Proposed FSAR Changes (Markups)

air-conditioning units serve the control room elevation and the Class 1E electrical equipment floors. Local fan-coil units serve the access control floor and nonvital areas of the electrical and mechanical equipment level and the counting room.

All outside air intakes, both essential and nonessential, are provided with labyrinth missile barriers. The barriers are designed to withstand and absorb missile impacts and to prevent the propagation of a missile trajectory in line with essential equipment.

Two exhaust systems also service the building. The control building exhaust system takes suction from the clean areas of the building, and the access control exhaust system takes suction from the potentially contaminated areas of the access control floor. The control building exhaust system discharges directly to the atmosphere, while the access control exhaust system processes the exhaust air through charcoal adsorbers prior to discharging through the unit vent.

Based on the source terms provided in Section 11.1 and the dose evaluation provided in Section 11.3, the access control exhaust system meets the objective of 10 CFR 50, Appendix I, and the limits of 10 CFR 20.

9.4.1.2.2 Component Description

Codes and standards applicable to the control building HVAC systems are listed in Tables 3.2-1 and 9.4-4. The control room air-conditioning system, including the control room filtration and pressurization systems, the Class 1E air-conditioning system, and safety-related HVAC penetrations of the control building boundaries are designed and constructed in accordance with codes and standards comparable with quality group C. The control room ac system coils and condenser and the Class 1E electrical equipment ac system coils and condensers are designed and constructed in accordance with quality group C.

NONESSENTIAL AIR HANDLING UNITS - Those nonessential air handling units which make up a part of the control building HVAC system are the control building supply air unit, access control air-conditioning unit, and the counting room fan coil unit.

The control building supply air unit consists of a particulate filter, hot-water heating coil, chilled-water cooling coil, centrifugal fan, and electric motor driver.

The access control air-conditioning unit consists of a particulate filter, chilled-water cooling coil, centrifugal fan, and electric motor driver.

The counting room fan-coil unit consists of a chilled-water cooling coil, humidifying unit, centrifugal fan, and electric motor driver.

SAFETY-RELATED AIR HANDLING UNITS - The control building HVAC system contains two safety-related air handling units, the control room air-conditioning unit, and the Class 1E electrical equipment air-conditioning unit.

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Both the control room air-conditioning unit and the Class 1E electrical equipment air-conditioning unit consist of high efficiency prefilters, a self-contained refrigeration system utilizing essential service water as the heat sink, centrifugal fans, and electric motor drivers. (During cold shutdown or refueling conditions (Mode 5 or Mode 6 per the plant's Technical Specifications), one (and only one) of the two control room air-conditioning units may have normal service water solely aligned to it as its heat sink (i.e., without essential service water available), as permitted per the plant's Technical Specifications for such conditions.)

NONESSENTIAL FILTER UNITS - The control building HVAC system contains two nonessential filter units, the access control filtration unit, and the counting room filter unit.

The access control filtration unit consists of moderate efficiency prefilters, HEPA filters, and charcoal adsorption beds.

The counting room filter unit consists of moderate efficiency prefilters and HEPA filters.

SAFETY-RELATED FILTER UNITS - Those safety-related filter units which are a part of the control building HVAC system are the control room filtration system filter adsorber units and the control room pressurization system filter adsorber units.

Each control room filtration system filter adsorber unit consists of moderate efficiency prefilters, HEPA filters, and charcoal adsorption beds.

Each control room pressurization system filter adsorber unit consists of a demister, electric heater, HEPA filters, and charcoal adsorption beds.

NONESSENTIAL FANS - There are two pairs of nonessential fans in the control building HVAC system -- the access control exhaust fans and the control building exhaust fans.

The access control exhaust fans are centrifugal fans with an electric motor driver.

The control building exhaust fans are vaneaxial fans with an electric motor driver.

SAFETY-RELATED FANS - Besides the integral fans in the safety-related air-conditioning units, the control building HVAC system contains five pairs of safety-related fans, including two control room filtration system fans, two control room pressurization system fans, four Class 1E supplemental cooling train supply fans and two Class 1E supplemental cooling train return fans.

The control room filtration system fans and the control room pressurization system fans are centrifugal fans with electric motor drivers. The Class 1E supplemental cooling train supply and return fans are vaneaxial fans with electric motor drivers.

SUPPLEMENTAL HEATER - Supplemental heating is provided by nonessential electric duct heaters and electric unit heaters.

Electric duct heaters supplement the heating of the control room, access control area, the HVAC equipment room, and the nonvital areas of the dc battery and switchgear area.

Electric unit heaters supplement the heating of the upper and lower cable spreading rooms, the ESF switchgear rooms, the pipe chase/tank area, and the control room air-conditioning equipment room. Each unit heater consists of a coil and a fan with an electric motor driver.

FIRE DAMPERS - Fire dampers are located between fire barriers, as necessary, to maintain the fire ratings of the barriers. Dampers are the 3-hour-rated curtain type.

ISOLATION DAMPERS - Where a means of system isolation is required, parallel-blade-type dampers are utilized. The type of operator employed is dependent upon the specific design and/or usage requirements.

The following specific criteria were included in the control room isolation damper procurement specification to ensure that the required leak-tightness is provided:

a. For dampers with a surface area equal to or greater than 2 ft^2, the maximum allowable leakage at a pressure differential of 6 inches w.g. is 20 cfm/ft^2.

b. For dampers with a surface area of less than 2 ft^2, but greater than 1 ft^2, the maximum allowable leakage at a differential pressure of 6 inches w.g. is 30 cfm/ft^2.

c. For dampers with a surface area of less than 1 ft^2, the maximum allowable leakage at a differential pressure of 6 inches w.g. is 30 cfm.

FLOW CONTROL DAMPERS - Opposed-blade-type dampers are utilized, as necessary, to provide a means of system balancing. In general, these are manually operated. However, some utilize power operators to allow compensation for changes occurring during system operation.

BACKDRAFT DAMPERS - Backdraft dampers are employed, where required, to maintain the proper direction of flow.

TORNADO DAMPERS - Tornado dampers are employed where isolation from the effects of extreme wind or tornado conditions is required. These dampers close with the flow produced by the differential pressure associated with the tornado or high winds.

9.4.1.2.3 System Operation

GENERAL - The control building is serviced by an outside air supply system which provides fresh cooled or heated air to each of the various levels of the building. Self-contained air-conditioning units serve the control room elevation and the Class 1E electrical equipment floors. Local fan-coil units serve the access control floor and the nonvital areas of the electrical and mechanical equipment level and the counting room.

Two exhaust systems also service the building. The control building exhaust system takes suction from the clean areas of the building, and the access control exhaust system takes suction from the potentially contaminated areas of the access control floor and the basement beneath. The control building exhaust system discharges directly to the atmosphere while the access control exhaust system processes the exhaust air through a charcoal adsorber train prior to discharging through the unit vent. The relative locations of all power block buildings and the location of the radiation release points are shown on FSAR Figure 1.2-1. FSAR Figure 11.3-2 identifies the release points of potentially radioactive gaseous effluents.

Cooling water for the nonessential units is supplied by the central chilled water system (Section 9.4.10), and cooling water for the safety-related units is supplied by the essential service water system (except that during cold shutdown or refueling conditions (Modes 5 and 6 per the plant's Technical Specifications), one (and only one) of the two control room air-conditioning units may have normal service water solely aligned to it as its heat sink (i.e., without essential service water available), as permitted by the plant's Technical Specifications for such conditions) (Section 9.2.1). Hot water for the control building supply air unit is supplied by the plant heating system (Section 9.4.9).

Discussed below are the power generation operations, fire operation, and emergency operations of the control building HVAC systems. Shutdown operations are identical to the power generation operations.

POWER GENERATION OPERATION - The control building supply air system draws in outside air, filters it through low efficiency particulate filters, either cooling it with a chilled-water coil or heating it with a hot-water coil, and distributes the conditioned air to separate floors of the control building. The normal source of outside air is provided by the intake plenum located on top of the auxiliary building which is identified as an HVAC penthouse located between building column lines A-3 and A-1 and A-J and A-H on FSAR Figure 1.2-14.

The normal control building air intake is located approximately 113 feet horizontally and 138 feet below the unit vent discharge point, 385 feet horizontally and 15 feet above the radwaste building vent discharge point, and 39 feet (nearest exhaust vent) to 318 feet (farthest exhaust vent) horizontally and 57 feet below the turbine building exhaust fan discharge points.

The control building supply air system intake is in a penthouse atop the auxiliary building, which is located approximately 15 feet below and 135 feet horizontally from the diesel exhaust discharge point. This separation is sufficient to provide significant dilution of the diesel exhaust gases; therefore, operation of the diesel during normal plant operations poses no danger to the occupants of the control room or other areas of the building.

The heating or cooling mode of operation of the outside air supply unit is a function of the outside air temperature only. When the outside air temperature exceeds 65°F, conditioned outside air is supplied to the building. When the outside air temperature is

between 65 and 50°F, unconditioned outside air is supplied to the building. When the outside air temperature is below 50°F, the heating system is operational. These operations are controlled by temperature switches, located in the ductwork upstream of the coils, which sense the outside air temperature and function accordingly.

When the outside air temperature rises above 65°F, the temperature switch associated with the cooling system activates the supply unit cooling control system. This control system then functions to maintain a constant supply air temperature of 60°F by modulating the flow of chilled water to the coil.

While the outside air temperature is between 65 and 50°F, the supply unit continues to operate, supplying unconditioned air to the building.

When the outside air temperature falls below 50°F, a temperature switch activates the supply unit heating control system. This control system then functions to maintain the temperature of the air leaving the coil at 65°F. The supply unit heating coil is supplied from a secondary hot-water loop to prevent the possible freezeup of the coil when the outside air temperature falls below 32°F. A temperature switch is provided in the outside air unit, downstream of the coils. This temperature switch will trip the supply unit, should the supply temperature drop below 40°F, to protect the coils from freezing.

Air from the control building supply system is supplied to the space above the access control area to remove the heat generated by electric cables. This cooling is provided to minimize the amount of cooling required for the spaces below. During periods of control building isolation, cooling is not required since the ambient temperature in the area will not exceed the ambient design rating (50°C) of the Class 1E power cables.

Supplemental heating for the access control area is provided by electric duct heaters located in the supply air mains serving that area. The heaters are interlocked with the supply fan, and operation of the heaters is controlled by room temperature switches which function to maintain space temperatures between 60 and 70°F.

Supplemental heating is also provided by electric unit heaters strategically located in the upper cable spreading room, the lower cable spreading room, the ESF switchgear rooms, the basement areas, and the control room air-conditioning equipment rooms. Each heater is sized for its specific location and is thermostatically controlled to maintain the space design temperature requirements of 60°F or above.

Air from the clean areas of the control building is exhausted by the control building exhaust system. Air from the potentially contaminated areas of the control building is exhausted by the access control exhaust system. Exhaust air from the access control exhaust system is processed through a charcoal filtration train for cleanup prior to discharge through the unit vent. Exhaust hoods are provided in the hot lab over the rinse sink and over the sample test area. The hoods in the hot lab contain an integral exhaust air bypass arrangement for periods when flow through a hood is not required. The hoods are used as part of the normal exhaust from the spaces and, therefore, contain no isolation provisions.

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One of each of the two control building exhaust fans and access control exhaust fans runs continuously during normal plant operations. The motor-operated discharge isolation dampers (one associated with each control building exhaust fan) operate in conjunction with their corresponding fans. Automatic back-draft dampers (one associated with each access control exhaust fan) operate in conjunction with their corresponding fans.

The control building exhaust system serves to remove the hydrogen generated by the batteries during normal plant operation. The quantity of air exhausted from each of the battery rooms is well in excess of that which was calculated as necessary to maintain the concentration of hydrogen in the rooms, under the worst conditions, below the flammability limit.

A differential pressure indicator controller, located across the access control filter adsorber unit, modulates a damper downstream of the filter train to maintain a constant system resistance as the particulate filters load up. This control arrangement will assure a constant system flow.

Each charcoal adsorber is monitored for charcoal bed temperature. Should the bed temperature approach 200°F, an alarm would sound in the control room via the plant computer to alert the operators of excessive bed heating. Subsequently, should the bed temperature continue to rise, conditions of 300°F and then 400°F will be alarmed in the control room via the plant computer. Each particulate filter bank is provided with differential pressure transmitters wired to the plant computer which will alarm excessive pressure drops.

The access control air-conditioning system operates in a continuous recirculation mode to provide supplemental cooling or heating of the nonvital equipment areas of the electrical and mechanical equipment room and the first aid room, the RP ALARA Office/ Dosimetry Issue & RP work space rooms, and the Pre-Access area.

The system cooling mode of operation is controlled by a temperature controller which senses return air (space) temperature and functions to maintain the spaces at 76°F. If the temperature falls below 74°F, no cooling is provided. If the temperature falls below 65°F, the heating mode is initiated.

The system heating mode is controlled by a temperature controller located in the unit return air ductwork. This controller energizes the electric duct heater, as necessary, to maintain the return air (space) temperature at 65°F.

Additional heating of the two mechanical equipment rooms is provided by an electric duct heater in the branches serving those spaces. These heaters are each sized for the specific room served and are thermostatically controlled to maintain the space design temperature requirements of 60°F or above.

The control room air-conditioning system operates in a continuous recirculation mode to maintain the control room at or below a temperature of 78°F. The amount of cooling provided by the self-contained refrigeration system is self-regulating and, therefore, automatically compensates for changes in the control room heat load.

Heating, if required, is provided by an electric duct heater. This heater is thermostatically controlled to maintain the space above 72°F. The heater serves no safety function.

The Class 1E electrical equipment air-conditioning system is operated in a continuous recirculation mode to maintain the ESF switchgear room, the battery rooms, and the dc switchgear rooms at or below a temperature of 90°F. The temperatures in these rooms may increase to a maximum of 104°F, under design basis accident (DBA) conditions. The amount of cooling provided by the self-contained refrigeration system is self-regulating and, therefore, automatically compensates itself for changes in the room heat loads.

The counting room cooling coil, counting room backup cooling coil, counting room fan-coil unit and filter unit operate in a continuous recirculation mode to provide the necessary cooling, filtration, and humidity control of the counting room atmosphere to maintain a suitable ambience for the electronic equipment and personnel in the room.

During a normal plant operation the amount of cooling provided by the counting room fan coil unit is controlled by a temperature controller located in the return air duct to the unit. The temperature controller functions to modulate the flow of chilled water to the coil so as to maintain the space temperature and thus return air temperature at 74°F. Additional cooling, if required, can be provided by the counting room cooling coil. Operation of this coil is initiated manually from the counting room by means of a handswitch.

During system outages of the chilled water system the amount of cooling provided by the counting room backup cooling coil is controlled by a temperature controller located in the counting room so as to maintain the space temperature at 74°F.

A moisture switch, located in the counting room fan-coil unit return air duct, senses the relative humidity of the return air and operates the humidifier, as required, to maintain the space relative humidity between 40 and 60 percent.

A HEPA and prefilter filter unit are provided upstream of the fan coil unit to minimize the airborne particulates in the space.

The control building supply air unit intake, the control building exhaust system, control room pressurization, and the access control exhaust system contain dampers capable of withstanding the effects of extreme wind or tornado conditions (3 psi total at a rate of 2 psi/second per Regulatory Guide 1.76). These dampers close with a tornado or high winds. The dampers located in the exhaust systems are spring loaded to prevent closure during normal system operations.

Based on the outside air design conditions, design space heat loads and operation of the control building HVAC systems, as described above, no area of the control building (except for the Decon sink area, the Laundry/Respro Decon area, and the shower areas of the access control area) will exceed a relative humidity of 70 percent.