

Auxiliary Building

This building covers elevations 261'-0", 271'-0", 281'-0", and 305'-0". All equipment is located in open areas or cubicles with open doorways. All areas have floor drains with backwater valves to prevent cross flooding of adjacent compartments and equipment pads higher than door thresholds to prevent the accumulation of standing water and prevent flooding of any floor mounted safety related equipment.

Fire protection for all areas consists of hose reels at accessible locations with adequate hose length to reach the equipment to be protected for each area. One location, AB-FZ-4 (penetration area-elev. 281'-0") is protected by an automatic pre-action sprinkler system and AB-FZ-7 (cooling pump area-elev. 305'-0") is protected by an automatic pre-action sprinkler system, which forms a water curtain for the open passageway to adjacent zone AB-FZ-6. Water from the floor drain system flows by gravity to the Auxiliary Building Sump located at elevation 261'-0" where it is pumped to holding tanks. The expected water to be discharged from simultaneous operation of two (2) fire hoses is 250 gpm. The maximum expected flow from either of the two automatic pre-action sprinkler systems is about 400gpm. With an average of 30 floor drains available on each Auxiliary Building elevation and assuming the drain system is running full, 1600 gpm can be removed to the sump.

Charcoal filter plenums in the Aux and Fuel Handling Ventilation and Reactor Purge Systems (elev. 305'-0") contain deluge systems, the largest of which could discharge a total of 408 gpm. This water remains contained within each filter housing and is allowed to drain at a combined flow rate of 130 gpm through 55 separate 1" diameter check valves to open area floor drains adjacent to each filter housing. The main filter room contains 3 separate floor drains with a combined capacity of 160 gpm flowing full.

The following lists major safety related components in the Auxiliary Building with a discussion of water damage prevention features:

TABLE 6-1
WATER DAMAGE STUDY

AUXILIARY BUILDING

EQUIPMENT	FIRE AREA/ZONE	TYPE OF FIRE SUPPRESSION	DISCUSSION
1A & 1B Eng. Safeguards Valves and Heating Control Center	AB-FZ-6, AB-FZ-6a	Manual Hose	Drip shields have been installed on the MCCs to protect against water spray. More substantial protection has been provided by a fire barrier constructed between the two MCCs, thus preventing fire suppression activities at one MCC from affecting the redundant train MCC.

EQUIPMENT	FIRE AREA/ZONE	TYPE OF FIRE SUPPRESSION	DISCUSSION
Nuclear Service Closed Cycle Cooling Water Pumps NS-P-1A NS-P-1B NS-P-1C	AB-FZ-7	Manual Hose	One pump is required during hot shutdown to provide cooling water to makeup pump MU-P-1B during a fire in AB-FZ-7. Circuit protection is provided for NS-P-1A and NS-P-1C. The existing concrete dividers between the pumps provide protection against possible water damage to more than two pumps from a single hose stream spray directed to one area. Pre-fire plan for AB-FZ-7 advises caution.
Decay Heat Closed Cycle Cooling Water Pumps DC-P-1A DC-P-1B	AB-FZ-7	Manual Hose	DC pump is not required for hot shutdown. One pump is required to provide cooling water to the decay heat removal coolers during cold shutdown. No circuit protection is proposed. Cable for one pump will be repaired. The existing concrete divider between the two pumps provides protection against possible water damage to more than one pump from a single hose stream spray. Pre-fire plan for AB-FZ-7 advises caution.
Intermediate Cooling Water Pumps IC-P-1A IC-P-1B	AB-FZ-7	Manual Hose Automatic Pre-action Type Water Curtain	These two pumps are subject to fire damage and water damage in the event of a fire in AB-FZ-7. Safe shutdown will be achieved without IC pumps for a fire in AB-FZ-7. The intermediate cooling pump motors, IC-P-1A and IC-P-1B, could be degraded by contact with water from the automatic pre-action type water curtain located in this area. A fire occurring in AB-FZ-6 or FH-FZ-2 could damage IC-P-1B circuits in AB-FZ-6 and actuate the water curtain. Circuits for IC-P-1A are not located in either FH-FZ-2 or AB-FZ-6. A water shield (to protect the pump motor from water damage) is provided for the IC-P-1A pump motor, which is required for safe shutdown in the event of a fire occurring in either AB-FZ-6 or FH-FZ-2.

The areas where the safety related equipment is located will not flood with standing water. Excess water in any isolated cubicle will flow through doorways to adjacent drains with the overall drains system on each elevation able to remove all water that can be expected to be discharged through the use of fire fighting equipment. Water flowing from the charcoal filter plenums will be removed by the floor drain systems with no possibility of standing water in the filter rooms.

Air Intake Tunnel

This area consists of a 210 foot long underground outside air entrance to the plant that is equipped with sensors to detect the presence of combustible gas or liquids. The entire length of the tunnel is covered with Halon 1301 and 3 deluge systems with drainage provided by nine 6" drains that flow to a sump located at the tunnel entrance. The sump is provided with three (3) sump pumps. SD-P-7 has a capacity of 2000 gpm. SD-P-8A and SD-P-8B each have a capacity of 20 gpm.

The maximum fire suppression flowrate demand, 1720 gpm, is based on Air Intake Tunnel deluge system actuation when all three Air Intake Tunnel systems actuate (Ref. OPE-03-025 dated 4-28-04). The floor drains systems running full will remove about 157 gpm to the sump, which is insignificant compared to the majority of flow, which drains to the sump over the floor. Sump pump SD-P-7 is sized to remove water at the rate it may enter from all fire protection equipment. There is no equipment located in this area that is required for safe shutdown.

Control Building

This building covers elevations 306'-0", 322'-0", 338'-6", 355'-0" and 380'-0" and includes the following safety related equipment: charcoal filter plenums, batteries, A.C./D.C. distribution panels, inverters, 480V switchgear, engineered safeguard cabinets, motor control centers, DC transfer switch panels, relay cabinets 4160V switchgear, actuation cabinets, safeguard relay cabinets, control consoles, nuclear reactor panels, remote shutdown panels, normal, emergency and return air fans and electrical cable trays. All safety related electrical equipment in this building is on raised pedestals.

CB-FA-1 (elev.-306'-0") – This floor is protected by a sprinkler system and has no open area floor drains except in the locker and toilet facilities. A charcoal filter plenum has an internal deluge system that discharges about 33 gpm, is contained in the unit and is piped to the radioactive drain collection system.

CB-FA-2a-2g (elev.-322'-0") – This floor is protected by two manual hose stations and has no floor drain system.

CB-FA-3a-3d (elev. 338'-6") - This floor is protected by two manual hose stations and has no floor drain system. The relay room is protected by an automatic total flooding CO₂ System. The ESAS room is protected by a manually actuated dry sprinkler system equipped with fusible head nozzles. Drip shields are provided for ES Actuation cabinets A & B and ES Relay cabinets 1, 2 & 3 to protect them from the water spray.

CB-FA-4a-4b (elev. 355'-0") - This floor is protected by two manual hose stations and has no floor drain system.

CB-FZ-5a-5b (elev. 380'-0") - This floor is protected by two manual hose stations and has two open area floor drain systems for each fire zone. One drain system adjacent to the charcoal filter plenum is for the collection of the 150 gpm discharge from the charcoal filter deluge system.

While the discharge rate of the deluge system is more than the capacity of the 4" drain, the plenum contains the excess water to meter its flow to the drain system. The other open area floor drain is connected to the sanitary system. .

With flat floors and the lack of open floor drainage, the possible use of water will make it necessary to let water run out doorways, down stairwells and open hatchways to the lower floors. This water would drain to the Turbine Building or the Fuel Handling Bldg. with no standing water in the Control Building.

Tests of the automatic CO₂ System have demonstrated that the concentration after initiation of the system results in a concentration of approximately 50% within 3-4 minutes and has no effect upon the performance of instrumentation. (Ref. Report 0003 attached to GEM 3531 dated 12/3/76)

Diesel Generator Building

This building has a floor elevation of 305'-0" and houses the following safety related equipment. DG-FA-1 houses an emergency diesel generator and ventilation system. DG-FA-2 houses an emergency diesel generator, fuel and ventilation system. Both areas are protected by automatic area wet pipe sprinklers and deluge systems at the air intakes as well as manual hose stations.

The floor drain systems in DG-FA-1 and DG-FA-2 are physically isolated by an expandable plug in the under-floor drain pipe between the two fire areas. In addition, the drain system is isolated from the yard by locked closed stop check valve SD-V-125 in DG-FA-1. Since the drain system is isolated, all water discharged by sprinkler or deluge systems would accumulate in sumps, and overflow through the associated entry door and into the associated relay cabinet room. To prevent water from adversely impacting the non-affected diesel, the pre-fire plans direct the door between DG-FA-1 and DG-FA-2 relay cabinet rooms to be diked. For a fire affecting DG-FA-1, the dike would direct the water through the North door, and into the yard adjacent to the building. For a fire affecting DG-FA-2, the dike would direct the water through the door connecting the Service Building and Diesel Generator Building and into the Service Building Maintenance Assembly area. The floor slopes downward away from both sides of the door between the DG-FA-1 and DG-FA-2 relay cabinet rooms and assists in preventing water from adversely impacting the other, non-affected diesel.

Fuel Handling Building

This building covers elevation 281'-0", 305'-0", 329'-0" and 348'-0". The only safety related components in this building are the nuclear service cooling surge tanks on elev. 329'-0". Fire protection consists of manual hose stations at all elevations.

Floor drains located on elevation 281'-0" would collect water drainage down floor openings, hatches and stairwells from above. However, there is no safety related equipment on that could be damaged by standing water.

Intermediate Building

This building covers elevation 281'-0", 305'-0", 329'-0" and 348'-0" and includes the following safety related equipment: emergency feedwater pumps and valves, and Reactor Building cooling unit water isolation valves. Fire protection consists of manual hose stations. All components are located in cubicles with drain sumps interconnected with 6" drain piping.

The following lists major safety related components in the Intermediate Building with a discussion of water damage prevention features:

TABLE 6-1(CONT'D)
WATER DAMAGE STUDY

EQUIPMENT	FIRE AREA/ZONE	TYPE OF FIRE SUPPRESSION	DISCUSSION
Motor-Driven Emergency Feedwater Pumps EF-P-2A EF-P-2B	IB-FZ-3	Manual Hose	During a fire in IB-FZ-3, both EF-P-2A and EF-P-2B may be damaged. EFW valves may spuriously operate. It is planned to utilize high pressure injection cooling in lieu of the normal decay heat removal by the EFW system. After the fire, the EFW flow path is manually re-established using the turbine-driven EFW pump. The motor-driven EFW pumps will not be used. Hence, additional damage due to fire suppressant has no consequence to safe shutdown.

The areas at elevation 295'-0" where the safety related equipment is located are in small cubicles that have drain sumps which can remove water at about 157 gpm. Hose discharge at about 125 gpm could not flood the area above equipment pads. All other elevations in this building have adequate drainage.

Intake Screen and Pump House

This building covers elevation 308'-0" and includes the following safety related components: ventilation units, control centers, nuclear service, decay heat river water and Reactor Building emergency cooling pumps. Fire protection consists of automatic area wet pipe sprinklers and manual hose protection. Floor drains flow directly (straight down) to the intake below elevation 308'-0".

The capacity of a vertical drain is 2.4 times that of a sloped horizontal drain. There is no possibility of standing water near any safety related equipment.

Reactor Building

This building covers elevations 281'-0", 308'-0" and 346'-0" and includes the following safety related components: steam generators, isolation valves, cooling units, pressurizer, air filter unit, switches and pressure detectors. All equipment is located in open areas that are equipped with floor drains. Fire protection in the reactor building consists of manual hose stations and a deluge spray system in the kidney charcoal filter. The spray water is collected and sent to a holding tank and continues to be pumped through the spray system. This water does not flow to an open drain system.

The following lists major safety related components in the Reactor Building with a discussion of water damage prevention features:

TABLE 6-1(CONT'D)
WATER DAMAGE STUDY

EQUIPMENT	FIRE AREA/ZONE	TYPE OF FIRE SUPPRESSION	DISCUSSION
Pressurizer Heaters RC-GRP-8 RC-GRP-9	RB-FZ-1d	Manual Hose	Pressurizer heaters will be used for the reactor coolant pressure control only if they are available. The cables are not protected. If the redundant pressurizer heaters are lost due to a fire, RCS pressure will be controlled by the makeup and letdown systems. Hence, water damage to heater terminals and cables has no real consequences.
Reactivity NI-11, NI-12	RB-FZ-3		One instrument is required for each process monitoring function. Cables and transmitters for the following instruments are protected in the reactor building:
RCS Outlet Temperature RC4A-TE-1, RC4A-TE-4, RC-TE-958, RC4B-TE-1, RC4B-TE-4, RC-TE-960	RB-FZ-1d RB-FZ-1e		NI-12 RC-TE-960 RC-TE-961 RC-PT-949 RC1-LT-3 with RC2-TE-2 FW-LT-775 FW-LT-776 MS-PT-950 MS-PT-951
RCS Inlet Temperature RC5A-TE-2, RC5A-TE-4, RC-TE-959, RC5B-TE-2 RC5B-TE-4, RC-TE-961	RB-FZ-1d RB-FZ-1e		
RCS Pressure RC3A-PT-3, RC-PT-963, RC-PT-949	RB-FZ-3		

Pressurizer Level RC1-LT-1 RC1-LT-3,RC-LT-777 RC2-TE-1, RC1-TE-2	RB-FZ-1b RB-FZ-1a RB-FZ-1d		The protected circuits and instruments have either fire barrier wraps or fire rated Rockbestos Firezone R cables, which will withstand hose stream sprays. All wiring is terminated using butt splices, which are sealed against the water heat shrink tubing. At the instruments, CONAX connectors are used to seal the instrument body terminations against the water. The fire rated cable and fire barrier wraps on the circuits will withstand significant damage from fire hose streams based on previous fire tests. The radiant energy heat shields on the protected instruments are not completely enclosed, but the instruments have been qualified for a LOCA.
SG-A Level FW-LT-775 FW-LT-789	RB-FZ-1b		
SG-B Level FW-LT-788 FW-LT-776	RB-FZ-1c		
SG-A Pressure SP6A-PT-1, SP6A-PT-2, MS-PT-950	RB-FZ-2		
SG-B Pressure SP6B-PT-1, SP6B-PT2, MS-PT-951	RB-FZ-2		

The floor drain system is adequate for local cleanup and spills. There is no possibility for any safety-related equipment to be in standing water.