RL-675 (03/99)

United States Government **Department of Energy**

memorandum

Office of River Protection

DATE:

REPLY TO ATTN OF: WTP:JEO 07-WTP-030

SUBJECT: SUBMITTAL OF SYSTEM EVALUATION ON THE ACTIVE CONFINEMENT SYSTEMS IN THE WASTE TREATMENT AND IMMOBILIZATION PLANT (WTP) PRETREATMENT (PT) AND HIGH-LEVEL WASTE (HLW) FACILITIES IN RESPONSE TO DEFENSE NUCLEAR FACILITIES SAFETY BOARD (DNFSB) RECOMMENDATION 2004-2

TO: Ines R. Triay, Chief Operating Officer
for Environmental Management, EM-3, HQ

References:

1. HQ Memorandum from I. R. Triay to Distribution, "Office of Environmental Management Expectations for Implementation of Commitment 8.6 under the Department of Energy Implementation Plan Responding to Defense Nuclear Facilities Safety Board Recommendation 2004-2," dated June 9, 2006.

2. ORP Memorandum from R. J. Schepens to I. R. Triay, HQ, "Submittal of Data on the Active Confinement Systems in the Waste Treatment and Immobilization Plant (WTP) Pretreatment (PT) And High-Level Waste (HLW) Facilities in Response to Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2004-2," 06-WTP-155, dated November 8, 2006.

3. ORP Memorandum from R. J. Schepens to I. R. Triay, HQ, "Submittal of System Evaluation Data on the Active Confinement systems in the Waste Treatment and Immobilization Plant (WTP), Pretreatment (PT), and High-Level Waste Facilities in response to Defense Nuclear Facilities Safety Board (DNSFB) recommendations 2004-2," 06-WTP-196, dated December 20, 2006.

The purpose of this memorandum is to provide the System Evaluation (Enclosed) for the WTP PT and HLW Facilities at the U.S. Department of Energy (DOE), Office of River Protection (ORP), as requested in Reference 1. The enclosure provides the requested system evaluation for the active confinement systems in these facilities, as well as for the habitability ventilation system being designed for the PT (WTP Main Control Room). There was one identified gap in the compliance with DOE-STD-1066 requirements. Specifically, fire suppression features described in Section 14.0 and Appendix C of the standard have not been provided inside High-Efficiency Particulate Air filter housings for these facilities. The Preliminary Fire Hazard Analysis determined them not necessary and ORP is addressing this gap in accordance with the formal Authorization Basis change control process. Ventilation

system evaluation data (i.e., completed Tables 4.3 and 5.1 from the Implementation Plan for DNFSB Recommendation 2004-2) was previously provided by ORP in References 2 and 3.

If you have any questions, please contact me, or your staff may contact Lewis F. Miller, Jr., Acting Manager, WTP Engineering Division, (509) 376-6817.

Sincerely,

Roy J. Schepens, Manager
Office of River Protection

Enclosure

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Ventilation System Evaluation for HLW and PT Facilities

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Executive Summary

This ventilation system evaluation was conducted in accordance with the U.S. Department of Energy's, Office of River Protection (ORP) *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related Systems* (DOE 2006), to respond to the Defense Nuclear Facilities Safety Board Recommendation 2004-2, *Active Confinement Systems*. The evaluation applies to the High-Level Waste (HLW) and Pretreatment (PT) Facilities in the Waste Treatment and Immobilization Plant (WTP) Project at the Hanford Site in Washington State. The HLW and PT Facilities are categorized as Hazard Category 2 facilities in accordance with DOE-STD-3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports.*

In conducting the evaluation, one gap was identified that is common to both facilities: The fire suppression features have not been provided inside high-efficiency particulate air (HEPA) filter housings as recommended by DOE-STD-1066, *Fire Protection Design Criteria*, Chapter 14, "Nuclear Filter Plenum Fire Protection." The Preliminary Fire Hazard Analysis determined them not necessary and ORP is addressing this gap in accordance with the formal Authorization Basis change control process.

Acronyms

AHU	air handling unit
APC	additional protection class
DBE	design-basis event
DOE	U.S. Department of Energy
EDG	emergency diesel generator
HEME	high-efficiency mist eliminator
HEPA	high-efficiency particulate air (filter)
HLW	High-Level Waste [Facility]
ITS	important-to-safety
MCR	main control room
PJM	pulse jet mixer
PJV	Pulse Jet Ventilation System
PT	Pretreatment [Facility]
PVP	Pretreatment Vessel Vent Process System
PVV	Process Vessel Vent Exhaust System
ORP	Office of River Protection
SBS	submerged bed scrubber
SC	safety class
SRD	*Safety Requirements Document*
SS	safety significant
SSC	structure, system, and component
VOC	volatile organic compound
WESP	wet electrostatic precipitator
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1.0 Introduction

This ventilation system evaluation addresses the High-Level Waste (HLW) and Pretreatment (PT) Facilities currently being designed and constructed as part of the Waste Treatment and Immobilization Plant (WTP) Project at the Hanford Site in southeast Washington. The WTP is part of the U.S. Department of Energy (DOE), Office of River Protection's (ORP) largest and most complex environmental cleanup project. ORP is responsible for managing millions of gallons of radioactive waste, the result of over 40 years of reactor operations and plutonium production for national defense. The waste is stored in underground tanks, many of which are believed to have leaked into the soil. Some of this waste may have reached groundwater, threatening the nearby Columbia River. This waste must be removed, treated (turned to glass, or vitrified), and securely disposed of or stored.

1.1 Facility Overview

1.1.1. PT Facility

The PT Facility is designed to contain processes for pretreatment of waste transferred from the Hanford Site underground storage tanks before it is immobilized at the Low-Activity Waste and HLW Vitrification Facilities. The main PT process facility is a five-story structure, primarily at grade, with several belowgrade areas at different elevations. The radioactive material processing and receipt areas (hot cell and black cells, respectively) are contained in concrete structures near the center of the facility. A two-story annex building adjacent to and south of the PT building houses various areas for support activities. The main control room is housed in the control room building adjacent to and east of the annex building. The secondary, or standby, control room is in the PT building proper. The processing areas consist of a central hot cell area, multiple black cells, a filter cave, and process bulges; all designed to meet confinement and shielding requirements. The hot cell and black cell walls and penetrations are designed to shield workers from direct radiation exposure during normal, abnormal, and accident conditions. The processing areas will provide a secondary confinement boundary to mitigate the effects of normal, abnormal, and accidental releases of material from process equipment.

The PT Facility is a Hazard Category 2 facility.

1.1.2. HLW Facility

The main HLW process facility is a five-story structure that includes several belowgrade areas at different elevations. The processing areas consist of multiple cells and caves connected by transfer tunnels and shielded doors designed to meet confinement and shielding requirements. The cell or cave walls and penetrations are designed to shield workers from direct radiation exposure during normal, abnormal, and accident conditions. The processing areas, in conjunction with active ventilation, will provide a confinement boundary to mitigate the effects of normal and accidental releases of material from process equipment. The HLW melter systems are designed to immobilize pretreated waste and entrained solids that meet waste acceptance requirements when blended with the appropriate glass formers. The quantity of glass produced will depend on the composition of the high-level waste.

The HLW Facility is a Hazard Category 2 facility.

1.2 Confinement Ventilation System/Strategy

The PT and HLW Facilities are part of the WTP that is being designed and constructed on the Hanford Site. However, the facility design is not complete; therefore, the evaluation of the systems is based on information available in the PT and HLW preliminary safety analysis reports and system design information.

The PT and HLW Facilities are segregated into ventilation zones. Zone segregation for the design of the ventilation systems is based on the system for classifying areas for potential contamination. Zones classified as C5 are potentially the most contaminated, while zones classified as C2 have the lowest potential for contamination.

1.2.1 PT Facility

1.2.1.1 C5V Exhaust System

The PT Facility C5V Exhaust System in conjunction with the building structure provides confinement of contamination sources and removes airborne particulate from the discharge air. Supply air cascades to the C5 areas from the adjacent C3 areas through in-bleed units, engineered wall penetrations, and air gaps.

The C5V Exhaust System is designed to maintain the C5 areas at the greatest negative pressure relative to the surrounding areas in an effort to maintain a barrier against backflow across the confinement boundaries. C5 areas are held at a negative pressure with respect to C3 areas. As a result of the negative pressure gradient, airflow cascades into the C5 areas from the C2 and C3 areas. Failure of the C5V fans to maintain a depression will trip the C3V exhaust, C2V supply, and C2V exhaust fans to prevent backflow conditions.

C3V/C5V in-bleed units are provided with moderate efficiency air filters, chilled water cooling coils for heat removal when required, a manual balancing damper, a pneumatically actuated isolation damper, and a fire damper. The pneumatically actuated isolation damper closes in case of low flow, and on area smoke detection upstream of the in-bleed units. The fire damper closes when the fire damper fusible link exceeds its rated temperature. This prevents smoke from a fire in the associated C3 area from migrating to the C5 area, reducing the potential challenge to C5V high-efficiency particulate air (HEPA) filters.

Two stages of HEPA filters are provided upstream of the C5V exhaust fans. The primary stage filters are located in a filter cave and require remote handling. Design of the secondary stage filters allows manual changeout. Each stage consists of multiple parallel banks and standby units.

The C5 Exhaust System consists of four centrifugal exhaust fans, which draw air from the C5 areas in order to maintain the required differential pressure. Electrical power to the C5V exhaust fans is supplied by the emergency diesel generators (EDG) during loss of offsite power. An isolation damper is located at each fan pair inlet. An isolation damper and a backdraft damper are also provided at the discharge of each fan. Discharge air from the C5V exhaust fans is ducted via a dedicated flue, which is routed through the facility exhaust stack. A radiation monitoring and sampling system is provided downstream from the C5V exhaust fans in the

exhaust air stream. The C5 Exhaust System is provided with two sources of offsite power and EDG power.

The C5V Exhaust System is one of the primary controls against a release to the environment following a design-basis event (DBE). The C5V Exhaust System is credited in the following events:

- Radioactive material drops
- Liquid spills
- Vessel overflow
- Spray leak events
- Pressurized releases
- Vessel boiling
- Cesium ion exchange column events
- Hydrogen explosions
- Seismic events

1.2.1.2 Pretreatment Vessel Vent Process and Process Vessel Vent Exhaust Systems

The Pretreatment Vessel Vent Process System (PVP)/ Process Vessel Vent Exhaust System (PVV) treat the vent gases from various PT Facility process vessels. Treatment includes removal of NO_x/acid-gases, solid particulates (both radioactive and nonradioactive), volatile organics, liquid droplets, and mists. The PVP/PVV maintain a negative pressure differential relative to C5V. The systems include passive air in-bleed piping to the vessels, vent gas collection headers, vessel vent caustic scrubber, vessel vent high-efficiency mist eliminators (HEME), vessel vent volatile organic compound (VOC) oxidizer unit, vessel vent carbon bed adsorbers, vessel vent HEPA filters, and vessel vent exhaust fans. The offgas is discharged to the environment at an elevated release point via the PT stack.

The credited safety functions of the PVP/PVV are to provide primary confinement, treatment, and filtration of process vessel aerosols that could result in radioactive dose in excess of the radiological exposure standards for anticipated events. The PVP/PVV also have a hydrogen mitigation safety function. However, the PVP/PVV do not provide an active safety function post-DBE; the post-DBE safety function is to maintain a passive barrier against release to the environment. On a loss of functionality of the PVP/PVV (e.g., loss of power or seismic event), the vessel headspaces are vented into a C5 area.

The PVP/PVV is credited in the following events:

- Pressurized releases
- Vessel boiling
- Hydrogen explosions
- Seismic events

1.2.1.3 Pulse Jet Ventilation System

The Pulse Jet Ventilation System (PJV) for the PT Facility receives exhausts from the fluidic devices (e.g., reverse flow diverters) and pulse jet mixers (PJM) operating in various process vessels by way of several subheaders. The system maintains a negative pressure differential

relative to C5V. The exhausts flow from subheaders to the inlet header to the HEMEs, which remove fine aerosols to protect the downstream PJV exhaust HEPA filters from excessive activity buildup. The treated exhausts from the HEMEs, mixed with the hot air in-bleed, flow into the PJV primary and secondary exhaust HEPA filters. The PJV exhaust fans provide the pressure control for the PJV. From the PJV exhaust fans, treated effluents flow through a dedicated flue into the PT Facility common exhaust stack.

The PJV does not provide an active safety function post-DBE; the post-DBE safety function is to maintain a passive barrier against release to the environment.

The PJV is credited in the following events:

- Hydrogen explosions

1.2.1.4 Main Control Room Ventilation System

The main control room (MCR) is located in the Pretreatment Facility Control Building. The MCR is a part of the Safe Haven. The Safe Haven includes the Main Control Room, Airlock, Pass-Through, Kitchen, two Restrooms, and Incident Command Post. The Safe Haven has a dedicated ventilation system, which is a sub-set of the Pretreatment Facility Control Building ventilation system.

The Safe Haven ventilation system includes two redundant trains, each consisting of a filtration unit and two fan coil units (FCU). The filtration units take in and treats the fresh outdoor air for potential contamination to provide makeup air and pressurize the Safe Haven relative to the outside atmosphere and adjacent spaces. Each filtration unit includes an inlet damper, supply fan, low-efficiency filter, electric heater, first stage HEPA filter, carbon absorbers (3 trays total), second stage HEPA filter, and outlet damper. The HEPA filters are credited with removing radioactive particulates and the carbon absorbers are credited with removing anhydrous ammonia. One filtration unit operates full time except when there is detection of external smoke or fire. Then the Safe Haven rooms will be isolated by manually closing the inlet dampers on both filtration units, and the Safe Haven ventilation system will operate in recirculation mode via the FCUs. The operating train of FCUs receives treated air from the filtration unit, or recirculated air when the filtration units are isolated, to provide heating and cooling for the Safe Haven rooms during all conditions.

The Safe Haven ventilation system is on Emergency Diesel Generator power and will operate following a seismic Design Basis Event. It is credited in the following events:

- external smoke or fire
- external releases of radioactive materials
- external ammonia release
- seismic events

1.2.2 HLW Facility

1.2.2.1 C5V Exhaust System

The C5V Exhaust System in conjunction with the C5 boundary structure provides secondary confinement of released aerosols. Supply air cascades to the C5 areas from the adjacent C3 areas through in-bleed units, engineered wall penetrations, and air gaps.

The C5V Exhaust System is designed to maintain the C5 areas at the greatest negative pressure relative to the surrounding areas to prevent backflow across the confinement boundaries. As a result of the negative pressure gradient, airflow cascades into the C5 areas from the C2 and C3 areas. Failure of the C5V fans will trip the C3V exhaust, C2V supply, and C2V exhaust fans to prevent backflow conditions. The C5V Exhaust System also performs a Safety Class (SC) cooling function to mitigate the impact of the local thermal generation on the concrete structure.

In-bleed units have a medium efficiency filter, a balancing damper, an automatic isolation damper (which serves to isolate the in-bleed on loss of flow), and a fire/smoke isolation damper. Most in-bleed units also have a chilled water cooling coil.

The C5V Exhaust System consists of two 100% capacity centrifugal exhaust fans that draw air from the C5 areas to maintain the required differential pressure. The cascade ventilation air from C3 areas provides space cooling to help maintain the C5 space temperatures. Fan motor speed, differential pressure across each fan, and total discharge air flowrate are monitored. Each fan has an isolation damper at the inlet and an isolation damper at the discharge. Both inlet and outlet dampers have remote position monitoring. Discharge air from the C5 exhaust fans is ducted via a dedicated flue routed through the exhaust stack.

Two stages of remotely handled HEPA filters are provided upstream of the exhaust fans in a filter cave. The HEPA filters located upstream of the exhaust fans require remote handling and are located in the filter cave. Multiple filter trains are provided each with a primary filter bank and secondary filter bank, ducted in series. Incoming air enters a common inlet plenum and flows through the operating first stage filter banks. Upon exiting the first stage filters, the air is ducted to the inlet of the corresponding second stage filter bank. Air passes through the second stage filters and enters a discharge plenum. Filters are positioned vertically within the housing with individual access doors located on top to facilitate remote handling. Differential pressure transmitters are provided for remote monitoring of filter loading. A radiation monitoring and sampling system is downstream of the C5 exhaust fans in the effluent stream. The C5V has two sources of normal power as well as EDG power.

The C5V Exhaust System is one of the primary controls against a release to the environment following a DBE. The C5V Exhaust System is credited in the following events:

- Liquid spills
- Process vessel overflow
- Spray leak in transfer line to HLW melter feed preparation vessels
- Molten glass spills
- HLW canister drops
- HLW secondary radioactive solid waste events

- Process vessel and cell hydrogen explosions
- Melter offgas release
- HLW facility fire
- Seismic events

1.2.2.2 C3 Canister Storage Ventilation System

Two 100% outside air handling units (AHU) are the primary supply of conditioned air to the HLW canister storage area. Engineered air gaps from the cask handling tunnel and the crane maintenance room provide additional flow. Each AHU includes a preheat coil, low- and high-efficiency filters, chilled water coil, heating coil, and variable speed centrifugal supply fan. Fan motor speed, differential pressure across each fan, and fan discharge flow are monitored. Isolation dampers are provided in the inlet of each AHU and in the ductwork downstream of each unit. Both inlet and outlet dampers have position monitoring. The C3 canister storage exhaust air is served by a single stage of HEPA filtration and two 100% capacity, variable speed centrifugal exhaust. The C3 Canister Storage Ventilation System also performs an ITS cooling function to mitigate the impact of thermal input from canister cooling and immobilized high-level waste decay heat on the concrete structure.

The exhaust fan maintains cascade airflow to maintain the C3 canister storage areas pressure negative relative to the C2 area and has provisions for automatic switchover to the standby fan, on detection of low-low flow from the operating fan. The exhaust fans and safety controls loop require power from the EDG. The C3 Canister Storage Ventilation System exhaust fans, in conjunction with the C3 canister storage exhaust system ductwork and HEPA filter housings, direct the exhaust air to the environment through the HEPA filter banks.

The C3 Canister Storage Ventilation System performs an active safety function for events within the canister storage area against a release to the environment following a DBE. The C3 Canister Storage Ventilation System is credited for the following events:

- HLW canister drops

1.2.2.3 HLW Melter Offgas System

The HLW Melter Offgas System cools and treats the melter offgas and vessel ventilation offgas to a level that meets environmental, safety, and health requirements.

The HLW Melter Offgas System is divided into the primary system and the secondary system to form the HLW Melter Offgas Treatment Process System (HOP). The primary offgas system is designed to handle dynamic changes in offgas generation rates. The primary system consists of a film cooler mounted on each melter, submerged bed scrubber (SBS), wet electrostatic precipitator (WESP), HEME, and HEPA filters including a preheater. This system cools the offgas, condenses the steam, and removes particulates.

There are parallel HEME, preheater, and HEPA filter trains in the primary system. If a component fails in the primary train, offgas flow manually transfers to the parallel train.

The secondary offgas system (after the HEPA filters to final discharge) removes hazardous gases including volatile mercury compounds, volatile organics, NO_x, and volatile halides including iodine-129. The exhausters used to maintain the system under vacuum are also included as part of the system. The secondary offgas system consists of activated carbon and silver mordenite columns, heat exchangers, a heater, exhausters, and catalytic units for the oxidation of VOCs and the reduction of oxides of nitrogen. Mercury is removed by activated carbon. Treatment for iodine, iodine-129, chloride, and fluoride removal is with silver mordenite. The thermal oxidizer destroys volatile organics and a selective catalytic reduction unit reduces NO_x to nitrogen and water. The offgas from the secondary offgas system is routed to the plant stack.

The Melter Offgas System does not provide an active safety function post-DBE; the post-DBE safety function is to maintain a passive barrier against release to the environment.

The Melter Offgas System is credited in the following events:

- Melter offgas release
- Process vessel and cell hydrogen explosions
- Pressurized releases and overblows
- Seismic events

1.2.2.4 Pulse Jet Ventilation System

The PJV for the HLW Facility consists of individual pipes connected from the fluidic devices to a common header. The PJV draws exhaust air from the PJMs. Based on the operation of the PJMs, the exhaust flow path cannot be blocked. The system includes the PJV piping/ductwork from the PJMs cell up to the exhaust fans. The exhaust piping upstream of the HEPA filters and the filter housing are safety significant (SS), since they filter the exhaust prior to being released to the stack.

The exhausts from the fluidic devices in the header are drawn through an electric preheater. The HEPA filter preheaters extend the life of the filters by ensuring any moisture in the air stream remains in the air stream.

The PJV does not provide an active safety function post-DBE; the post-DBE safety function is to maintain a passive barrier against release to the environment.

The PJV is credited in the following event:

- Process vessel and cell hydrogen explosions

1.3 Major Modifications

The WTP Facility is a new facility in design and construction and this section does not apply.

2.0 Functional Classification Assessment

2.1 Existing Classification

2.1.1 PT Facility

2.1.1.1 C5V Exhaust System

The C5V Exhaust System in the PT Facility is a safety class (SC) system. The major components of the system and the individual safety classifications are:

- C5V exhaust fans – SC
- C5V ductwork – SC
- C5V HEPA filters – SC
- C5V HEPA filter differential pressure alarm – SC
- C5V safety controls to transfer to standby fan – SC
- Backup power from EDGs – SC
- C5V exhaust fan interlock with C3V and C2V systems – additional protection class (APC)

2.1.1.2 Pretreatment Vessel Vent Process and Process Vessel Vent Exhaust Systems

The PVP/PVV are SC systems. The major components and individual safety classifications are:

- PVV piping and components downstream of the filter cave wall through vessel vent secondary HEPA filter housing –SS
- Vessel vent primary HEPA filter housing, including piping to the filter cave wall – SC
- Piping and components inside the C5 area from the vessel vent HEME to the vessel vent primary HEPA – SS
- Vessel vent primary HEPA filter – SC
- Vessel vent secondary HEPA filter – SC
- Vessel vent primary HEPA filter differential pressure monitor and alarm – SC

2.1.1.3 Pulse Jet Ventilation System

The PJV is an SC system. The major components of the system and individual safety classifications are:

- PJV piping including stack pipe – SC
- PJV primary and secondary exhaust HEPA filters – SC
- PJV exhaust HEPA filter housings – SC
- PJV demister housing – SC

2.1.1.4 Control Building Ventilation System

The Control Building Ventilation System is an SC system. The major components of the system and the individual safety classifications are:

- Filtration unit supply fans – SC
- Filtration system ducting – SC
- HEPA filters – SC
- Charcoal bed filters –SC
- Backup power from EDGs – SC

2.1.2 HLW Facility

2.1.2.1 C5V Exhaust System

The C5V Exhaust System in the HLW Facility is an SC system. The major components of the system and the individual safety classifications are:

- C5V exhaust fans –SC
- C5V ductwork – SC
- C5V HEPA filters – SC
- C5V HEPA filter differential pressure alarm – SC
- C5V safety controls to transfer to standby fan – SC
- Backup power from EDGs – SC
- C5V exhaust fan interlock with C3V and C2V systems – APC

2.1.2.2 C3 Canister Storage Ventilation System

The C3 Canister Storage Ventilation System is an SS system. The major components of the system and the individual safety classifications are:

- C3 canister storage exhaust system ductwork – SS
- C3 canister storage exhaust system HEPA filters and housing – SS
- C3 canister storage exhaust system exhaust fans – SS

2.1.2.3 HLW Melter Offgas System

The HLW Melter Offgas System is an SS system. The major components of the system and the individual safety classifications are:

- Vessel vent system piping from the vessels up to the melter offgas piping – SS
- Each melter offgas piping/ductwork including the SBS, WESP, HEME, preheaters, pressure boundary, and HEPA filter housings up to the exhaust stack – SS
- HEPA filters and preheaters – SS
- Catalyst skid electric heaters – SS
- Exhaust fans – SS
- All interconnecting piping to manual isolation valves – SS
- Secondary offgas system isolation valves and interlocks – SS
- The offgas treatment system is supplied SS power, including emergency power, through the HLW SC power system.

2.1.2.4 Pulse Jet Ventilation System

The PJV is an SS system. The major components of the system and the individual safety classifications are:

- PJV piping and ductwork – SS
- PJV HEPA filters – SS

2.2 Evaluation

The functional classification of the structures, systems, and components (SSC) at the WTP is based on the requirements of 24590-WTP-SRD-ESH-01-001-02, *Safety Requirements Document* (SRD), *Volume II*. The definition of SC and SS SSCs is consistent with the requirements of DOE-STD-3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*. The functional classification of the SSCs is maintained in alignment with these requirements, and changes are reviewed by DOE for approval. Therefore, the functional classification of the systems discussed in this evaluation is appropriate for the safety functions performed.

2.3 Summary

The ventilation systems discussed above have been functionally classified in accordance with the requirements of DOE-STD-3009, as implemented in the SRD for the WTP. The safety classifications of the systems are appropriate for the functions performed.

3.0 System Evaluation

3.1 Identification of Gaps

The following ventilation systems were evaluated against the criteria contained in Table 5.1 of *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related Systems* (DOE 2006):

Pretreatment Facility	High-Level Waste Facility
C5V Exhaust System	C5V Exhaust System
Pretreatment Vessel Vent Process and Process Vessel Vent Exhaust Systems	C3 Canister Storage Ventilation System
Pulse Jet Ventilation System	Melter Offgas System
Control Building Ventilation System	Pulse Jet Ventilation System

The criteria of Table 5.1 were considered to be mandatory for the safety classification of the system being considered. The criteria and WTP evaluation are included as Attachments 3 and 4 to this report.

3.2 Gap Evaluation

One gap was identified in each of the PT and HLW Facilities: The fire suppression features have not been provided inside HEPA filter housings as recommended by DOE-STD-1066, *Fire*

Protection Design Criteria, Chapter 14, "Nuclear Filter Plenum Fire Protection." ORP will tailor the application of DOE-STD-1066 through the Authorization Basis, consistent with the analyzed hazards.

3.3 Modifications and Upgrades

There are no modifications or upgrades recommended for the WTP ventilation systems discussed in this report.

4.0 Conclusions

The SC and SS ventilation systems in the WTP PT and HLW Facilities have been functionally classified in accordance with DOE-STD-3009, as implemented by the WTP SRD. These ventilation systems have been evaluated against the criteria contained in *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related Systems*. One gap has been identified that is common to both facilities: The fire suppression features have not been provided inside HEPA filter housings as recommended by DOE-STD-1066, Chapter 14. ORP will tailor the application of DOE-STD-1066 through the Authorization Basis, consistent with the analyzed hazards.

5.0 References

24590-WTP-PSAR-ESH-01-002-01, *Preliminary Safety Analysis Report to Support Construction Authorization; General Information*, Rev. 2.

24590-WTP-PSAR-ESH-01-002-02, *Preliminary Safety Analysis Report to Support Construction Authorization; PT Facility Specific Information*, Rev. 2.

24590-WTP-PSAR-ESH-01-002-04, *Preliminary Safety Analysis Report to Support Construction Authorization; HLW Facility Specific Information*, Rev. 2.

24590-WTP-SRD-ESH-01-001-02, *Safety Requirements Document*, Rev. 4f, Vol. II.

DOE 2006, U.S. Department of Energy, Deliverables 8.5.4 and 8.7 of Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 2004-2, *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related Systems*, Rev. 0, January 2006.

DOE-STD-1066, *Fire Protection Design Criteria*.

DOE-STD-3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*.

6.0 Attachments

The following documents are attachments to this report:

1. Confinement Information for the RPP-WTP PT Facility (Table 4-3)
2. Confinement Information for the RPP-WTP HLW Facility (Table 4-3)
3. Ventilation System Performance Criteria and Evaluation – PT Ventilation Systems (Table 5-1)
4. Ventilation System Performance Criteria and Evaluation – HLW Ventilation Systems (Table 5-1)

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
Drop of Ultrafilter Module in C5 Area (3.4.1.1.1)	C5V Ventilation System	Hot Cell (LPF = 1)	Public: 0.044 Co-located Workers: 42.0 Facility Workers: H		Hot Cell Building Structure C5V Ventilation System		Maintain secondary confinement if a drop of contaminated equipment should occur.	Cell walls are required to provide secondary confinement of dispersible particulates. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.	Will be provided in the DSA.	All crane load supporting components must be able to support the maximum expected weight. Hoist, cross travel, and long travel drives on the cranes must prevent a swinging load. The crane must be able to hold its load in the event of a power failure. The grapple must have a load limit greater than the maximum expected weight requiring lifting. The grapple must be designed to prevent inadvertent release of a suspended load. The grapple must be designed to prevent lifting with open or partially closed grapple. If the grapple fails while holding a load, it should fail in the closed position. The design should prevent release even if the grapple hits an obstruction during transport.

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
Drop of Cask in Export Truck Bay (3.4.1.1.2)	None credited	Solid Waste Casks and Drums	Public: 0.015 Co-located Workers: 13.99 Facility Workers: H		Solid Waste Casks and Drums		Maintain confinement when dropped from the maximum credible lift height.	The cask with drum must be designed to maintain confinement during and after the maximum drop that it could experience in the loading area and truck bay.	Will be provided in the DSA.	All crane load supporting components must be able to support the maximum expected weight. Hoist, cross travel, and long travel drives on the cranes must prevent a swinging load.
Liquid Spill from Waste Feed Receipt Vessel (FRP-VSL-00002A/B/C/D) into Black Cell (3.4.1.2.1)	C5V Ventilation System	Feed Receipt Vessel Black Cell (LPF = 1) Hot Cell (LPF = 1)	Public: 97.7 Co-located Workers: 8.35E+04 Facility Workers: H	Feed Receipt Vessel Black Cell Building Structure Hot Cell Building Structure C5V Ventilation System			The vessel will maintain primary confinement preventing the liquid spill. The ventilation system in combination with the cell will maintain secondary confinement if a spill from the vessel should occur.	The vessels must be designed and constructed to contain liquid for 40 yr given the process and operating environment. The cell walls and floor are required to provide secondary confinement of liquid released to the cell. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and	Will be provided in the DSA.	The Integrated Control Network (ICN) provides an alarm that requires operator action to stop transfers into the vessels. The black cell sump is provided with level detection and steam ejector to eventually remove the spilled liquid from the cell.

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Liquid Spill from Waste Feed Receipt Vessel Piping into the Hot Cell (3.4.1.2.2)	C5V Ventilation System	Feed Receipt Vessel Piping Black Cell (LPF = 1) Hot Cell (LPF = 1)	Public: 1.52 Co-located Workers: 246 Facility Workers: H		Feed Receipt Vessel Piping Black Cell Building Structure Hot Cell Building Structure C5V Ventilation System		The piping will maintain primary confinement preventing the liquid spill. The ventilation system in combination with the cell will maintain secondary confinement if a spill from the piping should occur.	The piping must be designed and constructed to contain liquid for 40 yr given the process and operating environment. The cell walls and floor are required to provide secondary confinement of liquid released to the cell. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere.	Will be provided in the DSA.	The pit berm, scupper drains, and drain pipes to the HLW drain/overflow pit vessels control gross flooding of hot cell. Hoisting equipment shall be designed and maintained appropriately to minimize load drops, thereby minimizing potential breaks of piping connected to the waste feed receipt vessels in the hot cell. The Integrated

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		Control Network (ICN) provides an alarm that requires operator action to stop transfers into the vessels. The hot cell sump is provided with level detection and steam ejector to eventually remove the spilled liquid from the cell.
Liquid Spill from the Tank Farm Feed Transfer Line into the PT Pipe Tunnel (3.4.1.2.3)	C5V Ventilation System	Transfer Line Piping Hot Cell Pit (LPF = 1) Black Cell (LPF = 1) Hot Cell (LPF = 1)	Public: 165 Co-located Workers: 5.54E+04 Facility Workers: H	Transfer Line Piping Hot Cell Pit Building Structure Black Cell Building Structure Hot Cell Building Structure C5V			The piping will maintain primary confinement preventing the liquid spill. The ventilation system in combination with the cell will maintain secondary confinement if a spill from	The piping must be designed and constructed to contain liquid for 40 yr given the process and operating environment. Hot cell pit is required to confine the liquid released to the cell. Cells in	Will be provided in the DSA.	Periodic integrity testing of the primary transfer line piping. Leak detection monitoring of the pipe jacket in the PT facility will alarm on detection of liquid. Leak detection monitoring of the pipe jacket in the PT facility will

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
				Ventilation System			the piping should occur.	conjunction with the pit are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		initiate a trip of feed from Tank Farms on detection of liquid. The cell sump is provided with level detection and steam ejectors to transfer contents to the ultimate overflow vessel. High-level alarm on the instrumented sump in the plant wash pit.
Overflow from Pretreatment Waste Feed Receipt Vessel due to Failure of Level	C5V Ventilation System	Overflow Vessel Pit (LPF = 1) Black Cell (LPF = 1)	Public: 5.35 Co-located Workers: 689 Facility Workers: H	Overflow Vessel Pit Building Structure Black Cell Building Structure			The ventilation system in combination with the cell will maintain secondary confinement if	Overflow vessel pit is required to confine the liquid released to the cell. Cells in conjunction with	Will be provided in the DSA.	The high-high interlock trips all significant feeds into the affected vessel (trips pumps and valves to sources such as process feeds,

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PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
Control in the Vessel (3.4.1.3.1)				C5V Ventilation System			a spill from the vessel should occur.	the pit are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		flush water, wash water and cooling water) on detection of high-high level in the affected vessel. The Integrated Control Network (ICN) monitors and controls (pump control) intra or inter-facility transfers and provides an alarm that requires operator action to stop transfers into the vessel.
Spray Leak from Pressurized Piping to Hot Cell due to Passive Mechanical Failure (3.4.1.4.1)	C5V Ventilation System	Process Piping Black Cell (LPF = 1) Hot Cell (LPF = 1)	Public: 1.52 Co-located Workers: 246 Facility Workers: H		Process Piping Black Cell Building Structure Hot Cell Building		The piping will maintain primary confinement preventing the spray leak. The ventilation	The piping must be designed and constructed to contain liquid for 40 yr given the process and operating environment.	Will be provided in the DSA.	

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PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
					Structure C5V Ventilation System		system in combination with the cell will maintain secondary confinement if a leak from the piping should occur.	The cell walls and floor are required to provide secondary confinement of liquid released to the cell. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Spray Leak	C5V	Process	Public: 1.52		Process		The piping	The piping must	Will be	Hoisting

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
from Pressurized Piping to Hot Cell due to Impact Failure (3.4.1.4.2)	Ventilation System	Piping Black Cell (LPF = 1) Hot Cell (LPF = 1)	Co-located Workers: 246 Facility Workers: H		Piping Black Cell Building Structure Hot Cell Building Structure C5V Ventilation System		will maintain primary confinement preventing the spray leak. The ventilation system in combination with the cell will maintain secondary confinement if a leak from the piping should occur.	be designed and constructed to contain liquid for 40 yr given the process and operating environment. The cell walls and floor are required to provide secondary confinement of liquid released to the cell. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and	provided in the DSA.	equipment shall be designed and maintained appropriately to minimize load drops, thereby minimizing potential breaks of piping connected to vessels in the hot cell.

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Spray Leak in Pressurized External Coaxial Transfer Line (3.4.1.4.4)	C5V Ventilation System	Primary Piping in the Transfer Line Coaxial Encasement Piping of the Transfer Line Black Cell (LPF = 1) Hot Cell (LPF = 1)	Public: 2.4 Co-located Workers: 389 Facility Workers: H		Primary Piping in the Transfer Line Coaxial Encasement Piping of the Transfer Line Black Cell Building Structure Hot Cell Building Structure C5V Ventilation System		The piping will maintain primary confinement preventing the spray leak. The ventilation system in combination with the cell and coaxial encasement will maintain secondary confinement if a leak from the piping should occur.	The primary piping must be designed and constructed to contain liquid for 40 yr given the process and operating environment. Coaxial encasement piping is required to confine the liquid released from the primary transfer pipe. The cell walls and floor are required to provide secondary confinement of liquid released to the cell. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the	Will be provided in the DSA.	

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Leak from External Transfer Line due to Excavation Accident (3.4.1.4.5)	None credited	None credited	Public: 2.4 Co-located Workers: 389 Facility Workers: H							Administrative control (TSR) to stop transfers, depressurize, and flush line before performing digging operations within 15 ft of buried radioactive waste transfer lines The location of buried process lines is clearly marked Administrative control (TSR) to perform digging

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
										operations in accordance with project requirements to prevent damaging buried process lines (i.e., Excavation Permit) Radioactive liquid transfer lines are double encased.
PJM Overblow Below Liquid Surface (3.4.1.5.1)	C5V Ventilation System	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell (LPF = 1) Hot Cell (LPF = 1)	Public: 1.5 Co-located Workers: 247 Facility Workers: H	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell Building Structure Hot Cell Building Structur C5V Ventilation System			Maintain secondary confinement if a PJM overblow should occur.	The PT process vessel ventilation system HEPA filters in combination with the HEMEs are required to remove aerosols from the headspace air before discharge to the environment. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to	Will be provided in the DSA.	

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
PJM Overblow at Low Liquid Level (3.4.1.5.2)	C5V Ventilation System	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell (LPF = 1) Hot Cell (LPF = 1)	Public: 595 Co-located Workers: 1.02E+05 Facility Workers: H	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell Building Structure Hot Cell Building Structur C5V Ventilation System			Maintain secondary confinement if a PJM overblow should occur.	The PT process vessel ventilation system HEPA filters in combination with the HEMEs are required to remove aerosols from the headspace air before discharge to the environment. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative	Will be provided in the DSA.	

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Steam Emptying Ejector Malfunction (3.4.1.5.3)	C5V Ventilation System	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell (LPF = 1) Hot Cell (LPF = 1)	Public: 9.5 Co-located Workers: 1.69E+03 Facility Workers: H	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell Building Structure Hot Cell Building Structur			Maintain secondary confinement if a PJM overblow should occur.	The PT process vessel ventilation system HEPA filters in combination with the HEMEs are required to remove aerosols from the headspace air before discharge to the environment. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere.	Will be provided in the DSA.	

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
				C5V Ventilation System				The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Boiling from Loss of Chilled Water (3.4.1.6.1)	C5V Ventilation System	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell (LPF = 1)	Public: 65 Co-located Workers: 1.1E+04 Facility Workers: H	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell Building Structure			The vessel vent piping will maintain primary confinement directing the gas through the filters. The ventilation system in combination with the cell will maintain secondary	The PT process vessel ventilation system HEPA filters in combination with the HEMEs are required to remove aerosols from the headspace air before discharge to the environment. Cells are required to provide	Will be provided in the DSA.	Process vessel vent system forced and passive purge air provides air sweep for enhanced evaporative cooling to delay the onset of boiling.

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
		Hot Cell (LPF = 1)		Hot Cell Building Structur C5V Ventilation System			confinement if a leak from the piping should occur.	secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Addition of Nitric Acid Solution to a Vessel Containing Caustic Waste (3.4.1.6.2)	C5V Ventilation System	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement	Public: 65 Co-located Workers: 1.1E+04 Facility Workers: H	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement			The vessel vent piping will maintain primary confinement directing the gas through the filters. The ventilation	The PT process vessel ventilation system HEPA filters in combination with the HEMEs are required to remove aerosols from the headspace air before discharge	Will be provided in the DSA.	

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PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
		boundary) Black Cell (LPF = 1) Hot Cell (LPF = 1)		boundary) Black Cell Building Structure Hot Cell Building Structur C5V Ventilation System			system in combination with the cell will maintain secondary confinement if a leak from the piping should occur.	to the environment. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Overflow to Ultimate Overflow Vessel (3.4.1.6.3)	C5V Ventilation System	PT Vessel Vent Process System HEPA Filters,	Public: 65 Co-located Workers: 1.1E+04 Facility Workers: H	PT Vessel Vent Process System HEPA Filters,			The vessel vent piping will maintain primary confinement directing the	The PT process vessel ventilation system HEPA filters in combination with the HEMEs are	Will be provided in the DSA.	

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
		HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell (LPF = 1) Hot Cell (LPF = 1)		HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell Building Structure Hot Cell Building Structure C5V Ventilation System			gas through the filters. The ventilation system in combination with the cell will maintain secondary confinement if a leak from the piping should occur.	required to remove aerosols from the headspace air before discharge to the environment. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Resin Dry	C5V	Cesium IX	Public: 1.12		Cesium IX	Hot Cell	Prevent	Cesium IX	Will be	When activated by

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PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
Out and Overheating Due to Cs IX Column Leak (3.4.1.7.1)	Ventilation System	Column Hot Cell	Co-located Workers: 982 Facility Workers: H		Column	Building Structure C5V Ventilation System	release of liquid and aerosols by maintaining primary confinement.	column is designed robustly to minimize the likelihood of a leak.	provided in the DSA.	Cs IX column high temperature or operator initiated the emergency elution function (1) initially resubmerges the resin bed with dilute sodium hydroxide, (2) rinses the resin bed with demineralized water, to minimize heat of dilution on addition of nitric acid, (3) adds 0.5 M nitric acid to remove the radioactive cesium from the resin media, and (4) reconditions the resin media back to caustic form for re-use or disposal.
High Strength Nitric Acid in the CNP, CXP, or NAR System Vessels (3.4.1.7.2)	C5V Ventilation System	Cesium IX Column Hot Cell (LPF = 1)	Public: 1.45 Co-located Workers: 2.96E+03 Facility Workers: H		Cesium IX Column Hot Cell Building Structure C5V Ventilation System		Cesium IX column prevents the release of liquid and aerosols by maintaining primary confinement. The ventilation system in combination with the cell will maintain secondary	Cesium IX column is designed to maintain the confinement boundary during and after the event. Cells are required to provide secondary confinement of aerosols released into the cell atmosphere.	Will be provided in the DSA.	When activated by Cs IX column high temperature or operator initiated the emergency elution function (1) initially resubmerges the resin bed with dilute sodium hydroxide, (2) rinses the resin bed with demineralized water, to minimize heat of dilution on

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PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
							confinement if a leak from the IX column should occur.	The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		addition of nitric acid, (3) adds 0.5 M nitric acid to remove the radioactive cesium from the resin media, and (4) reconditions the resin media back to caustic form for re-use or disposal.
Hydrogen Explosion Due to Loss of Purge (3.4.1.8.1)	C5V Ventilation System	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary for purge path) Black Cell (LPF = 1)	Public: 319 Co-located Workers: 3.05E+05 Facility Workers: H			PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary for purge path) Black Cell Building Structure	Not applicable	Not applicable	Not applicable	Purge air is required to provide sufficient gas flow to ensure a hydrogen concentration in the vessel headspace less than 25 % of the LFL, or one volume percent during normal operation and below LFL during abnormal conditions.

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PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
		Hot Cell (LPF = 1)				Hot Cell Building Structure C5V Ventilation System				
Hydrogen Explosion Due to Loss of Agitation (3.4.1.8.2)	C5V Ventilation System	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary for purge path) Black Cell (LPF = 1) Hot Cell (LPF = 1)	Public: 162 Co-located Workers: 1.55E+05 Facility Workers: H			PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary for purge path) Black Cell Building Structure Hot Cell Building Structure C5V Ventilation System	Not applicable	Not applicable	Not applicable	ITS agitation is required to provide sufficient agitation to prevent accumulation/ storage of hydrogen in the waste. Purge air is required to provide sufficient gas flow to ensure a hydrogen concentration in the vessel headspace less than 25 % of the LFL or one volume percent during normal operation, and less than LFL during abnormal and accident conditions.
Hydrogen Explosion Due to Loss of Power (3.4.1.8.3)	C5V Ventilation System	PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave	Public: 2.82 Co-located Workers: 2.69E+03 Facility Workers: H			PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave	Not applicable	Not applicable	Not applicable	ITS agitation is required to provide sufficient agitation to prevent accumulation/ storage of hydrogen in the waste.

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
		Wall (C5 confinement boundary for purge path) Black Cell (LPF = 1) Hot Cell (LPF = 1)				Wall (C5 confinement boundary for purge path) Black Cell Building Structure Hot Cell Building Structure C5V Ventilation System				Purge air is required to provide sufficient gas flow to ensure a hydrogen concentration in the vessel headspace less than 25 % of the LFL or one volume percent during normal operation, and less than LFL during abnormal and accident conditions.
Cesium IX Column Explosion (3.4.1.8.4)	C5V Ventilation System	Hot Cell (LPF = 1)	Public: 0.03 Co-located Workers: 40 Facility Workers: H			Hot Cell Building Structure C5V Ventilation System	Not applicable	Not applicable	Not applicable	Cesium IX process hydrogen mitigation collection piping is required to collect the gases generated in the Cs IX columns and contain a minimum volume of nitrogen such that all gas collected is inert. Purge air is required to provide sufficient gas flow to ensure a hydrogen gas concentration in the siphon break less than 1 vol % (25 % of the LFL).
Hydrogen Explosion in Co-axial	None credited	Primary Piping in the Transfer	Public: < 1 Co-located Workers: < 100	Primary Piping in the Transfer		Coaxial Encasement Piping of the	Prevent release of liquid and	Transfer line is required to be designed to ensure	Will be provided in the DSA.	Redundant leak detection is required to initiate

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
Line (3.4.1.8.5)		Line Coaxial Encasement Piping of the Transfer Line	Facility Workers: H	Line		Transfer Line	aerosols by maintaining primary confinement.	the confinement of radioactive streams.		shutoff of the transfer pump to limit the amount of material that could be in the encasement pipe.
Hydrogen Explosions in C5 Area Cells (3.4.1.8.6)	Jumper Piping Isolation Valve C5V Ventilation System	Hot Cell (LPF = 1)	Public: > 5 Co-located Workers: > 100 Facility Workers: H	Jumper Piping Isolation Valve Hot Cell Building Structure C5V Ventilation System			The isolation valves prevent spills of high activity process liquid into the Hot Cell The ventilation system in combination with the cell will maintain secondary confinement if a spill should occur. The ventilation system will maintain the cell volumes at less than 25 % of the LFL.	The C5 ventilation system is required to provide sufficient air flow to ensure a hydrogen concentration in the C5 cell is less than 25 % of the LFL, or one volume percent.	Will be provided in the DSA.	
Hydrogen Explosions Due to Loss of Mixing in Non-Newtonian Vessels (3.4.1.8.7)	C5V Ventilation System	Process Vessel Black Cell (LPF = 1)	Public: 23.8 (8 v%) Co-located Workers: 2.28E+04 (8 v%) Facility Workers: H	Process Vessel Black Cell Building Structure C5V Ventilation System			The vessel will provide partial confinement of radioactive material in the event of a hydrogen deflagration.	The vessel boundary must provide a barrier to the release of radioactive material in the event of a deflagration. Cells are required	Will be provided in the DSA.	The air spargers are required to bubble air through the waste providing the forced air purge necessary to sweep evolved hydrogen from the vessel headspace.

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
							The ventilation system in combination with the cell will maintain secondary confinement if a hydrogen deflagration should occur.	to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		The level interlock will ensure the air spargers go to an increased airflow-mixing mode if the allowable normal mixing aspect ratio is exceeded.
Fire in the Crane Maintenance Area (3.4.1.10)	C5V Ventilation System	None credited	Public: 0.034 Co-located Workers: 31.68 Facility Workers: M		C5V Ventilation System		The ventilation system will maintain confinement of the products of combustion.	The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain	Will be provided in the DSA.	

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Design Basis Seismic Event (3.4.2.1)	C5 Ventilation System	SC-I Vessels, Separators, and IX Columns PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell (LPF = 1) Hot Cell (LPF = 1)	Public: > 5 Co-located Workers: > 25	Vessels, Separators, and IX Columns PT Vessel Vent Process System HEPA Filters, HEMEs, and Piping to the Filter Cave Wall (C5 confinement boundary) Black Cell Building Structure Hot Cell Building Structure C5			SC-I vessels, separators, and IX columns prevent release of liquid and aerosols by maintaining primary confinement. The ventilation system in combination with the cell will maintain secondary confinement.	SC-I Vessels, Separators, and Cesium IX columns are designed to maintain the confinement boundary during and after the event. Black and Hot Cells are required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and	Will be provided in the DSA.	

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
				Ventilation System				C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Habitability of the Main Control Room Operators (4.3.20)	Main Control Room (MCR) Ventilation System Supply Fans	Main Control Room (MCR) Ventilation System HEPA Filters, Charcoal Bed Filters, Filter Housings, and Ductwork (pressure boundary)	Control Room Operator: H	Main Control Room Ventilation System HEPA Filters, Charcoal Bed Filters, Filter Housings, and Ductwork (pressure boundary) Main Control Room Ventilation System Supply Fans			The ventilation system supplies filtered air to the safe haven envelope with the Control Building.	The MCR ventilation system HEPA filters are required to filter incoming air. The MCR ventilation system charcoal bed filters are required to provide filtration for hazardous materials. The MCR ventilation system supply fans are required to maintain a minimum flow rate and maintain a positive pressure within the safe	Will be provided in the DSA.	The off line filtration unit isolation dampers are required to maintain low leakage while closed. The MCR filtration unit supply fans are required to be provided with Safety Class electrical power

Confinement Information for the RPP-WTP PT Facility

PT Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								haven envelope with respect to the surrounding atmosphere, sufficient to prevent hazardous contaminants from entering during a loss of power or design basis earthquake.		

*Based on consequence of the event. Reported safety classification in the PSAR may be higher.

(Basis: Preliminary Safety Analysis Report; PT Facility Rev. 2 & approved ABARs)

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
Canister Drop in C5 Ventilation Area (3.4.1.5.1)	C5V Ventilation System	HLW Canister (LPF = 0.1) Canister Handling Cave (LPF = 1) Pour Tunnel (LPF = 1)	Public: 0.455 Co-located Workers: 436 Facility Workers: H		Canister Handling Cave and Pour Tunnel Building Structure C5V Ventilation System	HLW Canister	Maintain secondary confinement if a drop of a canister should occur.	Cave and pour tunnel are required to provide secondary confinement of aerosols released into the cave and pour tunnel atmosphere. The C5 ventilation system is required to maintain the cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.	Will be provided in the DSA.	All crane load supporting components must be able to support the maximum expected weight. Hoist, cross travel, and long travel drives on the cranes must prevent a swinging load. The crane must be able to hold its load in the event of a power failure. The grapple must have a load limit greater than the maximum expected weight of a filled canister. The grapple must be designed to prevent inadvertent release of a suspended canister. The grapple must be designed to prevent lifting with open or partially closed grapple. If the grapple fails while holding a canister, it should fail in the closed position. The design should prevent canister release even if it hits an obstruction during transport.

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
Canister Drop in C3 Ventilation Area (3.4.1.5.2)	C3 Canister Storage Area Ventilation System	HLW Canister (LPF = 0.1) Canister Storage Cave (LPF = 1) Cask Handling Tunnel (LPF = 1)	Public: 0.455 Co-located Workers: 436 Facility Workers: H		Canister Storage Cave and Cask Handling Tunnel Building Structure C3 Canister Storage Area Ventilation System	HLW Canister	Maintain secondary confinement if a drop of a canister should occur.	Cave and cask handling tunnel are required to provide secondary confinement of aerosols released into the cave and handling tunnel atmosphere. The C3 canister storage area ventilation system is required to maintain the cave at a negative pressure with respect to the adjacent C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C3 canister storage area ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C3 canister storage area HEPA filters to remove particulates from the air before discharge to the environment.	Will be provided in the DSA.	All crane load supporting components must be able to support the maximum expected weight. Hoist, cross travel, and long travel drives on the cranes must prevent a swinging load. The crane must be able to hold its load in the event of a power failure. The grapple must have a load limit greater than the maximum expected weight of a filled canister or in-cask canister. The grapple must be designed to prevent inadvertent release of a suspended canister/cask. The grapple must be designed to prevent lifting with open or partially closed grapple. If the grapple fails while holding a canister/ cask, it should fail in the closed position. The design should prevent canister/ cask release even

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
										if it hits an obstruction during transport.
Drop of in-Cask Canister in the Export Truck Bay (3.4.1.5.3)	None credited	HLW Canister Cask	Public: 0.174 Co-located Workers: 166 Facility Workers: H		HLW Canister Cask		Maintain confinement when dropped from the maximum credible lift height.	The canister cask must be designed to maintain confinement during and after the maximum drop that it could experience in the truck export bay.	Will be provided in the DSA.	All crane load supporting components must be able to support the maximum expected weight. Hoist, cross travel, and long travel drives on the cranes must prevent a swinging load. The crane must be able to hold its load in the event of a power failure. The grapple must have a load limit greater than the maximum expected weight of an in-cask canister. The grapple must be designed to prevent inadvertent release of a suspended cask. The grapple must be designed to prevent lifting with open or partially closed grapple. If the grapple fails while holding a cask, it should fail in the closed position. The design should prevent cask

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
										release even if it hits an obstruction during transport.
Drop of a Waste Basket (3.4.1.6.1)	C5V Ventilation System	Melter Cave (LPF = 1) Drum Transfer Tunnel (LPF = 1)	Public: 5.27E-02 Co-located Workers: 50.5 Facility Workers: H		Melter Cave and Drum Transfer Tunnel Building Structure C5V Ventilation System		Maintain secondary confinement if a drop of a wastebasket should occur.	Cave and drum transfer tunnel are required to provide secondary confinement of aerosols released into the cave and pour tunnel atmosphere. The C5 ventilation system is required to maintain the cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.	Will be provided in the DSA.	All crane load supporting components must be able to support the maximum expected weight. Hoist, cross travel, and long travel drives on the cranes must prevent a swinging load. The crane must be able to hold its load in the event of a power failure. The grapple must have a load limit greater than the maximum expected weight of a filled waste container. The grapple must be designed to prevent inadvertent release of a suspended waste container. The grapple must be designed to prevent lifting with open or partially closed grapple. If the grapple fails while holding a waste container, it should fail in the closed position.

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
										The design should prevent waste container release even if it hits an obstruction during transport.
Pressurized Release from a Waste Drum (3.4.1.6.2)	C5V Ventilation System	Swabbing and Monitoring Area (LPF = 1)	Public: 3.32E-02 Co-located Workers: 31.8 Facility Workers: H		Swabbing and Monitoring Area Building Structure C5V Ventilation System		Maintain secondary confinement if a release from a drum should occur.	Swabbing and monitoring area is required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.	Will be provided in the DSA.	Mixing of waste in the drum that could produce heat, pressure, fire explosion, violent reaction, or flammable gases should be prevented. The waste drum should be provided with an adequate filter vent to prevent accumulation of flammable gasses above the lower flammability limit.
Drop of a Lidded Solid	None credited	Solid Waste Drum	Public: 5.27E-02 Co-located Workers:		Solid Waste Cask	Solid Waste Drum	Maintain confinement	The canister cask must be designed	Will be provided in the	All crane load supporting

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
Waste Cask (3.4.1.6.3)		Solid Waste Cask	50.5 Facility Workers: H				when dropped from the maximum credible lift height.	to maintain confinement during and after the maximum drop that it could experience in the truck export bay.	DSA.	components must be able to support the maximum expected weight. Hoist, cross travel, and long travel drives on the cranes must prevent a swinging load. The crane must be able to hold its load in the event of a power failure. The rigging must have a load limit greater than the expected weight of the loaded solid waste cask. The rigging must be designed to prevent inadvertent release of a suspended solid waste cask. The rigging design should prevent cask release even if it hits an obstruction during transport.
Loss of Contamination Control due to Crushing Used Filter (3.4.1.6.4)	C5V Ventilation System	HEPA Filter Filter Cave (LPF = 1)	Public: 8.27E-03 Co-located Workers: 7.92 Facility Workers: M		Filter Cave Building Structure C5V Ventilation System	HEPA Filter Design (reduces amount of released material from impact/ crushing)	Maintain secondary confinement if a release from a used filter should occur.	Cave is required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cave at a negative	Will be provided in the DSA.	

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Loss of Contamination Control due to Vessel Drop (3.4.1.6.5)	C5V Ventilation System	Melter Cave (LPF = 1)	Public: 0.1 Co-located Workers: 96 Facility Workers: H		Melter Cave Building Structure C5V Ventilation System		Maintain secondary confinement if a release of contaminated equipment should occur.	Cave walls are required to provide secondary confinement of dispersible particulates. The C5 ventilation system is required to maintain the cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall.	Will be provided in the DSA.	

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Liquid Spill due to Failure of HLW Melter Feed Preparation Vessels (3.4.1.1.1)	C5V Ventilation System	Process Vessel Melter Cave (LPF = 1)	Public: 0.953 Co-located Workers: 816 Facility Workers: H		Process Vessel Melter Cave Building Structure C5V Ventilation System		The vessel will prevent the release of liquid and aerosols by maintaining primary confinement. The ventilation system in combination with the cell will maintain secondary confinement if a spill from the vessel should occur.	The vessels must be designed and constructed to contain liquid for 40 years given the process and operating environment. The cave walls and floor are required to provide secondary confinement of liquid released to the cave. Cave is required to provide secondary confinement of aerosols released into the cave atmosphere. The C5 ventilation system is required to maintain the cave at a negative pressure with respect to the adjacent C3 and	Will be provided in the DSA.	

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Glass Spill due to Melter Overpressurization (3.4.1.4.1)	C5V Ventilation System	Melter Cave and Pour Tunnel (LPF = 1)	Public: 3.7 Co-located Workers: 2.06E+03 Facility Workers: H		Melter Cave and Pour Tunnel Building Structure C5V Ventilation System		Maintain secondary confinement if a large glass spill from the melter should occur.	The cave walls and floor are required to provide secondary confinement of liquid released to the cave. Cave and pour tunnel are required to provide secondary confinement of aerosols released into the cave and pour tunnel atmosphere. The C5 ventilation system is required to maintain the cave at a negative pressure with respect to the	Will be provided in the DSA.	

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Glass Spills due to Unplanned Pours (3.4.1.4.2)	C5V Ventilation System	Melter Cave and Pour Tunnel (LPF = 1)	Public: 3.7 (bound) Co-located Workers: 2.06E+03 (bound) Facility Workers: H		Melter Cave and Pour Tunnel Building Structure C5V Ventilation System		Maintain secondary confinement if a large glass spill from the melter should occur.	The cave walls and floor are required to provide secondary confinement of liquid released to the cave. Cave and pour tunnel are required to provide secondary confinement of aerosols released into the cave and pour tunnel atmosphere. The C5 ventilation system is required to maintain the cave at a negative pressure with	Will be provided in the DSA.	

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Overflow of One of the Feed Preparation Vessels due to Failure of Level Control in the Vessel (3.4.1.2.1)	C5V Ventilation System	Melter Cave (LPF = 1)	Public: 0.953 Co-located Workers: 816 Facility Workers: H		Melter Cave Building Structure C5V Ventilation System		Maintain secondary confinement if a spill from the vessel should occur.	The cave walls and floor are required to provide secondary confinement of liquid released to the cave. Cave is required to provide secondary confinement of aerosols released into the cave atmosphere. The C5 ventilation system is required to maintain the cave at a negative pressure with respect to the adjacent C3 and	Will be provided in the DSA.	The Integrated Control Network (ICN) provides an interlock to terminate transfer of HLW feed to the HFP vessels on detection of high-high liquid level.

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Spray Leak in Transfer Line to HLW Melter Feed Preparation Vessels (3.4.1.3.1)	C5V Ventilation System	Transfer Line Piping Wet Process Cell (LPF = 1) Melter Cave (LPF = 1)	Public: 0.91 Co-located Workers: 147 Facility Workers: H		Transfer Line Piping Wet Process Cell Building Structure Melter Cave Building Structure C5V Ventilation System		The transfer line piping will prevent the release of liquid and aerosols by maintaining primary confinement. The ventilation system in combination with the cell/cave will maintain secondary confinement if a leak from the piping should occur.	The process piping must contain liquid for a 40-year lifetime with consideration to the high radiation environment and the erosive nature of the solids. The cell/cave walls and floor are required to provide secondary confinement of liquid released to the cell/cave. Cell/cave is required to provide secondary confinement of aerosols released	Will be provided in the DSA.	

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								into the cell/cave atmosphere. The C5 ventilation system is required to maintain the cell/cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell/cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Release from a PJM Overblow (3.4.1.10.1)	C5V Ventilation System	Melter Offgas Treatment Process HEPA filters, HEMEs, and Piping to the Filter Cave Wall Wet Process Cell (LPF = 1)	Public: 0.73 Co-located Workers: 123.5 Facility Workers: H		Melter Offgas Treatment Process HEPA filters, HEMEs, and Piping to the Filter Cave Wall Wet Process Cell Building		Melter offgas treatment process provides filtration prior to discharge to the environment. The ventilation system in combination with the cell	The melter offgas treatment HEPA filters in combination with the HEMEs are required to remove aerosols from the headspace air before discharge to the environment. Cell is required to	Will be provided in the DSA.	

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
					Structure C5V Ventilation System		will maintain secondary confinement if a PJM overblow should occur.	provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
PJM Overblow at Low Liquid Level (3.4.1.10.2)	C5V Ventilation System	Melter Offgas Treatment Process HEPA filters, HEMEs, and Piping to the Filter Cave Wall	Public: 1.3 Co-located Workers: 163 Facility Workers: H		Melter Offgas Treatment Process HEPA filters, HEMEs, and Piping to the Filter Cave Wall		Melter offgas treatment process provides filtration prior to discharge to the environment. The ventilation	The melter offgas treatment HEPA filters in combination with the HEMEs are required to remove aerosols from the headspace air before discharge to the	Will be provided in the DSA.	Jumpers for each sparger air line supply are limited to 1/2 in (sparge air supply lines) to preclude flow in excess of allowed values based on choked flow for the line size.

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
		Melter Cave (LPF = 1)			Melter Cave Building Structure C5V Ventilation System		system in combination with the cell will maintain secondary confinement if a PJM overblow should occur.	environment. Cave is required to provide secondary confinement of aerosols released into the cave atmosphere. The C5 ventilation system is required to maintain the cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Hydrogen Deflagration in Newtonian Waste Vessel (3.4.1.7.1)	C5V Ventilation System	Process Vessel Melter Offgas Treatment Process and Process	Public: 2.17 Co-located Workers: 2.08E+03 Facility Workers: H		Melter Offgas Treatment Process and Process Vessel Vent HEPA filters and Piping	Process Vessel	Melter offgas treatment process provides filtration prior to discharge to the environment.	The melter offgas treatment HEPA filters are required to remove aerosols from the headspace air before discharge to the	Will be provided in the DSA.	The purge air system is required to provide sufficient airflow to ensure a hydrogen gas concentration in the vessel

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
		Vessel Vent HEPA filters and Piping to the Filter Cave Wall Wet Process Cell (LPF = 1)			to the Filter Cave Wall Wet Process Cell Building Structure C5V Ventilation System		The ventilation system in combination with the cell will maintain secondary confinement if a hydrogen deflagration should occur.	environment. Cell is required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cell at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		headspace is less than 1 vol% (25 % of the LFL). During a design basis event, the airflow through the purge system must be such that the hydrogen concentration is maintained at less than the LFL. The engineered vessel overflow is required to provide a pathway for waste to overflow the vessel in the event of the DBE. This overflow protects the volume of the vessel headspace and allows purge air to exit the vessel if the HOP system is degraded or plugged.
Hydrogen Deflagration in Non-Newtonian Vessel (3.4.1.7.2)	C5V Ventilation System	Process Vessel Melter Offgas Treatment Process and Process	Public: 1.32 Co-located Workers: 1.26E+03 Facility Workers: H		Process Vessel Melter Offgas Treatment Process and Process		The vessel will provide partial confinement of radioactive material in the event of a hydrogen	The vessel boundary must provide a barrier to the release of radioactive material in the event of a deflagration.	Will be provided in the DSA.	Air spargers are required to provide sufficient agitation to prevent accumulation/ storage of hydrogen in the

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
		Vessel Vent HEPA filters and Piping to the Filter Cave Wall Melter Cave (LPF = 1)			Vessel Vent HEPA filters and Piping to the Filter Cave Wall Melter Cave Building Structure C5V Ventilation System		deflagration. Melter offgas treatment process provides filtration prior to discharge to the environment. The ventilation system in combination with the cave will maintain secondary confinement if a hydrogen deflagration should occur.	The melter offgas treatment HEPA filters are required to remove aerosols from the headspace air before discharge to the environment. Cave is required to provide secondary confinement of aerosols released into the cell atmosphere. The C5 ventilation system is required to maintain the cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the		waste. The sparge air supply system is required to provide sufficient airflow to ensure a hydrogen gas concentration in the vessel headspace is less than the LFL during off normal operations. During off normal events the air supply system must facilitate controlled hydrogen release such that an accumulation and episodic release of stored hydrogen does not cause the hydrogen concentration in the vessel headspace to exceed the LFL. The engineered vessel overflow is required to provide a pathway for waste to overflow the vessel in the event of the DBE. This overflow protects the volume of the vessel headspace and allows purge air to exit the

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								environment.		vessel if the HOP system is degraded or plugged.
Hydrogen Deflagration Due to Waste Overflow (3.4.1.7.3)	C5V Ventilation System	Melter Cave (LPF = 1)	Public: 1.32 Co-located Workers: 1.26E+03 Facility Workers: H		Melter Cave Building Structure C5V Ventilation System		The ventilation system in combination with the cell/cave will maintain secondary confinement if a hydrogen deflagration should occur.	Cave is required to provide secondary confinement of aerosols released into the cell/cave atmosphere. The C5 ventilation system is required to maintain the cell/cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell/cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.	Will be provided in the DSA.	The Integrated Control Network (ICN) provides an interlock to terminate transfer of HLW feed to the HFP vessels on detection of high-high liquid level.
HLW Melter Offgas Release due to Loss of Offsite Power	Melter Offgas Treatment Process and Process Vessel Vent	Melter Offgas Treatment Process and Process Vessel Vent	Public: 2.63 Co-located Workers: 1.14E+03 Facility Workers: H		Melter Cave Building Structure Melter Offgas		Melter offgas treatment process fans ensure confinement of aerosolized	The melter offgas treatment process is required to provide primary confinement.	Will be provided in the DSA.	

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
(3.4.1.8.1)	Fans and HEPA Pre-heaters (backed by emergency power) C5V Ventilation System	HEPA filters and Piping to the Filter Cave Wall Melter Offgas Treatment Process and Process Vessel Vent Melter Cave (LPF = 1)			Treatment Process and Process Vessel Vent Fans and HEPA Pre-heaters (backed by emergency power) Melter Offgas Treatment Process and Process Vessel Vent HEPA filters and Piping to the Filter Cave Wall C5V Ventilation System		material. Melter offgas treatment process provides filtration prior to discharge to the environment. The ventilation system in combination with the cave will maintain secondary confinement if a melter offgas release should occur.	The melter offgas treatment HEPA filters are required to remove aerosols from the headspace air before discharge to the environment. Cave is required to provide secondary confinement of aerosols released into the cave atmosphere. The C5 ventilation system is required to maintain the cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
Failure of Melter Pressure Control Caused by Failure of the Standby Offgas System Valve to Open on Demand (3.4.1.8.2)	C5V Ventilation System	Melter Cave (LPF = 1)	Public: 3.13 Co-located Workers: 572 Facility Workers: H		Melter Cave Building Structure C5V Ventilation System		The ventilation system in combination with the cave will maintain secondary confinement if a melter offgas release should occur.	Cave is required to provide secondary confinement of aerosols released into the cave atmosphere. The C5 ventilation system is required to maintain the cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.	Will be provided in the DSA.	
Fire in Melter Offgas Fans (3.4.1.9.1)	C5V Ventilation System	Secondary Offgas Fan Room (LPF = 1) Melter Cave (LPF = 1)	Public: 2.63 Co-located Workers: 1.14E+03 Facility Workers: H		Secondary Offgas Fan Room Building Structure Melter Cave Building Structure		The ventilation system in combination with the cell/cave will maintain secondary confinement if a melter offgas	Cell/cave is required to provide secondary confinement of aerosols released into the cave atmosphere. The C5 ventilation system is required	Will be provided in the DSA.	The offgas fans are separated by ITS fire barriers to prevent a fire affecting one fan from spreading to the other fans.

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
					C5V Ventilation System		release should occur.	to maintain the cell/cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell/cave wall. The C5 ventilation system is required to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		
Melter Offgas Treatment Process Systems HEPA Filter Fire (3.4.1.9.2)	None credited	None credited	Public: 3.13 Co-located Workers: 572 Facility Workers: H				Not applicable	Not applicable	Not applicable	Design of equipment in the Melter Offgas Treatment Process system maximizes the use of non-combustible material. Design of equipment in the HEPA filter pre-heater element housing (thermal well) maximizes the use of non-combustible material. The HEPA filter pre-heater

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
										elements have a thermal overload protection.
Design Basis Seismic Event (3.4.2.1)	C5 Ventilation System C3 Ventilation System	SC-I Vessels Melter Offgas Treatment Process HEPA filters, HEMEs, and Piping to the Filter Cave Wall Wet Process Cell (LPF = 1) Melter Cave (LPF = 1)	Public: > 5 Co-located Workers: > 25	SC-I Vessels Melter Offgas Treatment Process HEPA filters, HEMEs, and Piping to the Filter Cave Wall Wet Process Cell Building Structure Melter Cave Building Structure C5 Ventilation System	C3 Ventilation System		SC-I vessels prevent release of liquid and aerosols by maintaining primary confinement. The ventilation system in combination with the cells/caves will maintain secondary confinement.	SC-I Vessels are designed to maintain the confinement boundary during and after the event. The cell/cave walls and floor are required to provide secondary confinement of liquid released to the cell/cave. Cells/caves are required to provide secondary confinement of aerosols released into the cell/cave atmosphere. The C5 ventilation system is required to maintain the cell/cave at a negative pressure with respect to the adjacent C3 and C2 areas of the plant, and to maintain confinement velocity across all penetrations in the cell/cave wall. The C5 ventilation system is required	Will be provided in the DSA.	

Confinement Information for the RPP-WTP HLW Facility

HLW Facility (Table 4-3)			Hazard Category 2				Performance Expectations			
Bounding Accidents	Confinement Type		Unmitigated Bounding Doses (rem)	Confinement Classification*			Function	Functional Requirements	Performance Criteria	Compensatory Measures
	Active	Passive		SC	SS	DID				
								to ensure that the contaminated air is directed to, and passed through, the C5V HEPA filters to remove particulates from the air before discharge to the environment.		

*Based on consequence of the event. Reported safety classification in the PSAR may be higher.

(Basis: Preliminary Safety Analysis Report; HLW Facility Rev. 2 & approved ABARs)

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA							
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
Ventilation System - General Criteria							
Pressure differential should be maintained between zones and atmosphere	Applies	Applies	Applies	Number of zones as credited by accident analysis to control hazard material release; demonstrate by use considering potential in-leakage	DOE-HDBK-1169 (2.2.9) ASHRAE Design Guide	The C5V exhaust fans must maintain C5 area pressures negative relative to the pressures in the C2/C3 and C3 areas during normal operation, on loss of power, fan failure, or design basis earthquake.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 2.6.4 and 4.3.2.3
						PVV System - The following items within the PVV system are classified as SC: the primary vessel vent HEPA filter housing (including the piping to the filter cave wall), vessel vent primary and secondary HEPA filters, and the vessel vent primary HEPA filter differential pressure alarm. Operation of the system fans is not required to support an SC or SS function	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.12
						PJV System – The PJV HEPA filters are safety class to provide a confinement function. Operation of the system fans is not required to support an SC or SS function.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.19
						Control Building Ventilation - The supply fans maintain a positive pressure within the safe haven habitability envelope with respect to the surrounding atmosphere, sufficient to prevent hazardous contaminants from entering during a loss of power or design basis earthquake.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.20
Materials of construction should be appropriate for normal, abnormal, and accident conditions	Applies	Applies	Applies		DOE HDBK-1169 (2.2.5) ASME AG-1	The C5V and ductwork will be constructed of corrosion resistant materials.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.2.5
						PVV/PVP - The standard (i.e., ASME Section VIII, ASME B31.3, and ASME AG-1) specified for these SSCs implement requirements that assure the use of appropriate materials of construction. This is implemented by the piping codes on the various system P&ID and/or V&IDs for the system ductwork, piping, and components (including the components, such as those required for the air permit, whose only credited nuclear safety function is to provide confinement like the piping and ductwork). This information would also be in the specification for the various specific components.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections, 4.3.4.4, 4.3.12.4.2, and 4.4.20.4

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA							
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						PJV – The PJV piping and associated component housings are constructed of stainless steel	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.19.5
						Control Building Ventilation - The standard (i.e., ASME Section VIII and ASME AG-1) specified that these SSCs implement requirements that assure the use of appropriate materials of construction. This is implemented by the piping/duct codes on the various system V&IDs for the system ductwork, piping, and components (including the components, such as those required for the air permit, whose only credited nuclear safety function is to provide confinement like the piping and ductwork). This information would also be in the specification for the various specific components.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.4.18.4
Exhaust system should withstand normal, abnormal, and accident system conditions and maintain confinement integrity.	Applies	Applies	Applies	As required by accident analysis to prevent accident release	DOE-HDBK-1169 (2.4) ASHRAE Design Guide	The C5V system is designed to remain functional and perform its confinement function during all normal, abnormal, and accident conditions.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.2
						PVV System – The system is designed to perform its confinement function during all normal, abnormal, and accident conditions.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.12
						PJV system - The PJV piping and associated component housings are provided with SC-I and PC-3 supports to ensure their structural integrity during all modes of operation and accident conditions.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.19.5
						Control Building ventilation - will filter outside air during abnormal and accident conditions.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.20.5

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA							
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
Confinement ventilation system will have appropriate filtration to minimize release	Applies	Applies	Applies	Address: 1) type of filter (e.g., HEPA, sand, sintered metal); 2) Filter sizing (flow capacity and pressure drop); 3) Decontamination factor vs. accident analysis assumptions	ASME AG-1 DOE-HDBK-1169 (2.2.1)	C5V system Filter Type - HEPA Design- The fan is designed for 70,535 cfm. HEPA filter banks are designed for 8817 (primarys) and 11,765 (secondarys) cfm. Decontamination factor (DF) - C5 HEPA filter bank shall have an efficiency of at least 99.95 % when tested in-situ. The accident analysis has assumed an efficiency of 99.5% for both primary and secondary banks	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 2.6.5, 3.4.1, 4.3.2.3, and 5.5.1 The filter sizing is based on 24590-PTF-MAC-C5V-00002, Rev. D. Post Seismic DBE viability of the C5V ventilation system is also addressed in CCN 111198.
						PVV/PVP System Filter Type - HEPA Design - The fan is designed for 4000 cfm/fan. HEPA filter banks are designed for (primarys and secondarys) 4000 cfm. DF - Each C3 canister storage area ventilation exhaust system HEPA filter bank shall have an efficiency of at least 99.95 % when tested in-situ. The accident analysis has assumed an efficiency of 99.5% for the filter bank.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 4.3.12.3, 5.5.2, Table 3A-13 The HEPA filter sizing is based on 24590-PTF-MAC-PVV-00001 Rev. C. The PVV/PVP fans are not credited to survive a seismic DBE so there is no post seismic functionality.
						PJV System Filter Type - HEPA Design - The fan is designed for 20,000 cfm/fan. HEPA filter banks are designed for 7500 (primarys) and 9000 (secondarys) cfm. DF - Each PVV/PVP ventilation exhaust system HEPA filter bank shall have an efficiency of at least 99.95 % when tested in-situ. The accident analysis has assumed an efficiency of 99.5% for the filter bank.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 4.3.19.3, 5.5.4, Table 3A-13 The HEPA filter sizing is based on 24590-PTF-MAC-PJV-00001 Rev. C. The PJV fans are not credited to survive a seismic DBE so there is no post seismic functionality. The post seismic DBE function is to maintain an open flow path.

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA							
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						Control Building Ventilation Filter Type - HEPA Design - The fan and inlet HEPA filter bank is designed for 9200 cfm (main control room) 840 cfm (incident command post). DF - Each control room building ventilation exhaust system HEPA filter bank shall have an efficiency of at least 99.95 % when tested in-situ. The accident analysis has assumed an efficiency of 99.5% for the filter bank. Filter Type - Control Room Building Charcoal bed filters Design - Designed based on the HEPA system. DF - The charcoal bed filters must provide filtration for hazardous materials (ammonia) at concentrations up to 11,900 mg/m3 over a 10-minute period and 1,980 mg/m3 over a one-hour period. Filters must have an efficiency of 99.95 % when tested in-situ.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.20.3 The HEPA filter sizing is based on 24590-PTF-MAC-C1V-00002 Rev. C. The control room ventilation function in the post seismic DBE environment is independent of the other ventilation systems.
Ventilation System - Instrumentation and Control							
Provide system status instrumentation and / or alarms	Applies	Applies	Applies	Address key information to ensure system operability (e.g., system delta-P, filter pressure drop)	ASME AG-1 DOE-HDBK-1169 ASHRAE Design Guide (Section 4)	C5V - Fan motor speed, differential pressure across each fan, and total discharge air flowrate are monitored. Differential pressure transmitters are provided for remote monitoring of filter loading. A radiation monitoring and sampling system is downstream of the C5 exhaust fans in the effluent steam. The C5V has two sources of normal power as well as emergency diesel generator (EDG) power.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 2.6.5, 2.7.3, 4.3.2.1.4, 4.3.2.3, 4.3.2.4.3, 4.3.2.4.4, 4.3.2.5.3, 4.3.2.5.4
						PVV/PVP - Differential pressure transmitters are provided for remote monitoring of filter loading. A radiation monitoring and sampling system is downstream of the C5 exhaust fans in the effluent stream. The fan controls do not have a credited safety function, since when the system pressurizes it vents to the C5V. The fans do have non-ITS controls similar to C5V. The PVV/PVP has two sources of normal power.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Sections 2.6.4.2, 4.3.12.2, 4.3.12.3, 4.3.11.4.3, Table 4A-1

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA

EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						PJV - The credited function is to provide an open path to the environment through the HEPA filters so no fan controls are credited. The humidity in the system will not exceed 100% so no active controls for filter loading by moisture is required. Aerosol buildup occurs over an extended period of time so there are active credited safety controls. However, there are process controls and dp monitoring of the fans and HEPA.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 4.3.19.1 to 4.3.19.5
						Control Building Ventilation - The implementation of the control room ventilation is only addressed generally in the PSAR at this time, but is similar to C5V and is being implemented in the design similarly.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 2.4.19.1, 4.3.20
Interlock supply and exhaust fans to prevent positive pressure differential	Applies	Applies	Applies		DOE-HDBK-1169 ASHRAE Design Guide (Section 4)	C5V - Upon shutdown of the C5V exhaust fans, an interlock must trip C3V and C2V exhaust fans, and C2V supply fans to minimize backflow into C2 and C3 areas.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Table 3A-8
						PVV/PVP – not applicable. This is a process-related system. If the system pressurizes it is designed to vent to C5V.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.12.2
						PJV – not applicable. This is a process-related system.	
						Control Building Ventilation - the system maintains a positive pressure with respect to other areas.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.20.3
Post accident indication of filter break-through	Applies	Applies	Does Not Apply	Instrumentation supports post accident planning and response; should be considered critical instrumentation for SC	TECH-34	C5V -. Differential pressure transmitters are provided for remote monitoring of filter loading. A radiation monitoring and sampling system is downstream of the C5 exhaust fans in the effluent stream.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 4.3.2.3, 4.3.2.4.4, 2.7.3.4, 2.7.4.1, 2.7.4.6, 2.7.5
						PVV/PVP -. Differential pressure transmitters are provided for remote monitoring of filter loading. A radiation monitoring and sampling system is downstream of the C5 exhaust fans in the effluent stream.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 4.3.12.4.3, 2.7.3.4, 2.7.4.1, 2.7.4.6, 2.7.5

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA							
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						PJV - The credited function is to provide an open path to the environment through the HEPA filters. Projected loading of the HEPA filter will occur over long periods of time. Thus only non-ITS monitoring of the HEPA filter dp is planned. This system does have a preheater to extend filter life, but the stream will not exceed 100% humidity.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 2.7.3.4, 2.7.4.1, 2.7.4.6, 2.7.5
						Control Building Ventilation - The implementation of the control room ventilation is only addressed generally in the PSAR at this time, but is similar to C5V and is being implemented in the design similarly.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 2.4.19.1, 4.3.20
Reliability of control system to maintain confinement function under normal, abnormal, and accident conditions	Applies	Applies	Applies	Address, for example, impacts of potential common mode failures from events that would require active confinement function.	DOE-HDBK-1169 (2.4)	C5V - ISA S84.01 is applied to all automatically actuated safety instrumented systems, to provide the guidance to ensure the required reliability of those systems. IEEE 338 supplements ISA S84.01 in designing safety instrumented systems so they can be tested to prove that they adequately perform their required safety function. IEEE 344 is applied to safety instrumented systems required to function during or after a seismic event. IEEE 379 is applied to safety instrumented systems to supplement ISA S84.01 for ensuring that these systems meet the single-failure criterion. IEEE 384 is applied to ensure independence of safety instrumentation from normal control functions. IEEE 1023 is applied to all safety functions requiring indication and/or alarm at a safety qualified operator interface.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.2.4.4

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA							
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						PVV/PVP system - ISA S84.01 is applied to all automatically actuated safety instrumented systems, to provide the guidance to ensure the required reliability of those systems. IEEE 338 supplements ISA S84.01 in designing safety instrumented systems so they can be tested to prove that they adequately perform their required safety function. IEEE 344 is applied to safety instrumented systems required to function during or after a seismic event. IEEE 379 is applied to safety instrumented systems to supplement ISA S84.01 for ensuring that these systems meet the single-failure criterion. IEEE 384 is applied to safety instrumented systems to supplement ISA S84.01 with respect to design considerations for multiple-channel safety systems. IEEE 1023 is applied to all safety functions requiring indication and/or alarm at a safety qualified operator interface.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.12.4.3
						PJV system – the system has no SC or SS instrumentation.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.19
						Control Building Ventilation - The control and instrumentation requirements for supply fan safety controls are specified in accordance with ISA S84.01, IEEE 338, IEEE 344, IEEE 379, IEEE 384, and IEEE 1023.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.20.4
Control components should fail safe	Applies	Applies	Applies		DOE-HDBK-1169 (2.4)	C5V - The system is designed so that active components fail to the safe state. This is shown on the applicable V&IDs. Safety class equipment is required to meet the single failure criteria consistent with the SRD requirements.	SRD (24590-WTP-SRD-ESH-01-001-02, Rev 4) Appendix B, Table 1.
						PVV/PVP- The system is designed so that active components fail to the safe state. This is shown on the applicable V&IDs/P&IDs.	
						PJV - The system is designed so that active components fail to the safe state. This is shown on the applicable V&IDs/P&IDs.	

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA							
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						Control Building Ventilation - The system is designed so that active components fail to the safe state. This is shown on the applicable V&IDs. Safety class equipment is required to meet the single failure criteria consistent with the SRD requirements.	SRD (24590-WTP-SRD-ESH-01-001-02, Rev 4) Appendix B, Table 1.
Resistance to Internal Events - Fire							
Confinement ventilation systems should withstand credible fire events and be able to operate and maintain confinement	Applies	Applies	Does Not Apply	**Required for new facilities;** as required by the accident analysis for existing facilities (discretionary). Must address protection of filter media.	DOE-HDBK-1169 (10.1) DOE-STD-1066	Fire barriers provide confinement of fires to protect the structural integrity of the C5 ventilation boundary and to protect the redundant SC components from being impacted by the same fire. Isolation dampers are provided to prevent smoke from C2/C3 areas from entering the C5 areas. Fire suppression features inside HEPA filter housings will be consistent with the safety basis and fire hazards analysis. Fire suppression features inside HEPA filter housings have not been provided. This is a discussion item underway with DOE.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 2.7.7.5
Confinement ventilation systems should not propagate spread of fire	Applies	Applies	Applies	**Required for new facilities;** as required by the accident analysis for existing facilities (discretionary). Address fire barriers, fire dampers arrangement.	DOE-HDBK-1169 (10.1) DOE-STD-1066	A Preliminary Fire Hazard Analysis has been prepared for PT facility that discusses fire protection features of the facility.	24590-PTF-RPT-ESH-02-001, Rev 2, Section 3.6 and 24590-PTF-RPT-ESH-02-001.
Resistance to External Events - Natural Phenomena - Seismic							
Confinement ventilation systems should safely withstand earthquakes	Applies	Applies	Does Not Apply	If the active CVS system is not credited in a seismic accident condition there is no need to evaluate that performance and / or design attribute for the confinement ventilation system (discretionary). Also, any seismic impact on the confinement ventilation system performance will be based on the current functional requirements in the DSA. NOTE: Seismic requirements may apply to Defense-in-Depth items indirectly for the	ASME AG-1 AA DOE O420.1B DOE-HDBK-1169 (9.2)	The confinement ventilation systems at WTP are designed to withstand earthquake loads as follows. C5V - Seismic Category - I	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.2.3
						PVV/PVP – SSCs with an SC safety function are designated as SC-I and SS safety functions are designated as SC-III. The system is not credited to function following the post seismic DBE. Portions of the system are credited to maintain confinement.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.12.3, Table 3A-13
						PJV - SSCs with an SC safety function are designated as SC-I. The active function of this system is not credited to function following the post seismic DBE.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.19.3, Table 3A-13

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA							
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
				protection of safety SSCs.		Control Building Ventilation system - The Control Building ventilation SSCs are designated SC-I.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 4.3.20.3, Table 3A-13
Resistance to External Events - Natural Phenomena - Tornado / Wind							
Confinement ventilation system should safely withstand tornado depressurization	Applies	Applies	Does Not Apply	If the active CVS system is not credited in a tornado condition there is no need to evaluate that performance and / or design attribute for the confinement ventilation system (discretionary). Also, any tornado impact on the confinement ventilation system performance will be based on the current functional requirements in the DSA.	DOE O420.1B DOE-HDBK-1169 (9.2)	Tornados are not applicable to WTP.	24590-WTP-SRD-ESH-01-001-02, SC 4.1-3
Confinement ventilation system should withstand design wind effects on system performance	Applies	Applies	Does Not Apply	If the active CVS is not credited in a wind condition there is no need to evaluate performance and / or design attribute for the confinement ventilation system (discretionary). Also, any wind impact on the confinement ventilation system performance will be based on the current NP analysis in the DSA.	DOE O420.1B DOE-HDBK-1169 (9.2)	The facility structure is credited to meet the NPH criteria including wind, and the equipment is all contained within the structure. The wind impacts on the ventilation system have been evaluated and addressed consistent with the applicable NPH criteria for the various systems. The system is being designed to minimize the impact of wind.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 2.4.2, 4.3.1.1, 4.3.1.3, 4.3.1.4, 4.3.2.4.1, 4.3.19.4, Mechanical System Instruction No. 12 (Design guidelines for ARV System), and CCN 146400
Other NP Events (e.g., flooding, precipitation)							
Confinement ventilation system should withstand other NP events considered credible in the DSA where the confinement ventilation system is credited	Applies	Applies	Does Not Apply	If the active confinement ventilation system is not credited for this event there is no need to evaluate that performance and / or design attribute for the confinement ventilation system (discretionary). Also, any wind impact on the confinement ventilation system performance will be based on the current NP analysis in the DSA.	DOE O420.1B DOE-HDBK-1169 (9.2)	Other natural phenomena are required to be applied to the design depending on the safety classification of the SSC.	24590-WTP-SRD-ESH-01-001-02, SC 4.1-3
Range Fires / Dust Storms							
Administrative controls should be established to protect confinement ventilation systems from barrier threatening events	Applies	Applies	Does Not Apply	Ensure appropriately thought out response to external threat is defined (e.g., pre-fire plan)	DOE O420.1B	These controls will be addressed by the conduct of operations and the fire protection programs. The items for the conduct of operations program are still being identified by implementation of the	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 5.5.21.12, 5.5.21.5, and 24590-PTF-RPT-ESH-02-001.

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA							
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						topography and environmental qualification programs that are ongoing. The current design is addressed in the PTF Fire Hazards Analysis.	
Testability							
Design supports the periodic inspection & testing of filters and housing, and tests and inspections are conducted periodically	Applies	Applies	Applies	Ability to test for leakage per intent of N510	DOE-HDBK-1169 (2.3.8) ASME AG-1 ASME N510	Periodic testing of the C5V filters is required to verify nuclear air cleaning system efficiency.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 5.5.1
						Periodic testing of the PVV filters is required to verify system efficiency.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 5.5.2
						Periodic testing of the PJV filters is required to verify system efficiency.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 5.5.4
						Periodic testing of the control building ventilation system HEPA filters and carbon bed adsorbers is required to verify system efficiency.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, Section 5.5.15
Instrumentation required to support system operability is calibrated	Applies	Applies	Applies	Credited instrumentation should have specified calibration / surveillance requirements. Non-safety instrumentation should be calibrated as necessary to support system functionality.	DOE-HDBK-1169 (2.3.8)	Specific calibration instructions have not been established at WTP. However, as described in Section 5.5.21.7 of the PSAR, the requirement to calibrate instrumentation is provided.	24590-WTP-PSAR-ESH-01-002-02, Rev 2
Integrated system performance testing is specified and performed	Applies	Applies	Does Not Apply	Required responses assumed in the accident analysis must be periodically confirmed including any time constraints	DOE-HDBK-1169 (2.3.8)	Specific system and performance testing has not been established at WTP.	24590-WTP-PSAR-ESH-01-002-02, Rev 2
Maintenance							
Filter service life program should be established	Applies	Applies	Applies	Filter life (shelf life, service life, total life) expectancy should be determined. Consider filter environment, maximum delta-P, radiological loading, age, and potential chemical exposure.	DOE-STD-1169 (3.1 & App C)	Maintenance requirements for the ventilation systems have not been established for WTP. However, Section 5.5.21.3 of the HLW PSAR requires that a preventive maintenance program be established to ensure that all SC and SS SSCs are properly maintained so that they can effectively perform their required safety functions.	24590-WTP-PSAR-ESH-01-002-02, Rev 2
Single Failure							
Failure of one component (equipment or control) shall not affect continuous operation	Applies	Does Not Apply	Does Not Apply	Address potential failures (example failures - fan, backup power supply, switchgear)	DOE O420.1B, *Facility Safety*, Chapter I, Sec. 3.b(8)	Single failure criteria are applicable to the C5V and control building ventilation system and are being applied in the system design. A single failure analysis has not been completed for the system.	24590-WTP-SRD-ESH-01-001-02, Rev 4c, Appendix B, Section 2.1.2
Automatic backup electrical power shall be provided to all critical instruments and	Applies	Does Not Apply	Does Not Apply		DOE-HDBK-1169 (2.2.7)	The C5V and control building ventilation systems are provided with SC electrical power.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 4.3.2 and 4.3.20

TABLE 5-1 VENTILATION SYSTEM PERFORMANCE CRITERIA							
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
equipment required to operate and monitor the confinement ventilation system						PJV and PVV systems are not required to operate following a loss of offsite power event or other accident condition.	24590-WTP-PSAR-ESH-01-002-02, Rev 2, sections 4.3.12 and 4.3.19
Backup electrical power shall be provided to all critical instruments and equipment required to operate and monitor the confinement ventilation system	Does Not Apply	Applies	Does Not Apply	NOTE: Safety Class is addressed through previous line.	DOE-HDBK-1169 (2.2.7)	There are no safety significant active functions associated with the confinement systems in PT.	
Other Credited Functional Requirements							
Address any specific functional requirements for the confinement ventilation system (beyond the scope of those above) credited in the DSA	Applies	Applies	Does Not Apply		10 CFR 830, Subpart B	None.	24590-WTP-PSAR-ESH-01-002-02, Rev 2

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
Ventilation System - General Criteria							
Pressure differential should be maintained between zones and atmosphere	Applies	Applies	Applies	Number of zones as credited by accident analysis to control hazard material release; demonstrate by use considering potential in-leakage	DOE-HDBK-1169 (2.2.9) ASHRAE Design Guide	The C5V system (SC) is designed to maintain ventilated areas at a negative pressure with respect to C2 and C3 areas.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 2.6.1, 2.6.5
						The C3 canister storage ventilation system (SS) is designed to maintain areas at a negative pressure in the canister storage area.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 2.6.1, 2.6.4.2
						The HLW melter offgas (HOP/PVV) system (SS) is a process-related system and maintains confinement of the melter offgas. The offgas system is negative relative to C5V.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Table 3A-9
						The pulse ventilation treatment system (PJV) will collect, contain, filter, monitor, and discharge exhaust air from fluidics equipment, and prevent release of contaminants to controlled spaces. However, the safety significant function of the HEPA filters is to support normal operations. The APC safety function of the pulse ventilation treatment system is to maintain airflow from the pulsejet mixers as part of solids mixing	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 2.4.19.1, 4.4.18
Materials of construction should be appropriate for normal, abnormal and accident conditions	Applies	Applies	Applies		DOE HDBK-1169 (2.2.5) ASME AG-1	The C5V filter housing and ductwork will be constructed of corrosion-resistant materials.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 2.6.5, 4.3.5.4
						C3 canister storage area ventilation - The filter housing and ductwork of the C3 canister storage exhaust system are fabricated from corrosion-resistant materials.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.20.4
						HLW melter offgas (HOP/PVV) system - The filter housing and piping/ductwork of the offgas treatment system are corrosion-resistant.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.3.4
						PCJ - The filter housing and piping/ductwork of the pulse ventilation treatment system are designed of corrosion-resistant materials.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.18.4
Exhaust system should withstand normal, abnormal and accident system conditions and maintain confinement integrity.	Applies	Applies	Applies	As required by accident analysis to prevent accident release	DOE-HDBK-1169 (2.4) ASHRAE Design Guide	The C5 ventilation system including cells, caves, and tunnels are designed to maintain cascade airflow from areas of lower to higher contamination levels for normal operations, loss of offsite power, single fan train failure, and high winds.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 3.4.2.2.1

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
Confinement ventilation system will have appropriate filtration to minimize release	Applies	Applies	Applies	Address: 1) type of filter (e.g., HEPA, sand, sintered metal); 2) Filter sizing (flow capacity and pressure drop); 3) Decontamination factor vs. accident analysis assumptions	ASME AG-1 DOE-HDBK-1169 (2.2.1)	C5V system Filter Type - HEPA Design- The fan is designed for 51000 cfm. HEPA filter banks are designed for 7200 to 7320 cfm. Decontamination factor (DF) - C5 HEPA filter bank shall have an efficiency of at least 99.95 % when tested in-situ. The accident analysis has assumed an efficiency of 99.5% for both primary and secondary banks	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 2.6.5, 3.4.1 The filter and fan sizing in the V&IDs is based on 24590-HLW-MAC-C5V-00004 and ECCN 24590-HLW-M8E-C5V-00001. The post seismic DBE functionality of the system is addressed in calculation 24590-HLW-M8C-C5V-00011.
						C3 Canister Storage Area Ventilation Filter Type - HEPA Design - The fan is designed for 10280 cfm. HEPA filter banks are designed for 5240 cfm. DF - Each C3 canister storage area ventilation exhaust system HEPA filter bank shall have an efficiency of at least 99.95 % when tested in-situ. The accident analysis has assumed an efficiency of 99.5% for the filter bank.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 4.4.20.5, 5.5.2 The filter and fan sizing in the V&IDs is based on 24590-HLW-MAC-C5V-00004 and ECCN 24590-HLW-M8E-C5V-00001. This system is not credited to function following a seismic DBE.
						Melter Offgas (HOP/PVV) Filter Type - HEPA Design - The fan is designed for booster fans at 1600/fan and for exhaust fan at 1785 cfm/per fan. HEPA filter banks are designed for 4000 cfm. DF - Each melter offgas system HEPA filter bank shall have an efficiency of at least 99.95 % when tested in-situ. The accident analysis has assumed an efficiency of 99.5% for the filter bank.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 4.4.4.3, 5.5.5 The offgas (i.e., HOP/PVV) system filter and fan sizing is based on 24590-HLW-MKC-HOP-00009. This system is not credited to function following a seismic DBE.
						PJV Filter Type - HEPA Design - The fan is designed 5000 cfm. HEPA filter banks are designed for 10,000 cfm. DF - Each PJV HEPA filter bank shall have an efficiency of at least 99.95 % when tested in-situ. The accident analysis has assumed an efficiency of 99.5% for the filter bank.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 4.4.18.3, 5.5.11 The PJV filter sizing is based on 24590-HLW-MAC-PJV-00002. (Fans are addressed in 24590-HLW-M4C-PJV-00001.) This system is not credited to function following a seismic DBE.
Ventilation System - Instrumentation and Control							

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
Provide system status instrumentation and / or alarms	Applies	Applies	Applies	Address key information to ensure system operability (e.g., system delta-P, filter pressure drop)	ASME AG-1 DOE-HDBK-1169 ASHRAE Design Guide (section 4)	C5V - Fan motor speed, fan speed, bearing temperature, differential pressure (dp) across each fan, and total discharge air flowrate are monitored. A radiation monitoring and sampling system is downstream of the C5 exhaust fans in the effluent stream. The C5V has two sources of normal power as well as emergency diesel generator (EDG) power. There is currently non-ITS monitoring of dp across individual HEPA filter banks. Because of potential filter loading concerns, ISM meetings are ongoing that are projected to add ITS dp monitoring for the C5V HEPA filters.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 2.6.5, 2.7.3, CCN 143124
						C3 canister storage area ventilation - Fan motor speed, differential pressure across each fan, and fan discharge flow are monitored. The fans are on the ITS power system. Aerosol buildup occurs over an extended period of time so there are no active credited safety controls. However, there are process controls and dp monitoring of the fans and HEPA.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 2.6.4.2
						Melter Offgas (HOP/PVV) - Fan motor speed, differential pressure (dp) across each fan, and total discharge air flowrate (flow rate is non-ITS) are monitored. A radiation monitoring and sampling system is downstream of the C5 exhaust fans in the effluent stream. The C5V has two sources of normal power as well as emergency diesel generator (EDG) power. The system also has ITS dp alarms (that shut off the fans on high-high dp) and ITS temperature monitoring to shut off the preheater if the high temperature limit is exceeded. There are also ITS ammonia controls for the secondary offgas treatment system. This system also has ITS controls to address fires in the carbon beds (CO detection and isolation of the bed from oxygen sources). Also, there is ITS temperature monitoring for the bed.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Various subsections of 4.4.3, ABAR 24590-WTP-SE-ENS-05-171

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						PJV - Non-ITS Monitoring will be provided for the following parameters: • Temperature of fluidics emissions • Temperature downstream of heater • System pressure • HEPA filter differential pressure • Flow rate Projected loading of the HEPA filter will occur over long periods of time. Non-ITS monitoring of HEPA filter dp is planned. This system does have a preheater to extend filter life, but the stream will not exceed 100% humidity.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 2.4.19.1, Table 3A-9
Interlock supply and exhaust fans to prevent positive pressure differential	Applies	Applies	Applies		DOE-HDBK-1169 ASHRAE Design Guide (Section 4)	C5V - Cascade trip system will trip C3 cascade and C2 supply and exhaust fans if C5 exhaust fans shut down. Cascade trip on loss of zone depression is based on dp between zones.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 3.3.5.2.9, ABAR 24590-WTP-SE-ENS-06-071
						C3 Canister Storage ventilation system - Cascade trip of C3 canister storage supply upon C3 canister storage exhaust fans failure based on C3 canister storage zone to zone C2 pressure differential.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 3.3.5.2.9
						Melter Offgas (HOP/PVV) - Not applicable as this is a process-related system. In the event of system failure, this system will vent to C5V.	
						PJV - Not applicable as this is a process-related system.	

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
Post accident indication of filter break-through	Applies	Applies	Does Not Apply	Instrumentation supports post accident planning and response; should be considered critical instrumentation for SC	TECH-34	C5V - Fan motor speed, fan speed, bearing temperature, differential pressure (dp) across each fan, and total discharge air flowrate are monitored. Differential pressure transmitters are provided for remote monitoring of system performance. A radiation monitoring and sampling system is downstream of the C5 exhaust fans in the effluent stream. The C5V has two sources of normal power as well as emergency diesel generator (EDG) power. There is currently non-ITS monitoring of dp across individual HEPA filters. Because of potential filter loading concerns, ISM meetings (see CCN 153124) are ongoing that are projected to add ITS dp monitoring for the C5V HEPA filters.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 2.7.3, 2.7.6, 4.3.5.3, 4.3.5.5, 5.5.1, ABAR 24590-WTP-SE-ENS-06-071, CCN 153124.
						C3 Canister Storage ventilation system Fan motor speed, fan speed, bearing temperature, flow through each fan, air flowrate are monitored. Differential pressure transmitters are provided for remote monitoring of system performance but are non-ITS. A radiation monitoring and sampling system is downstream of the exhaust fans in the effluent stream. Projected loading of the HEPA filter will occur over long periods of time. Non-ITS monitoring of the HEPA filter dp is planned.	
						Melter Offgas (HOP/PVV) - Fan motor speed, differential pressure (dp) across each fan, and total discharge air flowrate are monitored. A radiation monitoring and sampling system is downstream of the C5 exhaust fans in the effluent stream. The system also has ITS dp alarms (that shut off the fans on high-high dp).	See ABAR 24590-WTP-SE-ENS-05-0171 and applicable P&IDs/V&IDs

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						PJV - Fan motor speed, fan speed, bearing temperature, flow through each fan, air flowrate are monitored. Differential pressure transmitters are provided for remote monitoring of system performance but are non-ITS. A radiation monitoring and sampling system is downstream of the exhaust fans in the effluent stream. Projected loading of the HEPA filter will occur over long periods of time. Non-ITS monitoring of the HEPA filter dp is planned. This system does have a preheater to extend filter life, but the stream will not exceed 100% humidity.	
Reliability of control system to maintain confinement function under normal, abnormal and accident conditions	Applies	Applies	Applies	Address, for example, impacts of potential common mode failures from events that would require active confinement function.	DOE-HDBK-1169 (2.4)	C5V - ISA S84.01 is applied for all automatically executed safety instrumented systems, to provide the guidance to ensure the required reliability of those systems. A tailored version of IEEE 338 supplements ISA S84.01 in designing safety instrumented systems so they can be tested to prove that they adequately perform their required safety functions. A tailored version of IEEE 344 is applied to those safety instrumented systems required to function during and (or) after a seismic event. A tailored version of IEEE 379 is applied to safety instrumented systems to supplement ISA S84.01 in design considerations ensuring that the single failure criterion of those systems is met. A tailored version of IEEE 384 is applied to safety instrumented systems to supplement ISA S84.01 in design considerations for independence of multiple-channel safety systems. Finally, a tailored version of IEEE 1023 is applied to all safety functions requiring indication and/or alarm at a safety qualified operator interface.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.3.5.5

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						C3 canister storage area ventilation - ISA S84.01 is applied for all automatically executed safety instrumented systems to provide the guidance to ensure the required reliability of those systems. A tailored version of IEEE 338 supplements ISA S84.01 in designing safety instrumented systems so they can be tested to prove that they adequately perform their required safety functions. Finally, a tailored version of IEEE 1023 is applied to all safety functions requiring indication and/or alarm at a safety qualified operator interface.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.20.5
						Melter Offgas (HOP/PVV) - The design of the SS fans uses ISA S84.01 for all automatically executed safety instrumented systems to provide the necessary guidance to ensure the required reliability of those systems. A tailored version of IEEE 338 is applied to supplement ISA S84.01 in designing safety instrumented systems so they can be tested to prove that the adequately perform their required safety functions. A tailored version of IEEE 1023 is applied to all safety functions requiring indication and/or alarm at a safety-qualified operator interface.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.3.5
						PJV - Because of the very limited source term that will be present in this system, the system is APC. Fan motor speed, flow through each fan, air flowrate are monitored. Differential pressure transmitters are provided for remote monitoring of system performance but are non-ITS. A radiation monitoring and sampling system is downstream of the exhaust fans in the effluent stream. Projected loading of the HEPA filter will occur over long periods of time. Non-ITS monitoring of the HEPA filter dp is planned. This system does have a preheater to extend filter life, but the stream will not exceed 100% humidity.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Table 3A-9

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
Control components should fail safe	Applies	Applies	Applies		DOE-HDBK-1169 (2.4)	This is documented in the applicable V&IDs/P&IDs, which are reviewed against the requirements in the PSAR. SRD (24590-WTP-SRD-ESH-01-001-02, Rev 4) Appendix B, Table 1 requires that this system meet single failure.	SRD (24590-WTP-SRD-ESH-01-001-02, Rev 4) Appendix B, Table 1.
						C3V Canister Storage - The system is designed for active components to fail to the safe state. This is shown on the applicable P&IDs.	
						HOP/PVVV - The system is design so that active components fail to the safe state. This is shown on the applicable V&IDs/P&IDs.	
						PJV- The system is designed so that active components fail to the safe state. This is shown on the applicable V&IDs/P&IDs.	
Resistance to Internal Events - Fire							
Confinement ventilation systems should withstand credible fire events and be able to operate and maintain confinement	Applies	Applies	Does Not Apply	**Required for new facilities;** as required by the accident analysis for existing facilities (discretionary). Must address protection of filter media.	DOE-HDBK-1169 (10.1) DOE-STD-1066	Fire barriers provide confinement of fires to protect the structural integrity of the C5 ventilation boundary and to protect the redundant SC components from being impacted by the same fire. Isolation dampers are provided to limit smoke from C2/C3 areas from entering the C5 areas. Fire suppression features inside HEPA filter housings will be consistent with the safety basis and fire hazards analysis. Fire suppression features inside HEPA filter housings have not been provided. This is a discussion item underway with DOE.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 4.3.4.3 and 2.7.1.5 and 24590-HLW-RPT-ESH-01-001
Confinement ventilation systems should not propagate spread of fire	Applies	Applies	Applies	**Required for new facilities;** as required by the accident analysis for existing facilities (discretionary). Address fire barriers, fire dampers arrangement.	DOE-HDBK-1169 (10.1) DOE-STD-1066	A Preliminary Fire Hazard Analysis has been prepared for HLW that discusses fire protection features of the facility.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 3.6 and 24590-HLW-RPT-ESH-01-001
Resistance to External Events - Natural Phenomena - Seismic							
Confinement ventilation systems should safely withstand earthquakes	Applies	Applies	Does Not Apply	If the active CVS system is not credited in a seismic accident condition there is no need to evaluate that performance and /	ASME AG-1 AA DOE O420.1B DOE-HDBK-1169 (9.2)	The confinement ventilation systems at WTP are designed to withstand earthquake loads as follows. C5V - Seismic Category - I or SC-II	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.3.5.3, Table 3A-10

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
				or design attribute for the confinement ventilation system (discretionary). Also, any seismic impact on the confinement ventilation system performance will be based on the current functional requirements in the DSA. NOTE: Seismic requirements may apply to Defense-in-Depth items indirectly for the protection of safety SSCs.		C3V – The system is designed to meet SC-III requirements.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.20.3, Table 3A-10
						Melter Offgas (HOP/PVV) - The offgas treatment system filters and housing in the filter cave and offgas piping interfacing with the filter cave are designed to SC-I standards. The portions of the offgas system upstream of the filters and downstream of the filters are designed to SC-III standards.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.3.3, Table 3A-10
						PJV - The pulse ventilation treatment system ductwork/piping is not credited to operate after a seismic event. The Pulse Vent filters and housing in the Filter Cave and offgas ductwork interfacing with the Filter Cave are SC- III.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.18.3 and Table 3A-10.
Resistance to External Events - Natural Phenomena - Tornado / Wind							
Confinement ventilation system should safely withstand tornado depressurization	Applies	Applies	Does Not Apply	If the active CVS system is not credited in a tornado condition there is no need to evaluate that performance and / or design attribute for the confinement ventilation system (discretionary). Also, any tornado impact on the confinement ventilation system performance will be based on the current functional requirements in the DSA.	DOE O420.1B DOE-HDBK-1169 (9.2)	Tornados are not applicable to WTP.	24590-WTP-SRD-ESH-01-001-02, SC-4.1-3
Confinement ventilation system should withstand design wind effects on system performance	Applies	Applies	Does Not Apply	If the active CVS is not credited in a wind condition there is no need to evaluate performance and / or design attribute for the confinement ventilation system (discretionary). Also, any wind impact on the confinement ventilation system performance will be based on the current NP analysis in the DSA.	DOE O420.1B DOE-HDBK-1169 (9.2)	The facility structure is credited to meet the NPH criteria including wind, and the equipment is all contained within the structure. The wind impacts on the ventilation system have been evaluated and addressed consistent with the applicable NPH criteria for the various systems. The system is being designed to minimize the impact of wind. For equipment located outside, the NPH criteria will be implemented as part of the environmental conditions for the equipment. Because of the size of the facility, this includes the application of the wind-driven missile criteria to items	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 2.4.2, 4.3.1.1, 4.3.1.3, 4.3.1.4, 4.4.3.5, CCN 116400, Mechanical System Instruction No. 12 (Design guidelines for ARV System), CCN 140974

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
						located on the facility roof.	
Other NP Events (e.g., flooding, precipitation)							
Confinement ventilation system should withstand other NP events considered credible in the DSA where the confinement ventilation system is credited	Applies	Applies	Does Not Apply	If the active confinement ventilation system is not credited for this event there is no need to evaluate that performance and / or design attribute for the confinement ventilation system (discretionary). Also, any wind impact on the confinement ventilation system performance will be based on the current NP analysis in the DSA.	DOE O420.1B DOE-HDBK-1169 (9.2)	Other natural phenomena are required to be applied to the design depending on the safety classification of the SSC.	24590-WTP-SRD-ESH-01-001-02, SC-4.1-3
Range Fires / Dust Storms							
Administrative controls should be established to protect confinement ventilation systems from barrier threatening events	Applies	Applies	Does Not Apply	Ensure appropriately thought out response to external threat is defined (e.g., pre-fire plan)	DOE O420.1B	These controls will be addressed by the conduct of operations and the fire protection programs. The items for the conduct of operations program are still being identified by implementation of the topography and environmental qualification programs that are ongoing. The current design is addressed in the HLW Fire Hazards Analysis.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, sections 5.5.13.6, 5.5.13.9, and 24590-HLW-RPT-ESH-01-001
Testability							
Design supports the periodic inspection & testing of filters and housing, and tests and inspections are conducted periodically	Applies	Applies	Applies	Ability to test for leakage per intent of N510	DOE-HDBK-1169 (2.3.8) ASME AG-1 ASME N510	Periodic testing of the C5V filters is required to verify nuclear air cleaning system efficiency.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 5.5.1
						Periodic testing of the C3 canister storage area ventilation filters is required to verify system efficiency.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 5.5.2
						Periodic testing of the C5V filters is required to verify system efficiency.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 5.5.5
						Periodic testing of the pulse jet ventilation system filters is required to system filter efficiency.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 5.5.11
Instrumentation required to support system operability is calibrated	Applies	Applies	Applies	Credited instrumentation should have specified calibration / surveillance requirements. Non-safety instrumentation should be calibrated as necessary to support system functionality.	DOE-HDBK-1169 (2.3.8)	Specific calibration instructions have not been established at WTP. However, as described in Section 5.5.13.7 of the PSAR, the requirement to calibrate instrumentation is provided.	24590-WTP-PSAR-ESH-01-002-04, Rev 2
Integrated system performance testing is specified and performed	Applies	Applies	Does Not Apply	Required responses assumed in the accident analysis must be periodically confirmed including any time constraints.	DOE-HDBK-1169 (2.3.8)	Specific system and performance testing has not been established at WTP.	24590-WTP-PSAR-ESH-01-002-04, Rev 2
Maintenance							
Filter service life program should	Applies	Applies	Applies	Filter life (shelf life, service life,	DOE-STD-1169 (3.1 & App	Maintenance requirements for the	24590-WTP-PSAR-ESH-01-002-04,

TABLE 5-1					VENTILATION SYSTEM PERFORMANCE CRITERIA		
EVALUATION CRITERIA	SAFETY CLASS	SAFETY SIGNIFICANT	DEFENSE-IN-DEPTH / OTHER	DISCUSSION	REFERENCE	WTP EVALUATION	WTP REFERENCE
be established				total life) expectancy should be determined. Consider filter environment, maximum delta-P, radiological loading, age, and potential chemical exposure.	C)	ventilation systems have not been established for WTP. However, Section 5.5.13.3 of the HLW PSAR requires that a preventive maintenance program be established to ensure that all SC and SS SSCs are properly maintained so that they can effectively perform their required safety functions.	Rev 2
Single Failure							
Failure of one component (equipment or control) shall not affect continuous operation	Applies	Does Not Apply	Does Not Apply	Address potential failures (example failures - fan, backup power supply, switchgear)	DOE O420.1B, *Facility Safety*, Chapter I, Sec. 3.b(8)	Single failure criteria are applicable to the C5V system and are being applied in the system design. A single failure analysis has not been completed for the system. Single failure criteria are considered for safety significant systems which include the C3 Canister storage ventilation system, the melter offgas system, and the pulse jet ventilation system.	24590-WTP-SRD-ESH-01-001-02, Rev 4c, Appendix B, Section 2.1.2
Automatic backup electrical power shall be provided to all critical instruments and equipment required to operate and monitor the confinement ventilation system	Applies	Does Not Apply	Does Not Apply		DOE-HDBK-1169 (2.2.7)	C5V system - Continuous operation during loss of site power is provided by the plant emergency power system.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.3.5.5
Backup electrical power shall be provided to all critical instruments and equipment required to operate and monitor the confinement ventilation system	Does Not Apply	Applies	Does Not Apply	NOTE: Safety Class is addressed through previous line.	DOE-HDBK-1169 (2.2.7)	C3 canister storage area ventilation - The exhaust fans and safety controls loop require SS power	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.20.3
						Melter offgas (HOP/PVV) system - The offgas treatment system is supplied SS power, including emergency power.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.3.3
						PJV - does not perform an active SS function.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.18
Other Credited Functional Requirements							
Address any specific functional requirements for the confinement ventilation system (beyond the scope of those above) credited in the DSA	Applies	Applies	Does Not Apply		10 CFR 830, Subpart B	C5V performs an ITS cooling function to mitigate the impact of the local thermal generation on the concrete structure.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 2.6.5
						The C3 canister storage exhaust system performs an ITS cooling function to mitigate the impact of the local thermal generation on the concrete structure.	24590-WTP-PSAR-ESH-01-002-04, Rev 2, Section 4.4.20.1