSAR (WHC-SD-CP-SAR-021, CH 9) SECTION/TITLE:		
9.1.1	Radioisotope-Bearing Liquid Spills	
9.1.2	Radioisotope-Bearing Pressurized Liquid Container	
9.1.3	Radioisotope-Bearing Powder Spills	
9.1.4	Radioisotope-Bearing Pressurized Powder Container	
9.1.5	Stack Release Resulting From Filter Changes	
9.1.7	Ventilation System Upsets	
9.1.8	Loss of Ventilation	
9.1.9	Glovebox Glove Breach	
9.2.2	Fire	
APPLICABLE PLANT/PROCESS DESIGN/OPERATION DESCRIPTION(S) [FSAR CHAPTER/ SECTION]:		
4.3.5.3	Radiation Alarm Systems	
5.4.10.1.6	Stack Monitors	
5.4.10.2.1	Emergency Signals and Responses	
7.1.1.3.2	Continuous Monitoring and Alarms	
7.2.1	Radioactive Gaseous Effluents	
8.6.1.1.2	Monitoring Capabilities	
SYSTEM DRAWINGS [H-2-XXXXX, sheet XX]		
H-2-28364, Functional Diagram Stack Sampler & Drawing Index		
H-2-96431, CAM Alarm Annunciator Panel Relocation		
H-2-815175, Functional Diagram Stack Samplers		
H-2-96401, Annunciator ANN-714		
IMPLEMENTING PROCEDURES/COMPLIANCE VERIFICATION		
OPERATING [ZO-series]:		
ZO-060-117,	Perform Power Equipment Surveillance	
ZO-060-612,	Operate Air Sampler Vacuum	
ZO-060-622,	Operate 291-Z Air Sampler Vacuum Pumps with Closed Loop Cooling	
ZAR-001,	ANN-714 Panel Alarms	

OSR LCO COMPLIANCE SHEET

APPLICABLE OSR LCO (WHC-SD-CP-OSR-010, Rev. 0, Section 3.0):

3.2.2 Effluent Stack Air Monitors and Alarms

LABORATORY [LO-, LA- series]: NONE

HEALTH PHYSICS:

PFP Facility Specific Radiological Control Procedures (ZHs)

ZH-100-101, Perform Shiftly Gaseous Effluent Sampling and Monitoring System Operability Inspection
ZH-100-102, Perform Bi-Weekly Gaseous Effluent Sampling and Monitoring System Inspection and Sample Exchange
ZH-100-107, RCT Response to Room 714 Annunciator Panel Stack CAM High Radiation Alarms
ZH-100-108, RCT Response to Room 714 Annunciator Panel Stack CAM Fail, Low Flow, Loss of Vacuum Alarms

SUPPORTING DOCUMENTS:

WHC-SD-CP-SDD-006, Definition and Means of Maintaining the Effluent Stack Monitors Portion of the PFP Safety Envelope

OSR LCO COMPLIANCE SHEET			
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010, Rev. 0, Section 3.0):			
3.2.2 Effluent Stack Air Monitors and Alarms			
ADMINISTRATIVE [WHC-5-8, etc]: WHC-CM-5-8, <u>Plutonium Finishing Plant Administration Manual</u> 1.5, Non-Routine Release Response 1.31, Operation of Radioactive Airborne Effluent Monitors			
MAINTENANCE [2Z-, 1-ZM-, etc]: NON-LCO PSCP-4-007, Rockwell Type Gas Meter 1-ZM-094, Stack Effluent Systems, Vacuum Pump Replacement and Temporary Installation 2Z18379, CAM Chart Change			
SURVEILLANCE REQUIREMENT	PROCEDURE NUMBER	DESCRIPTION	PROCEDURE FREQUENCY
SR 3.2.2.1 and SR 3.2.2.2	ZH-100-101 (All Stacks)	Operability Check (RCT Procedure)	Shiftly (minimum of Daily)
SR 3.2.2.3	ZSE-24A-001 (291-Z-1)	Functional Test & CAM Exchange	Monthly*
	ZSE-24A-003 (296-Z-3)	Functional Test & CAM Exchange	Monthly*
	ZSE-24A-005 (296-Z-5)	Functional Test & CAM Exchange	Monthly*
	ZSE-24A-007 (296-Z-6)	Functional Test & CAM Exchange	Monthly*
	ZSE-24A-009 (296-Z-14)	Functional Test & CAM Exchange	Monthly*
SR 3.2.2.4	ZSE-24A-002 (291-Z-1)	Calibration	Annual*
	ZSE-24A-004 (296-Z-3)	Calibration	Annual*
	ZSE-24A-006 (296-Z-5)	Calibration	Annual*
	ZSE-24A-008 (296-Z-6)	Calibration	Annual*
	ZSE-24A-010 (296-Z-14)	Calibration	Annual*
* and as needed for corrective maintenance			
OTHER: NONE			

APPENDIX B - MASTER COMPONENT INDEX INPUT LIST

OSR SYSTEMS COMPLIANCE SHEET		
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):		
3.2.2 Effluent Stack Air Monitors and Alarms		
SAFETY ENVELOPE EQUIPMENT/COMPONENT LIST		
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	DRAWING NUMBER
COMMON EQUIPMENT		
ANN-714	Room 714 Alarm Annunciator Panel	H-2-96401, Sheet 2
ANN-714-HORN	Room 714 Alarm Panel Annunciator Horn	H-2-96401, Sheet 2
ANN-714-RESET	Room 714 Alarm Panel Annunciator Reset/Silence Button	H-2-96401, Sheet 2
291-Z-1 STACK		
PROBE-SPL-Z1	Sample Collection Probe	H-2-28358
SPLIT-CAM-Z1	Sample Flow Splitter	H-2-28360
CAM-Z1	Alpha CAM	H-2-28364
FI-CAM-Z1	Alpha CAM Flow Indicator	H-2-28364
VS-CAM-Z1	CAM Vacuum Switch	H-2-28364
ANN-714-W1	Rm.714 CAM High Rad. Alarm Window	H-2-96401, Sheet 2
ANN-714-W2	Rm.714 CAM Failure Alarm Window	H-2-96401, Sheet 2
ANN-714-W3	Rm.714 CAM Low Flow Window	H-2-96401, Sheet 2
296-Z-3 STACK		
PROBE-SPL-Z3	Sample Collection Probe	H-2-28358
SPLIT-CAM-Z3	Sample Flow Splitter	H-2-28360
CAM-Z3	Alpha CAM	H-2-28365
FI-CAM-Z3	Alpha CAM Flow Indicator	H-2-28364
VS-CAM-Z3	CAM Vacuum Switch	H-2-28364
ANN-714-W6	Rm.714 CAM High Rad. Alarm Window	H-2-96401, Sheet 2
ANN-714-W7	Rm.714 CAM Failure Alarm Window	H-2-96401, Sheet 2
ANN-714-W8	Rm.714 CAM / Record Low Flow Alarm Window	H-2-96401, Sheet 2
296-Z-5 STACK		
PROBE-CAM-Z5	CAM Sample Collection Probe	H-2-815175, Sheet 3
CAM-Z5	Alpha CAM	H-2-815175, Sheet 3
FI-CAM-Z5	Alpha CAM Flow Indicator	H-2-815175, Sheet 3
VS-CAM-Z5	Building 2736-ZB Vacuum Switch	H-2-815175, Sheet 3

OSR SYSTEMS COMPLIANCE SHEET		
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):		
3.2.2 Effluent Stack Air Monitors and Alarms		
SAFETY ENVELOPE EQUIPMENT/COMPONENT LIST		
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	DRAWING NUMBER
ANN-714-W11	Rm.714 CAM High Rad. Alarm Window	H-2-96401, Sheet 2
ANN-714-W12	Rm.714 CAM Failure Alarm Window	H-2-96401, Sheet 2
ANN-714-W13	Rm.714 Loss of Vacuum 2736-ZB Alarm Window	H-2-96401, Sheet 2
296-Z-6 STACK		
PROBE-CAM-Z6E	East Filter Bank CAM Sample Collection Probe	H-2-815175, Sheet 2
PROBE-CAM-Z6W	West Filter Bank CAM Sample Collection Probe	H-2-815175, Sheet 2
CAM-Z6E	East Filter Bank Alpha CAM	H-2-815175, Sheet 2
CAM-Z6W	West Filter Bank Alpha CAM	H-2-815175, Sheet 2
FI-CAM-Z6E	East Filter Bank Alpha CAM Sample Flow Indicator	H-2-815175, Sheet 2
FI-CAM-Z6W	West Filter Bank Alpha CAM Sample Flow Indicator	H-2-815175, Sheet 2
PS-5900-Z3A	Building 2736-ZA Vacuum Switch	H-2-140537, Sheet 12
ANN-714-W16	Rm.714 East Filter Bank CAM High Rad. Alarm Window	H-2-96401, Sheet 2
ANN-714-W17	Rm.714 East Filter Bank CAM Failure Alarm Window	H-2-96401, Sheet 2
ANN-714-W18	Rm.714 Loss of Vacuum 2736-ZA Alarm Window	H-2-96401, Sheet 2
ANN-714-W21	Rm.714 West Filter Bank CAM High Rad. Alarm Window	H-2-96401, Sheet 2
ANN-714-W22	Rm.714 West Filter Bank CAM Failure Alarm Window	H-2-96401, Sheet 2
296-Z-14 STACK		
PROBE-CAM-Z14	CAM Sample Collection Probe	H-2-815175, Sheet 1
SPLIT-CAM-Z14	CAM Sample Flow Splitter	H-2-815175, Sheet 1
CAM-UPPER-Z14	Upper Alpha CAM	H-2-815175, Sheet 1
FI-UPPER-Z14	Upper Alpha CAM Sample Flow Indicator	H-2-815175, Sheet 1
FS-UPPER-Z14	Upper Alpha CAM Sample Flow Switch	H-2-815175, Sheet 1
CAM-LOWER-Z14	Lower Alpha CAM	H-2-815175, Sheet 1

OSR SYSTEMS COMPLIANCE SHEET		
APPLICABLE OSR LCO (WHC-SD-CP-OSR-010 Section 3.0):		
3.2.2 Effluent Stack Air Monitors and Alarms		
SAFETY ENVELOPE EQUIPMENT/COMPONENT LIST		
MASTER COMPONENT INDEX NUMBER	FUNCTIONAL DESCRIPTION	DRAWING NUMBER
FI-LOWER-Z14	Lower Alpha CAM Sample Flow Indicator	H-2-815175, Sheet 1
FS-LOWER-Z14	Lower Alpha CAM Sample Flow Switch	H-2-815175, Sheet 1
PNL-Z14	Local Alarm Annunciator Panel	H-2-82838, Sheet 1 H-2-815175, Sheet 1
ANN-PNL-Z14_DS2	Low Flow CAM #1 (Upper CAM) Alarm	H-2-82838, Sheet 1 H-2-815175, Sheet 1
ANN-PNL-Z14_DS3	Low Flow CAM #2 (Lower CAM) Alarm	H-2-82838, Sheet 1 H-2-815175, Sheet 1
ANN-PNL-Z14_DS4	High Rad. CAM #1 (Upper CAM) Alarm	H-2-82838, Sheet 1 H-2-815175, Sheet 1
ANN-PNL-Z14_DS5	Fail CAM #1 (Upper CAM) Alarm	H-2-82838, Sheet 1 H-2-815175, Sheet 1
ANN-PNL-Z14_DS6	High Rad. CAM #2 (Lower CAM) Alarm	H-2-82838, Sheet 1 H-2-815175, Sheet 1
ANN-PNL-Z14_DS7	Fail CAM #2 (Lower CAM) Alarm	H-2-82838, Sheet 1 H-2-815175, Sheet 1
RESET-PNL-Z14	Local Alarm Annunciator Panel Reset/Silence Button	H-2-82838, Sheet 1 H-2-815175, Sheet 1
<u>ANN-714-W25</u>	Rm.714 General Trouble Alarm Window	H-2-96401, Sheet 2 H-2-815175, Sheet 1

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Pat J. Sullivan	Date 6/11/96
Project Title/Work Order		EDT No. N/A
WHC-SD-CP-SDD-006, Authorization Basis for PFP, FSAR/OSR		ECN No. 632796

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