REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.:	**235-8275**
SRP Section:	**12.03 – 12.04 – Radiation Protection Design Features**
Application Section:	**12.03 – 12.04**
Date of RAI Issue:	**10/07/2015**

Question No. 12.03-46

10 CFR 50.48 requires that the risk of fire-induced radiological hazards to the public, environment, and personnel are minimized and Regulatory Guide 1.189 states that the plant should maintain the ability to minimize the potential for radioactive releases to the environment in the event of a fire and that radioactive waste buildings, storage areas, and decontamination areas should be separated from other areas of the plant by fire barriers having at least 3-hour ratings.

FSAR Section 9.5.1.2.1 indicates that radioactive waste areas, storage areas, and decontamination areas are separated from other areas of the plant by fire barriers having at least a 3-hour rating. However, the identification of radiological areas and analysis to ensure that the radiological risk to the public, environment, and personnel are minimized appears to be incomplete and inaccurate. For one example, FSAR Section 9.5A.3.6.4, discusses the fire area F000-RW, which encompasses several fire zones and includes significant radiation sources in the Compound Building such as the charcoal delay beds and spent resin long-term storage tank. However, the radioactive release analysis for this area indicates that it is not a radiological area and does not even discuss significant radiation sources like the charcoal delay beds or spent resin long-term storage tank.

Please provide a fire hazard analysis and plant design appropriate to ensure that the risk of fire-induced radiological hazards to the public, environment, and personnel are minimized in accordance with 10 CFR 50.48 and Regulatory Guide 1.189, for radiological hazards other than the reactor, and update the FSAR, as appropriate.

Response – (Rev. 1)

The fire area F000-RW in the Compound Building includes several rooms such as the spent resin long-term storage tank room and the charcoal delay bed rooms. The spent resin and the charcoal delay bed include radioactive materials that need to be prevented from releasing to environment.

Therefore, in DCD Section 9.5A.3.6.4, the phrase “radioactive release analysis” of this fire area was revised as shown in Attachment 1.

The spent resin is stored in the spent resin long-term storage tank in the wet condition, which is composed of spent resin and water. These spent resin tanks are located at the enclosed, controlled-access storage area. There is no ignition source in the spent resin long-term storage tank room. Thus it can be credited the radioactive materials contained in the spent resin are not released to the environment since the possibility of fire occurrence is eliminated by the fire hazard analysis.

For the charcoal delay bed rooms of the GWMS (Gaseous Waste Management System), it is not realistic to assume the fire damage of the charcoal due to exposed fire outside the charcoal delay bed rooms. There is no combustible material inside the charcoal delay bed rooms except for the charcoal in the delay beds. As shown in the Figure 9.5A-21, which is provided in Attachment 2. There is no large opening to allow propagation of fire from outside the room into these rooms. The access openings to the charcoal delay bed rooms for maintenance are normally closed by removable slabs, which do not allow propagation of fire. Thus, the possibility of exposure to direct flame by a postulated fire outside of the charcoal delay bed rooms is eliminated in the fire hazard analysis. Furthermore, potential fire in the charcoal delay beds can be eliminated by the fire prevention design of GWMS as is described in response No.1 to RAI 205-8230, Question No. 11.03-5 (ML16116A390).

Supplemental Questions and Responses

June 29, 2016 NRC Feedback

NRC Feedback

In the response to RAI 8275, Question 12.03-46, the applicant makes changes to Section 9.5A.3.6.4, however, Section 9.5A.3.6.4 is referred to in the question only as an example of an area that was deficient (the RAI indicates that Section 9.5A.3.6.4 is just an example of one deficient area). The applicant was expected to review all of 9.5A and correct other similar errors and provide additional information on how they were addressing radiological hazards in the fire analysis. Specific comments to help the applicant satisfactorily address the original RAI question adequately are as follows:

1. In the proposed addition to the radiological analysis in Section 9.5A.3.6.4 it should state that (underlined words added), “This fire area is a radiological area, due to radiological sources such as the charcoal delay beds and spent resin long-term storage tank containing radiological material.” Since the Compound Building contains many sources other than just the two source mentioned. In addition, since the Compound Building contains radwaste storage areas that could contain flammable material, they should be addressed in this section as well, or included in the DCD elsewhere under item 3 below.

KHNP Response

The underlined words are added to related sentence in Section 9.5A.3.6.4. Other radiological sources such as spent filter, spent resin, R/O(Reverse Osmosis)

membrane, R/O concentrate, dry active waste, ion exchanger or resins other than the two original sources (i.e. charcoal delay beds and spent resin long-term storage tank) are addressed according to comments. These will be incorporated as shown in Attachment 1("Radioactive Release Analysis" part of Section 9.5A.3.6.4).

NRC Feedback

2. While in the response to RAI 8022, Question 09.05.01-30, the applicant removed numerous inconsistencies regarding if an area is a radiological area or not, numerous other "radioactive release analysis" sections of 9.5A were not fixed. Specifically, there are still numerous sections in DCD 9.5A that indicate that the area is not a radiological area and that the piping in the area does not contain fluids with radiological content, when in reality, the equipment is radioactive, sometimes containing significant radioactivity (such as mechanical penetration areas, the volume control tank area, and other CVCS and radioactive system piping areas). The applicant is requested to review all areas and remove this inaccurate information. In replacing the inaccurate information, it may be acceptable in many cases to simply refer to a separate section which discusses fire protection of radiological sources in general, instead of providing specific information for each in each section (as discussed in item 3 below).

KHNP Response

Fire areas, including the mechanical penetration areas, the volume control tank area, and other CVCS and radioactive system piping area in the "Radioactive Release Analysis" sections will be revised to consider the effect on the release of radioactive materials. These will be incorporated as shown in Attachment 3.

NRC Feedback

3. RG 1.189 contains numerous discussions of design features and operational considerations for controlling radiological releases from radiation sources throughout the plant (beyond just the reactor core). In some cases, it does not appear that APR1400 DCD adequately addresses this information from in the RG. This can be done by adding a section to Section 9.5A or possibly adding information to DCD Table 9.5.1-1, in lieu of updating the radiological discussion to each individual relevant section. Relevant quotes from RG 1.189, which do not appear to be addressed in the DCD, are provided as follows, including additional discussion of information needed in bold, when necessary:

   From Section C.1.2 - Explosion-prevention measures in areas subject to potentially explosive environments from flammable gases or other potentially energetic sources (e.g., chemical treatment systems, ion exchange columns, high-voltage electrical equipment) should be listed. **(There does not appear to any discussion of controlling flammable/explosive gases from ion exchange columns or resins. How does the design ensure that flammable/explosive conditions will be avoided)**.

KHNP Response

Ion exchanger or resins are designed to prevent the potential flammable/explosive condition from chemicals, organic materials, or detergent in liquid radwaste. As stated in DCD Tier 2, Section 11.2, the liquid radwaste will be processed by the R/O package in the LWMS, which consists of a pretreatment module, a R/O module and a demineralizer module.

Since the demineralizer module is located downstream of the pretreatment and R/O modules, the potential presence of chemicals, organic materials, or detergent in the liquid radwaste can be removed by pretreatment module and R/O module before being treated at the demineralizer module. For this reason, the demineralizer module would not be influenced from the chemicals, organic materials or detergent that may contribute to a potential flammable or explosive condition.

In addition, the detergent waste is normally released through a monitored pathway after processing by the detergent waste filter in the detergent waste subsystem; this is because the waste is unlikely to have high radioactivity. If the waste needs further treatment, the detergent waste will be transferred to the LWMS where it will be treated by pretreatment module and R/O module.

For chemicals such as decontamination waste, the waste is stored in a chemical waste tank in the LWMS. The LWMS has provisions to process such chemical waste using mobile or temporary equipment. Therefore, the LWMS is designed that the impact on demineralizer module due to chemical processing can be minimized. This information will be incorporated into Section 9.5A.3.6.4 as shown in Attachment 1.

NRC Feedback

From Section C.4.1.4 - Release of smoke and gases containing radioactive materials to the environment should be monitored in accordance with emergency plans as described in the guidelines of Regulatory Guide 1.101, “Emergency Planning and Preparedness for Nuclear Power Reactors” (Ref. 111). Any ventilation system designed to exhaust potentially radioactive smoke or gases should be evaluated to ensure that inadvertent operation or single failures will not violate the radiologically controlled areas of the plant design. This should include containment functions for protecting the public and maintaining habitability for operations personnel.

KHNP Response

Compliance with Regulatory Guide 1.101, “Emergency Planning and Preparedness for Nuclear Power Reactors” is not applicable to the APR 1400 DCD. This compliance is currently listed as a COL item (DCD Tier 2 Table 1.9-1).

The HVAC areas containing the potential radioactive materials are the controlled HVAC area of auxiliary building and the compound building. The air in these two areas is filtered and exhausted to the atmosphere through ACUs during plant normal operation. The radiation level is monitored by a radiation monitor installed at a downstream duct of the ACUs. In the event of a fire in these HVAC areas, the smoke is filtered and exhausted to the atmosphere through ACUs after suppressing the fire. The ACUs operated during normal operation in the auxiliary building controlled area consist of two normal exhaust ACUs with a100% capacity per division.

In the case of the compound building, there are two HEPA filter exhaust ACUs with a 50% capacity and two carbon adsorber exhaust ACUs with a 50% capacity. The two carbon adsorber exhaust ACUs are protected by a manually actuated deluge system. Therefore, the single failure of each ACU in auxiliary building and compound building does not affect the performance of the ACU's function since redundant ACUs are operable. The related description will be incorporated into DCD Section 9.5A.3.2.89, 9.5A.3.3.109 and 9.5A.3.6.4 as shown on Attachment 4.

NRC Feedback

From Section 4.1.8 - Systems or processes that involve hydrogen supplies (e.g., generator cooling systems and reactor coolant hydrogen addition systems) and those that may give off hydrogen or explosive gases (e.g., waste gas and solid radioactive waste processing systems) should be designed to prevent development of explosive mixtures by limiting the concentration of explosive gases and vapors within enclosures to less than 50 percent of the lower explosive limit, or by limiting oxygen within systems containing hydrogen. Hydrogen distribution and supply systems should include design features that mitigate the consequences of system damage, such as excess flow valves or flow restrictors, double-walled pipe with annulus leak detection, and rupture diaphragms. **(There is no discussion of design features to limit explosive conditions from solid waste and solid waste processing systems.)**

KHNP Response

As described in the response related to Section C.1.2, the spent resin from the demineralizer module does not contain any organic materials that may cause explosive conditions. In addition, the SWMS does not use chemicals in the processing of the solid radwaste. The method of treatment for solid radwaste in the SMWS is based on a dewatering process and packaging dewatered solid radwaste in drums and high integrity containers. Therefore, it is not expected that explosive condition would be generated for solid radwaste treatment and the resultant solid radwaste. These will be incorporated into Section 9.5A.3.6.4 as shown on Attachment 1.

NRC Feedback

From Section 6.2.3 - Materials that collect and contain radioactivity, such as spent ion exchange resins, charcoal filters, and HEPA filters, should be stored in closed metal tanks or containers that are located in areas free from ignition sources or combustibles. These materials should be protected from exposure to fires in adjacent areas as well. Requirements for removal of decay heat from entrained radioactive materials should be considered. **(Discussions in DCD Section 9.5A.3.6.4 do not fully address the above criteria.)**

KHNP Response

The solid radioactive wastes are packaged in the HIC and 200L drum, which are stored in the CPB temporary storage area where the HVAC system provides ventilation flow and proper control of the area temperature; there is no ignition source in this area. These will be incorporated into Section 9.5A.3.6.4 as shown on Attachment 1.

November 1, 2016 NRC Feedback

NRC Comments

I have comments on KHNP's response to Question 3. All proposed DCD updates, etc., can be kept as is, except as may be necessary to address these comments:

Neither the response nor the DCD system figures discuss or show where the demineralizers, other than the CVCS system demineralizers (such as LWMS and SGBD demineralizers), are vented to or show retention elements, similar to what is shown for the CVCS system demineralizers. This level of information is appropriate in the DCD in order to ensure that the RG 1.189 criteria of controlling flammable/explosive gases from ion exchange columns is met and for ALARA and minimizing contamination considerations. In addition, DCD Figure 9.3.4-1 shows that the CVCS demineralizers and other components in the CVCS system are vented to the room vent. It is unclear why it is appropriate to vent CVCS system components to the room ventilation system, instead of the gaseous radwaste system, when the CVCS system fluid could be expected to contain significant levels of gaseous radwaste.

KHNP Response

As described in DCD Section 11.3, the APR1400 gaseous waste management system (GWMS) encompasses the gaseous radwaste subsystem (GRS) as well as the building ventilation subsystems. Therefore, the provision of the controlled building ventilation system for the CVC system components, as well as the respective radioactive building ventilation systems for other radioactive system components, was designed to be consistent with this APR1400 design. The implications of this design approach for the GWMS result in the inclusion of the necessary HEPA and carbon filters within the controlled radioactive HVAC subsystems in order to ensure that the total activity of the releases from the GWMS subsystems meet the limits of 10 CFR Part 20. DCD Table 11.3-1 illustrates the implementation of this design approach for GWMS releases showing all of the building HVAC expected releases following treatment and filtration within the HVAC subsystems. The total activities of the GWMS release streams, including those from the GRS as well as the individual building HVAC releases, is used to determine the offsite individual doses resulting from normal plant gaseous releases. DCD Table 11.3-6 shows that the doses calculated at the site boundary taking into consideration all GWMS release streams are well below the 10 CFR 20 Appendix B limits using the design basis effluent activity values.

With respect to the Liquid Waste Management System (LWMS), the one cation bed and two mixed bed ion exchangers included in the system design, are all vented to the room atmosphere where any contaminated vented air is collected by the building controlled radioactive HVAC system. As explained above, the controlled building HVAC systems include HEPA and carbon filters to remove the radionuclides to meet the limits of 10 CFR Part 20. The LWMS ion exchange skid is specified in the P&IDs as a vendor-supplied package. Thus, the detailed design of the ion exchange skid, including the vent lines are not shown at this stage of design. Figure 1 of this response shows schematic connections to the ventilation design for the LWMS ion exchange columns and Figure 2 shows the included note for the ventilation design for the LWMS.

For the SGBD demineralizers, a vent line is located from the top of each SGBD demineralizer which is routed to the proximity of the floor drain inside the SGBD demineralizer room. During venting, the SGBD demineralizers are vented to the room atmosphere for collection by the controlled building radioactive HVAC system. The potentially contaminated vented air is treated within the HVAC system prior to release to the environment. DCD Tier 2 Figure 10.4.8-1 (Sheet

2 of 2) showing the SGBDS flow diagram will be revised to add the omitted vent design of the SGBD demineralizers as indicated in the Attachment 5.

In general, ion exchange column vents are not used during normal ion exchange operation, including those from the CVCS. These vents are only opened during the resin change-out process. During this process, the vent valve is individually opened for depressurization, and compressed air is sent through the bottom of the ion exchange column to facilitate fluidization of the resin for sluicing. Accordingly, the vented gases released during this process will contain a substantial amount of oxygen which could cause the formation of a potentially dangerous mixture if routed to the Gaseous Radwaste System which contains hydrogen. Therefore, the ion exchange column design includes venting to the room atmosphere for collection by the building controlled radioactive HVAC system which will provide filtration and treatment before release.

The ventilation design of the CVCS purification ion exchangers (two purification ion exchangers and one deborating ion exchanger) is indicated in Figure 9.3.4-1, Sheet 2 of 7. This Figure shows the vents from the individual ion exchangers connected to one header, which is then routed to the close proximity of the ion exchanger room ventilation exhaust in the AB controlled radioactive HVAC system. As discussed in the last response, this design approach prevents the infiltration of the contaminated liquid from entering the HVAC duct.

The vents for the CVCS pre-holdup ion exchanger and the boric acid condensate ion exchanger are also designed to vent to the proximity of the individual room exhausts, as indicated in Figure 9.3.4-1, Sheet 5 and Sheet 7, respectively.

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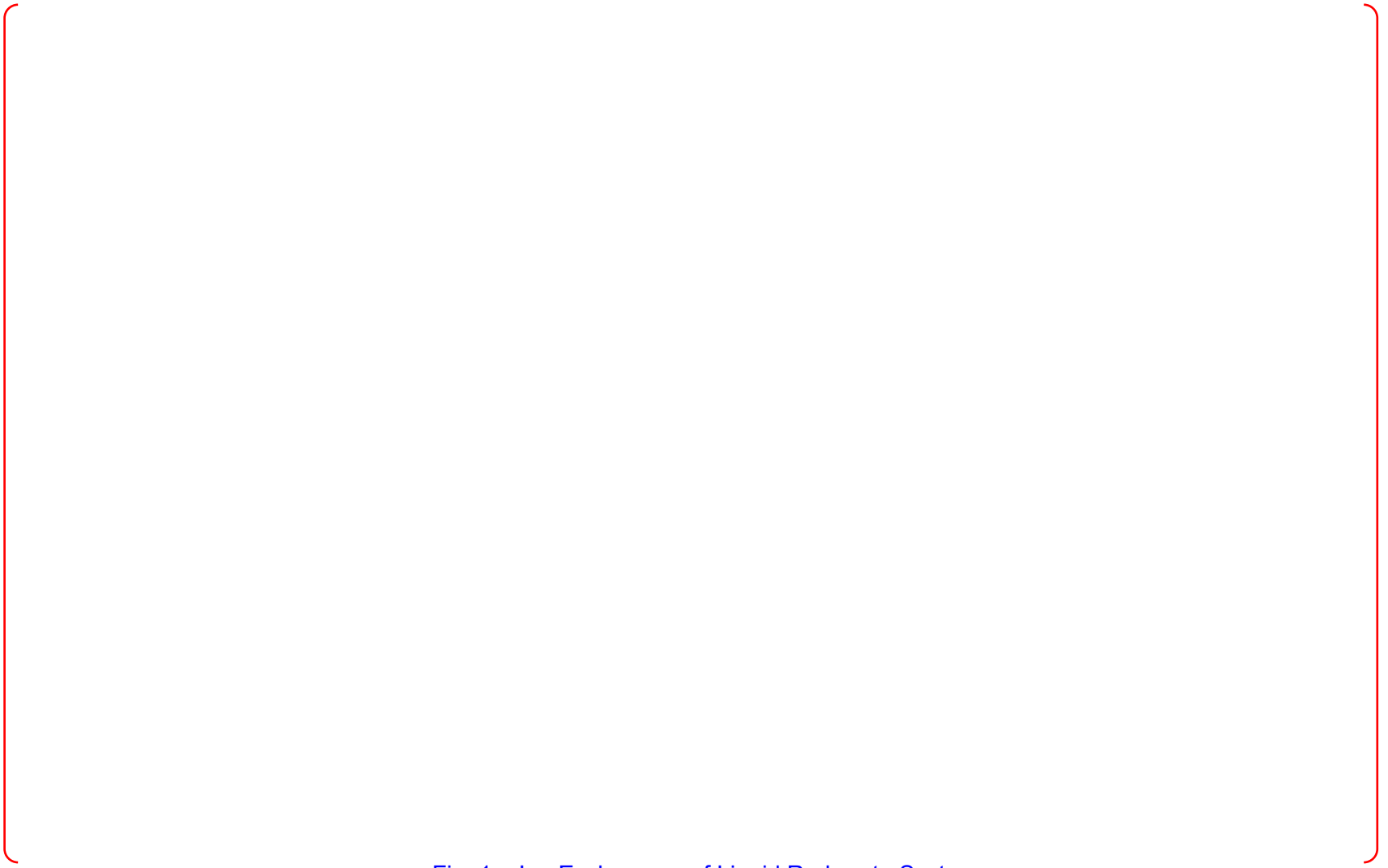

<Fig. 1> Ion Exchangers of Liquid Radwaste System

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<Fig. 2> The Note to Figure 1 for the Ventilation of Ion Exchangers in the LWMS

April 18, 2017 KHNP Feedback to Chapter 12 Draft SER Issues

NRC Comment

Staff has reviewed KHNP comments sent 12/19/2016. Staff would like to have a call to discuss venting from the ion exchangers. Do CVCS ion exchangers discharge near exhaust in ion exchange cubicle or do they discharge in area outside of ion exchange cubicle? Why not include a drop box in the vent line? Would like to discuss any other information on how contamination and dose are minimized with the current design and if vented inside ion exchange room, how would any leakage be cleaned up, etc.?

KHNP Response

The vent lines from the three CVCS Purification Ion Exchangers (PIX) are combined inside the PIX cubicle (Please refer to Figure 1). The combined vent line is then routed outside and returned back to the inside of the PIX cubicle where the deborating ion exchanger is housed (Please refer to Figure 2). The discharge of the vent line is designed to be routed to the vicinity of the cubicle ventilation exhaust (Please refer to Figure 3). The vent line also contains a drain line that routes drains to the equipment drain tank.

As indicated in Figure 1, the drain pipe is connected to the horizontal segment of the combined vent pipe close to the PIXs to facilitate immediate separation of liquid-gas. The drain pipe is then dropped down to connect to the drain header (Please refer to Figure 3), which connects to the equipment drain tank.

The PIX vent pipe is routed upwards at the connecting point and then horizontally to a convenient location to facilitate the minimum 10-foot long vertical riser pipe (Please refer to Figure and Figure 2, vent pipe is highlighted in red, flow direction is indicated by yellow arrows). This piping configuration facilitates liquid-gas separation, and prevents backflow of drainage. The vertical riser pipe is then rerouted back to the cubicle, and is terminated near the cubicle ventilation exhaust, with a gap to prevent liquid moisture entering and contaminating the ventilation exhaust.

As indicated and discussed, the vent line is routed from the PIX cubicle to other areas and is then returned back to the cubicle. The discharge of the vent gas is inside the PIX cubicle. This design approach, consisting of horizontal piping, vertical riser, and a drain pipe works similar to a “drop box” concept, but without a physical “drop box”, to facilitate liquid-gas separation.

Each of the PIX vent lines is equipped with a manual valve with an extended stem to minimize radiation dose when the PIX resin needs replacement. Based on KHNP operating procedures and experiences, the vent line and valve is not used during spent resin removal; the vent valve is opened slowly to facilitate displaced air when fresh resin is being added.

It is noted that after spent resin is sluiced to the SRLTS tank, each of the PIX vessel is rinsed with demineralized water before fresh resin is reloaded. This design and the associated operating procedure minimizes cubicle contamination. But, in the event that the floor would require cleaning due to leakage or flooding, the PIX cubicle can be accessed through a floor plug opening on the floor above. Demineralized water can be brought through a water hose from the floor above without physical entry to the PIX cubicle. This design minimizes dose uptake when cubicle requires cleaning.

Figure 1 PIX Vent and Drain Line

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Figure 2 Routing of PIX Vent Line

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Line Figure 3 Routing of PIX Drain

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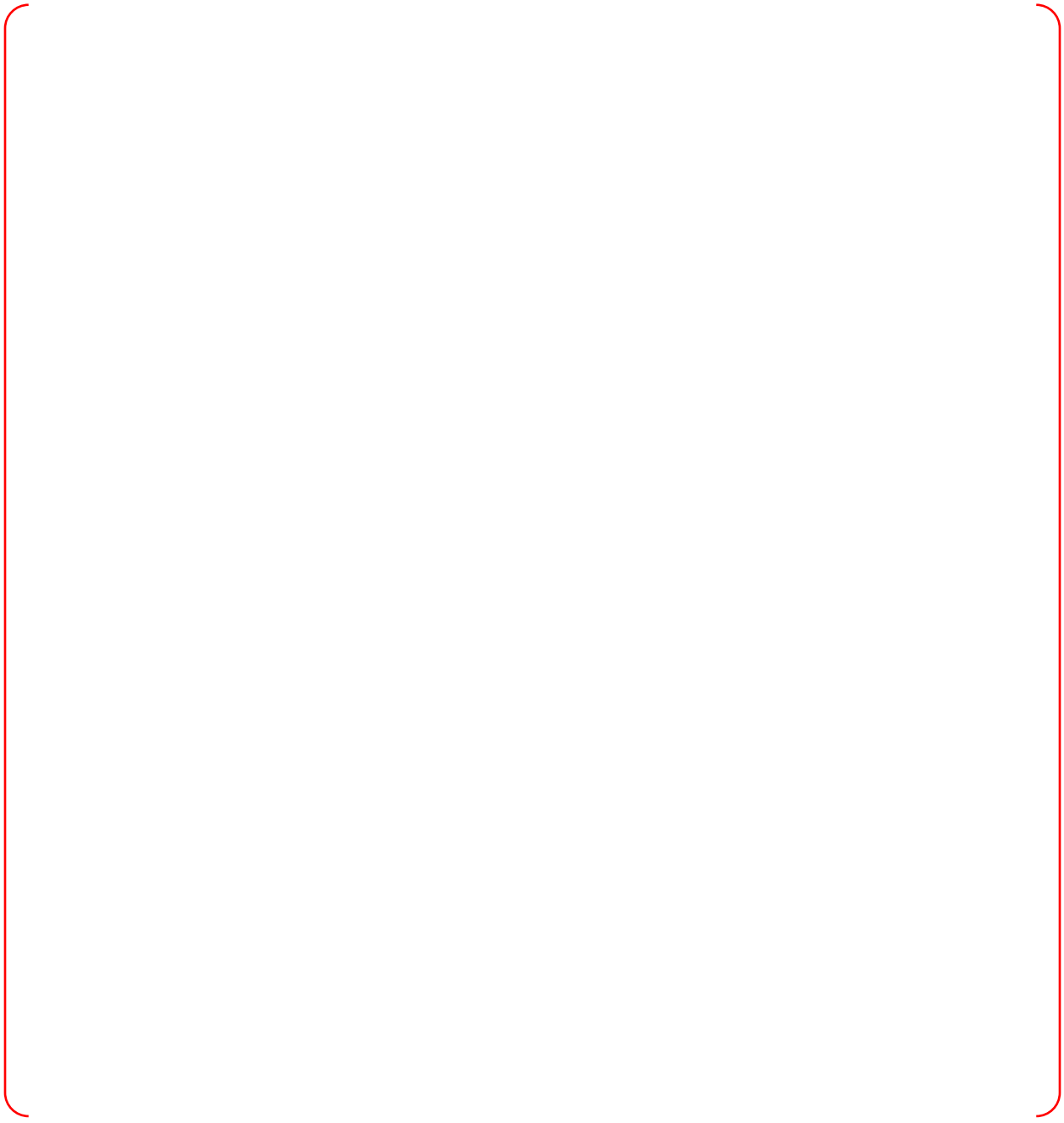

Impact on DCD

DCD Section 9.5A will be revised as indicated in Attachments 1, 3, 4, and 5.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical or Environmental Report.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except for the exterior walls. Penetrations and openings are sealed for fire confinement. HVAC ductwork passing into the barrier is equipped with a fire damper.

A fire in this area is detected by smoke and temperature detectors and is extinguished manually using water hose or portable extinguishers in accordance with NFPA 72, 14, and 10. The fire area has an automatic wet pipe sprinkler system in accordance with NFPA 13 and regulatory guidance. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected. On this basis, there is adequate fire protection provided for this fire area.

This fire area is served by the CPB HVAC system. Any HVAC ductwork passing into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings of the fire area boundaries. After the fire, smoke is removed from the fire area by the exhaust ACU.

Fire Protection System Integrity

Inadvertent actuation of the automatic wet pipe sprinklers installed in this area would not affect the capability to safely shut down the plant since there is no safety-related equipment in this area.

Safe Shutdown Analysis

The design basis fire would occur if all combustibles in this fire area burned, but the design basis fire would not affect the ability to safely shut down the plant since this fire area is completely separated from the adjacent fire areas by 3-hour-rated fire barriers and equipment located in this fire area is non-safety related.

Radioactive Release Analysis

radiological sources such as

This fire area is a radiological area, due to the charcoal delay beds and spent resin long-term storage tank containing radiological material. But the spent resin is stored in the spent resin long-term storage tank in the wet condition, which is composed of spent resin

and water. These spent resin tanks are located at the enclosed, controlled-access storage area. Also, there is no ignition source in the spent resin long-term storage tank room. Thus it can be credited the radioactive materials contained in the spent resin are not released to the environment since the possibility of fire occurrence is eliminated by the fire hazard analysis.

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For the charcoal delay bed rooms of the GWMS(Gaseous Waste Management System), it is not realistic to assume the fire damage of the charcoal due to exposed fire outside the charcoal delay bed rooms. There is no combustible material inside the charcoal delay bed rooms except for the charcoal in the delay beds. As shown in Figure 9.5A-21, there is no large opening to allow propagation of fire from outside the room into these rooms. The access openings to the charcoal delay bed rooms for maintenance are normally closed by removable slabs, which do not allow propagation of fire. Thus, the possibility of exposure to direct flame by a postulated fire outside of the charcoal delay bed rooms is eliminated in the fire hazard analysis. The radioactive laundry system treats all liquid wastes within the refueling water area that have the potential for radioactive contamination (e.g., personnel decontamination, contaminated laundry waste). The treatment process is conducted in steel containers and monitored. Therefore, in case a fire accident occurs in the CPB, no significant release is expected; any release is below the 10 CFR Part 20 limits.

Burning of filters could result in releases of radioactive products, but this is within the radiological design basis since all filters are in closed metal tanks or containers and all air leaving this area passes through charcoal filters that are monitored by radiation detectors. Charcoal filters are also protected by deluge systems.

9.5A.3.7 ESW/CCW Hx. Building

9.5A.3.7.1 F000-WPPA: ESW Pump Room - Div.I

Figures 9.5A-25 through 9.5A-26 show the location of fire area F000-WPPA, which comprises the following zones:

Z081-W01A Pump Room – El. 81 ft

Z100-W07A Pump Room – El. 100 ft

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In addition, there are spent filter, spent resin, R/O(Reverse Osmosis) membrane, R/O concentrate, dry active waste in radwaste drum storage area and ion exchanger or resins in ion exchanger module room containing radiological material.

But there is no combustible materials in radwaste drum storage area and in adjacent area. These radiological material is stored in container type such as the drum and HIC(High Integrity Container).

Ion exchanger or resins are designed to prevent the potential flammable/explosive condition from chemicals, organic materials, or detergent in liquid radwaste. As stated in DCD Tier 2, Section 11.2, the liquid radwaste will be processed by the R/O package in the LWMS, which consists of a pretreatment module, a R/O module and a demineralizer module.

Since the demineralizer module is located downstream of the pretreatment and R/O modules, the potential presence of chemicals, organic materials, or detergent in the liquid radwaste can be removed by pretreatment module and R/O module before being treated at the demineralizer module. For this reason, the demineralizer module would not be influenced from the chemicals, organic materials or detergent that may contribute to a potential flammable or explosive condition.

In addition, the detergent waste is normally released through a monitored pathway after processing by the detergent waste filter in the detergent waste subsystem; this is because the waste is unlikely to have high radioactivity. If the waste needs further treatment, the detergent waste will be transferred to the LWMS where it will be treated by pretreatment module and R/O module.

For chemicals such as decontamination waste, the waste is stored in a chemical waste tank in the LWMS. The LWMS has provisions to process such chemical waste using mobile or temporary equipment. Therefore, the LWMS is designed that the impact on demineralizer module due to chemical processing can be minimized.

As described above, the spent resin from the demineralizer module does not contain any organic materials that may cause explosive conditions. In addition, the SWMS does not use chemicals in the processing of the solid radwaste. The method of treatment for solid radwaste in the SMWS is based on a dewatering process and packaging dewatered solid radwaste in drums and high integrity containers. Therefore, it is not expected that explosive condition would be generated for solid radwaste treatment and the resultant solid radwaste.

The solid radioactive wastes are packaged in the HIC and 200L drum, which are stored in the CPB temporary storage area where the HVAC system provides ventilation flow and proper control of the area temperature; there is no ignition source in this area.

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 9.5A-21 Fire Barrier DBD – CPB El. 100′-0″

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 9.5A-22 Fire Barrier DBD – CPB El. 120′-0″

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.2.11 F055-A18A: Pipe Chase & Valve Room

Figure 9.5A-1 shows the location of fire area F055-A18A.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the floor and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The floor of this area is basemat that is not required to be rated, according to NRC RG 1.189.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F055-A18A is 1.07×10^5 kJ/m^2 (9.44×10^3 Btu/ft^2), and the expected duration of fire is 7 minutes. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using a water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork passing into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The design basis fire would occur if all of the combustibles in this area burned. This fire area is separated from the adjacent fire areas with 3-hour-rated fire barriers and equipment in this area is not needed for safe shutdown. Therefore, a complete loss of equipment in the event of a fire in this area would not affect the plant safe shutdown.

Radioactive Release Analysis

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

9.5A.3.2.12 F055-A21A: Pipe Chase & Valve Room

Figure 9.5A-1 shows the location of fire area F055-A21A.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the floor and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The floor of this area is basemat that is not required to be rated, according to NRC RG 1.189.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F055-A21A is 9.07×10^3 kJ/m^2 (7.99×10^2 Btu/ft^2), and the expected duration of fire is 1 minute. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using a water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on

the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The design basis fire would occur if all of the combustibles in this area burned. This fire area is separated from the adjacent fire areas with 3-hour-rated fire barriers and equipment in this area is not needed for safe shutdown. Therefore, a complete loss of equipment in the event of a fire in this area would not affect the plant safe shutdown.

Radioactive Release Analysis

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

9.5A.3.2.13 F055-A22A: Pipe Chase

Figure 9.5A-1 shows the location of fire area F055-A22A.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the floor and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.2.14 F055-A30A: SC Heat Exchanger Room A

Figure 9.5A-1 shows the location of fire area F055-A30A.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the floor and the east wall and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The floor and east wall of this area are exterior barriers that are not required to be rated, according to NRC RG 1.189.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F055-A30C is 6.37×10^4 kJ/m^2 (5.61×10^3 Btu/ft^2), and the expected duration of fire is 4 minutes. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using a water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~ Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.2.35 F078-A23A: Buttress Opening

Figure 9.5A-3 shows the location of fire area F078-A23A.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F078-A23A is 7.78×10^3 kJ/m^2 (6.85×10^2 Btu/ft^2), and the expected duration of fire is 1 minute. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area extinguished manually using water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

There is no safe shutdown equipment. Loss of equipment in the event of a fire in this area would not affect the plant safe shutdown.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls and has 3-hour-rated fire doors. HVAC ductwork that passes through barriers is equipped with a fire damper.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F100-A13A is 9.98×10^3 kJ/m^2 (8.79×10^2 Btu/ft^2), and the expected duration of fire is 1 minute. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using a water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The design basis fire would occur if all of the combustibles in this area burned. This fire area is separated from the adjacent fire area with 3-hour-rated fire barriers and equipment located in this area is not needed for safe shutdown. Therefore, a complete loss of equipment is acceptable.

Radioactive Release Analysis

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.2.51 F100-A23A: AB Controlled Area (I) Supply AHU Room

Figure 9.5A-4 shows the location of fire area F100-A23A.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F 100-A23A is 1.42×10^4 kJ/m^2 (1.25×10^3 Btu/ft^2), and the expected duration of fire is 1 minute. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using a water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

located in this area is not needed for safe shutdown. Therefore, a complete loss of equipment is acceptable.

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

9.5A.3.2.63 F120-A21A: AB Controlled Area (I) ECCS Equip. Room Exhaust ACU Room 1

Figure 9.5A-5 shows the location of fire area F120-A21A.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F120-A21A is 2.52×10^6 kJ/m^2 (2.22×10^5 Btu/ft^2), and the expected duration of fire is 2.8 hours. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using a water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The capability to safely shut down the plant would not be affected by a fire in this area because redundant trains are separated by 3-hour-rated fire barriers.

Radioactive Release Analysis

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

9.5A.3.2.90 F156-A16A: SIS Filling Tank Room

Figure 9.5A-7 shows the location of fire area F156-A16A.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the north and east walls. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The north and east walls of this area are exterior walls that are not required to be rated, according to NRC RG 1.189.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F156-A16A is 1.14×10^4 kJ/m^2 (1.01×10^3 Btu/ft^2), and the expected duration of fire is 1 minute. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

A fire in this area would not affect safe shutdown of the plant because there are no safety-related structures or equipment that would be affected by the fire.

Radioactive Release Analysis

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

9.5A.3.2.110 F000-ACVU: CVCS Area – Upper Area

Figures 9.5A-4 through 9.5A-7 show the location of fire area F000-ACVU, which comprises the following zones:

Z100-ACVU CVCS Area – Upper Area El.100 ft 0 in

Z120-ACVU CVCS Area – Upper Area El.120 ft 0 in

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the east wall and ceiling and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The east

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.2.111 Stairs, Elevator Hoistways, and Elevator Halls

Figures 9.5A-1 through 9.5A-9 show the location of the fire areas that include the stairs, elevator hoistways, and elevator halls, which are as follows:

F049-A01C	Elevator Hoistway
F049-A02A	Elevator Hoistway
F055-A05C	Stair
F055-A20A	Stair
F055-A60A	Elevator Hall
F055-A61C	Elevator Hall
F078-A54A	Elevator Hall
F078-A55C	Elevator Hall
F100-A45A	Elevator Hall
F100-A46C	Elevator Hall
F120-A17A	Stair
F120-A33A	Elevator Hall

the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The design basis fire would occur if all of the combustibles in this area burned. This fire area is separated from the adjacent fire areas with 3-hour-rated fire barriers and equipment in this area is not needed for safe shutdown. Therefore, a complete loss of equipment in the event of a fire in this area would not affect the plant safe shutdown.

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.3.10 F055-A18B: Pipe Chase & Valve Room

Figure 9.5A-1 shows the location of fire area F055-A18B.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the floor and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.3.11 F055-A21B: Pipe Chase & Valve Room

Figure 9.5A-1 shows the location of fire area F055-A21B.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the floor and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The floor of this area is Basemat that is not required to be rated, according to NRC RG 1.189.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F055-A21B is 3.64×10^4 kJ/m^2 (3.21×10^3 Btu/ft^2), and the expected duration of fire is 2 minutes. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using a water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on the expected fire hazards in this area, 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The design basis fire would occur if all of the combustibles in this area burned. This fire area is separated from the adjacent fire areas with 3-hour-rated fire barriers and equipment in this area is not needed for safe shutdown. Therefore, a complete loss of equipment in the event of a fire in this area would not affect the plant safe shutdown.

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.3.12 F055-A22B: Pipe Chase

Figure 9.5A-1 shows the location of fire area F055-A22B.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the floor and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The floor of this area is Basemat that is not required to be rated, according to NRC RG 1.189.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F055-A22B is 7.70×10^3 kJ/m^2 (6.78×10^2 Btu/ft^2), and the expected duration of fire is 1 minute. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using a water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on

the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The design basis fire would occur if all of the combustibles in this area burned. This fire area is separated from the adjacent fire areas with 3-hour-rated fire barriers and equipment in this area is not needed for safe shutdown. Therefore, a complete loss of equipment in the event of a fire in this area would not affect the plant safe shutdown.

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.3.13 F055-A30B: SC Heat Exchanger Room B

Figure 9.5A-1 shows the location of fire area F055-A30B.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the floor and east wall and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement.

A fire in this area is detected by a smoke detector and is extinguished manually using a water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

A fire in this area would not affect safe shutdown of the plant because there are no safety-related structures or equipment that would be affected by the fire.

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.3.33 F078-A23B: Buttress Opening

Figure 9.5A-3 shows the location of fire area F078-A23B.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls and has 3-hour-rated fire doors. There are no penetrations and openings except the door.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The design basis fire would occur if all of the combustibles in this area burned. This fire area is separated from the adjacent fire area with 3-hour-rated fire barriers and equipment located in this area is not needed for safe shutdown. Therefore, a complete loss of equipment is acceptable.

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.3.53 F100-A16D: Pipe Chase

Figure 9.5A-4 shows the location of fire area F100-A16D.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls and has Three-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The floor of this area is basemat that is not required to be rated.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F100-A16D is 6.45×10^3 kJ/m^2 (5.68×10^2 Btu/ft^2), and the expected duration of fire is less than 1 minute. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is extinguished manually using portable extinguisher in accordance with NFPA 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of

this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The design basis fire would occur if all of the combustibles in this area burned. This fire area is separated from the adjacent fire area with 3-hour-rated fire barriers and equipment located in this area is not needed for safe shutdown. Therefore, a complete loss of equipment is acceptable.

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.3.54 F100-A32B: SFP Cooling Heat Exchanger Room

Figure 9.5A-4 shows the location of fire area F100-A32B.

The fire area is enclosed with 3-hour-rated concrete walls except the east wall and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The east wall of this area is an exterior wall that is not required to be rated, according to NRC RG 1.189.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F100-A32B is 3.20×10^5 kJ/m^2 (2.81×10^4 Btu/ft^2), and the expected duration of fire is 21 minutes. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~ Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.3.65 F120-A29B: AB Controlled Area (II) ECCS Equip. Room. Exhaust ACU Room 1

Figure 9.5A-5 shows the location of fire area F120-A29B.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F120-A29B is 2.53×10^6 kJ/m^2 (2.22×10^5 Btu/ft^2), and the expected duration of fire is 2.8 hours. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using a water hose or portable extinguisher in accordance with NFPA 72, 14, and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F195-A08B is 6.60×10^5 kJ/m^2 (5.81×10^4 Btu/ft^2), and the expected duration of fire is 44 minutes. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using portable extinguisher in accordance with NFPA 72 and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The capability to safely shut down the plant would not be affected by a fire in this area because redundant trains are separated by 3-hour-rated fire barriers.

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

The filters in the ACU may contain radioactive materials only if filters have been used for radiological events for the time within the allowable limit. However, the likelihood that the radioactive smoke would be released is low because the fire would be extinguished by the water spray nozzles for the charcoal filters, which are in the filter housing. Thus, no significant release is expected; any release is below the 10 CFR Part 20 limits.

9.5A.3.3.110 F195-A10D: Smoke Fan Room

Figure 9.5A-9 shows the location of fire area F195-A1

Radioactive Release Analysis

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~ Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

9.5A.3.3.112 F000-AFHU: Fuel Handling Area – Upper Area

Figures 9.5A-4 through 9.5A-7 show the location of fire area F000-AFHU, which comprises the following zones:

Z100-AFHU Fuel Handling Area – Upper Area El.100 ft 0 in

Z120-AFHU Fuel Handling Area – Upper Area El.120 ft 0 in

Z137-AFHU Fuel Handling Area – Upper Area El.137 ft 6 in

Z156-AFHU Fuel Handling Area – Upper Area El.156 ft 0 in

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the ceiling and has 3-hour-rated fire doors. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The ceiling of this area is Basemat that is not required to be rated.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F000-AFHU is 1.53×10^5 kJ/m^2 (1.34×10^4 Btu/ft^2), and the expected duration of fire is 10 minutes. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by smoke, heat and flame detectors sin accordance with NFPA 72. The fire area has automatic wet pipe sprinkler system in accordance with NFPA 13 and regulatory guidance. Additional fire suppression capability is provided by a water hose or portable extinguishers in accordance with NFPA 14 and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient

containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by fuel handling area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. After the fire, smoke is removed from the fire area by an exhaust ACU.

Fire Protection System Integrity

Inadvertent actuation of the automatic wet pipe sprinklers installed in this area would not affect the capability to safely shut down the plant because there is no safety-related equipment in this area.

Safe Shutdown Analysis

This fire area is separated from the adjacent fire areas with 3-hour-rated fire barriers and the only safe shutdown equipment in this area is Division II.

Radioactive Release Analysis

Significant release is not expected because the charcoal filters in the AB exhaust ACUs provide reasonable assurance that the potential for the release of radioactive materials is eliminated; any release is below the 10 CFR Part 20 limits.

~~This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.~~

9.5A.3.3.113 F000-AHV: HELB Vent Area

Figures 9.5A-1 through 9.5A-6 show the location of fire area F000-AHV, which comprises the following zones:

Z055-A46B Condensate Return Unit Room

Z068-A06A Gas Stripper Room

Z078-A40B Boric Acid Conc. Room

openings in the fire area boundaries. ~~After the fire, smoke is removed from the fire area by an exhaust ACU.~~

Insert "A" on following page

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The capability to safely shut down the plant would not be affected by a fire in this area because redundant trains are separated by 3-hour-rated fire barriers.

Radioactive Release Analysis

This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.

9.5A.3.2.90 F156-A16A: SIS Filling Tank Room

Figure 9.5A-7 shows the location of fire area F156-A16A.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except the north and east walls. Penetrations and openings are sealed for fire confinement. HVAC ductwork that passes through barriers is equipped with a fire damper. The north and east walls of this area are exterior walls that are not required to be rated, according to NRC RG 1.189.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F156-A16A is 1.14×10^4 kJ/m^2 (1.01×10^3 Btu/ft^2), and the expected duration of fire is 1 minute. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

Combustible materials in this area are listed in Table 9.5A-2. The fire loading of fire area F195-A08B is 6.60×10^5 kJ/m^2 (5.81×10^4 Btu/ft^2), and the expected duration of fire is 44 minutes. Three-hour-rated fire barriers provide adequate separation from adjacent fire areas, and the fire is contained within the fire area.

A fire in this area is detected by a smoke detector and is extinguished manually using portable extinguisher in accordance with NFPA 72 and 10. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected to occur. On this basis, the fire protection that is provided for this fire area is adequate.

This fire area is served by the AB controlled area HVAC system. Any HVAC ductwork that passes into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings in the fire area boundaries. ~~After the fire, smoke is removed from the fire area by an exhaust ACU.~~

Insert "B" on following page

Fire Protection System Integrity

Because no automatic suppression systems are installed in this area, an evaluation of the inadvertent actuation effect of an automatic suppression system is not applicable.

Safe Shutdown Analysis

The capability to safely shut down the plant would not be affected by a fire in this area because redundant trains are separated by 3-hour-rated fire barriers.

Radioactive Release Analysis

This fire area is not a radiological area. The piping systems in the fire area do not contain fluids with radiological content. Therefore, a radioactive release due to a fire in this area is not expected.

9.5A.3.3.110 F195-A10D: Smoke Fan Room

Figure 9.5A-9 shows the location of fire area F195-A10D.

Fire Protection Adequacy Evaluation

The fire area is enclosed with 3-hour-rated concrete walls except for the exterior walls. Penetrations and openings are sealed for fire confinement. HVAC ductwork passing into the barrier is equipped with a fire damper.

A fire in this area is detected by smoke and temperature detectors and is extinguished manually using water hose or portable extinguishers in accordance with NFPA 72, 14, and 10. The fire area has an automatic wet pipe sprinkler system in accordance with NFPA 13 and regulatory guidance. Based on the expected fire hazards in this area, the 3-hour-rated boundaries of this area provide sufficient containment of any unsuppressed fire that can be expected. On this basis, there is adequate fire protection provided for this fire area.

This fire area is served by the CPB HVAC system. Any HVAC ductwork passing into the area is provided with automatically closing fire dampers at the fire area boundaries. Smoke migration into the area is mitigated by sealed penetrations and openings of the fire area boundaries. ~~After the fire, smoke is removed from the fire area by the exhaust ACU.~~

Insert "C" on following page

Fire Protection System Integrity

Inadvertent actuation of the automatic wet pipe sprinklers installed in this area would not affect the capability to safely shut down the plant since there is no safety-related equipment in this area.

Safe Shutdown Analysis

The design basis fire would occur if all combustibles in this fire area burned, but the design basis fire would not affect the ability to safely shut down the plant since this fire area is completely separated from the adjacent fire areas by 3-hour-rated fire barriers and equipment located in this fire area is non-safety related.

Radioactive Release Analysis

This fire area is a radiological area, due to the charcoal delay beds and spent resin long-term storage tank containing radiological material. But the spent resin is stored in the spent resin long-term storage tank in the wet condition, which is composed of spent resin

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"A"

The air in AB controlled HVAC area is filtered and exhausted to the atmosphere through ACUs during plant normal operation. The radiation level is monitored by a radiation monitor installed at a downstream duct of the ACUs. In the event of a fire in these HVAC areas, the smoke is filtered and exhausted to the atmosphere through ACUs after suppressing the fire. The ACUs operated during normal operation in the auxiliary building controlled area consist of two normal exhaust ACUs with a100% capacity per division. Therefore, the single failure of each ACU in auxiliary building does not affect the performance of the ACU's function since redundant ACUs are operable.

"B"

The air in AB controlled HVAC area is filtered and exhausted to the atmosphere through ACUs during plant normal operation. The radiation level is monitored by a radiation monitor installed at a downstream duct of the ACUs. In the event of a fire in these HVAC areas, the smoke is filtered and exhausted to the atmosphere through ACUs after suppressing the fire. The ACUs operated during normal operation in the auxiliary building controlled area consist of two normal exhaust ACUs with a100% capacity per division. Therefore, the single failure of each ACU in auxiliary building does not affect the performance of the ACU's function since redundant ACUs are operable.

"C"

The air of CPB controlled HVAC area is filtered and exhausted to the atmosphere through ACUs during plant normal operation. The radiation level is monitored by a radiation monitor installed at a downstream duct of the ACUs. In the event of a fire in these HVAC areas, the smoke is filtered and exhausted to the atmosphere through ACUs after suppressing the fire.
The ACUs operated during normal operation in compound building consist of two HEPA filter exhaust ACUs with a 50% capacity and two carbon adsorber exhaust ACUs with a 50% capacity. The two carbon adsorber exhaust ACUs are protected by a manually actuated deluge system. Therefore, the single failure of each ACU in compound building does not affect the performance of the ACU's function since redundant ACUs are operable.

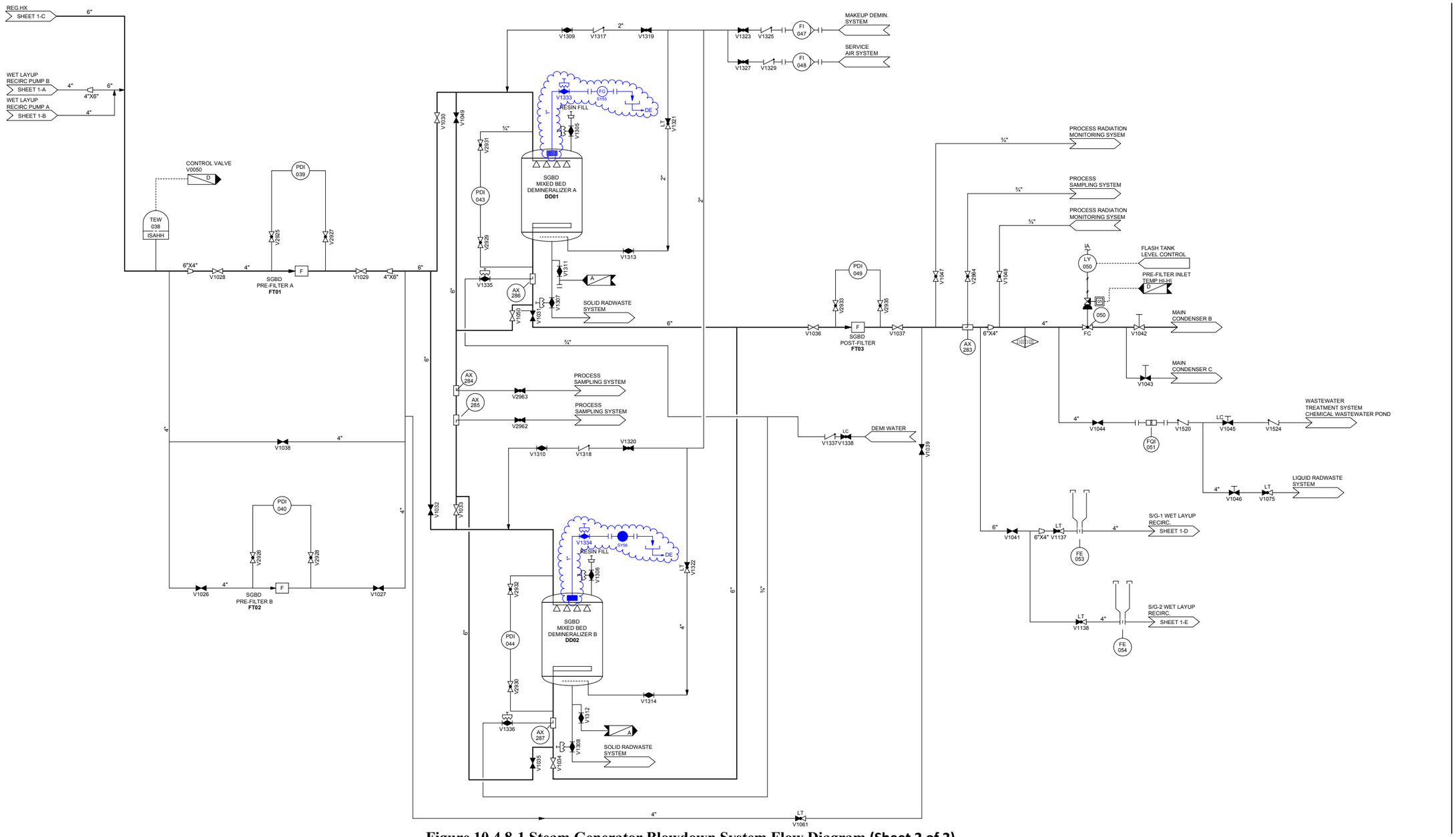

Figure 10.4.8-1 Steam Generator Blowdown System Flow Diagram (Sheet 2 of 2)