

## Basis

The spray systems in each reactor unit consist of two separate parallel Containment Spray Subsystems, each of 100 percent capacity, and four separate parallel Recirculation Spray Subsystems, each of 50 percent capacity.

Each Containment Spray Subsystem draws water independently from the refueling water storage tank (RWST). The water in the tank is cooled to 45°F or below by circulating the water through one of the two RWST coolers with one of the two recirculating pumps. The water temperature is maintained by two mechanical refrigerating units as required. In each Containment Spray Subsystem, the water flows from the tank through an electric motor driven containment spray pump and is sprayed into the containment atmosphere through two separate sets of spray nozzles. The capacity of the spray systems to depressurize the containment in the event of a Design Basis Accident is a function of the pressure and temperature of the containment atmosphere, the service water temperature, and the temperature in the refueling water storage tank as discussed in the Basis of Specification 3.8.

Each Recirculation Spray Subsystem draws water from the common containment sump. In each subsystem the water flows through a recirculation spray pump and recirculation spray cooler, and is sprayed into the containment atmosphere through a separate set of spray nozzles. Two of the recirculation spray pumps are located inside the containment and two outside the containment in the containment auxiliary structure.

With one Containment Spray Subsystem and two Recirculation Spray Subsystems operating together, the spray systems are capable of cooling and depressurizing the containment to 0.5 psig in less than 60 minutes and to subatmospheric pressure within 4 hours following the Design Basis Accident. The Recirculation Spray Subsystems are capable of maintaining subatmospheric pressure in the containment indefinitely following the Design Basis Accident when used in conjunction with the Containment Vacuum System to remove any long term air inleakage. The radiological consequences analysis demonstrates acceptable results provided the containment pressure does not exceed 0.5 psig (from 1 hour to 4 hours) and is maintained less than 0.0 psig (after 4 hours).

TABLE 3.7-5  
 AUTOMATIC FUNCTIONS  
 OPERATED FROM RADIATION MONITORS ALARM

<u>Monitor Channel</u>	<u>Automatic Function At Alarm Conditions</u>	<u>Monitoring Requirements</u>	<u>Alarm Setpoint <math>\mu</math> CI/cc</u>
1. Component cooling water radiation monitors	Shuts surge tank vent valve HCV-CC-100	See Specification 3.13	Twice Background

If the containment air partial pressure rises to a point above the allowable value the reactor shall be brought to the HOT SHUTDOWN condition. If a LOCA occurs at the time the containment air partial pressure is at the maximum allowable value, the maximum containment pressure will be less than design pressure (45 psig), the containment will depressurize to 0.5 psig within 1 hour and less than 0.0 psig within 4 hours. The radiological consequences analysis demonstrates acceptable results provided the containment pressure does not exceed 0.5 psig for the interval from 1 to 4 hours following the Design Basis Accident.

If the containment air partial pressure cannot be maintained greater than or equal to 9.0 psia, the reactor shall be brought to the HOT SHUTDOWN condition. The shell and dome plate liner of the containment are capable of withstanding an internal pressure as low as 3 psia, and the bottom mat liner is capable of withstanding an internal pressure as low as 8 psia.

#### References

UFSAR Section 4.3.2	Reactor Coolant Pump
UFSAR Section 5.2	Containment Isolation
UFSAR Section 5.2.1	Design Bases
UFSAR Section 5.5.2	Isolation Design
UFSAR Section 6.3.2	Containment Vacuum System

### 3.10 REFUELING

#### Applicability

Applies to operating limitations during REFUELING OPERATIONS or irradiated fuel movement in the Fuel Building.

#### Objective

To assure that no accident could occur during REFUELING OPERATIONS or irradiated fuel movement in the Fuel Building that would affect public health and safety.

#### Specification

A. During REFUELING OPERATIONS the following conditions are satisfied:

1. The equipment access hatch and at least one door in the personnel airlock shall be capable of being closed. For those penetrations which provide a direct path from containment atmosphere to the outside atmosphere, the containment isolation valves shall be OPERABLE or the penetration shall be closed by a valve, blind flange, or equivalent or the penetration shall be capable of being closed.

2. At least one source range neutron detector shall be in service at all times when the reactor vessel head is unbolted. Whenever core geometry or coolant chemistry is being changed, subcritical neutron flux shall be continuously monitored by at least two source range neutron detectors, each with continuous visual indication in the Main Control Room and one with audible indication within the containment. During core fuel loading phases, there shall be a minimum neutron count rate detectable on two operating source range neutron detectors with the exception of initial core loading, at which time a minimum neutron count rate need be established only when there are eight (8) or more fuel assemblies loaded into the reactor vessel.
3. The manipulator crane area monitors and the containment particulate and gas monitors shall be OPERABLE and continuously monitored to identify the occurrence of a fuel handling accident.

4. At least one residual heat removal pump and heat exchanger shall be OPERABLE to circulate reactor coolant. The residual heat removal loop may be removed from operation for up to 1 hour per 8-hour period during the performance of core alterations or reactor vessel surveillance inspections.
5. Two residual heat removal pumps and heat exchangers shall be OPERABLE to circulate reactor coolant when the water level above the top of the reactor pressure vessel flange is less than 23 feet.
6. At least 23 feet of water shall be maintained over the top of the reactor pressure vessel flange during movement of fuel assemblies.
7. With the reactor vessel head unbolted or removed, any filled portions of the Reactor Coolant System and the refueling canal shall be maintained at a boron concentration which is:
  - a. Sufficient to maintain K-effective equal to 0.95 or less, and
  - b. Greater than or equal to 2300 ppm and shall be checked by sampling at least once every 72 hours.
8. Direct communication between the Main Control Room and the refueling cavity manipulator crane shall be available whenever changes in core geometry are taking place.
9. No movement of irradiated fuel in the reactor core shall be accomplished until the reactor has been subcritical for a period of at least 100 hours.

10. A spent fuel cask or heavy loads exceeding 110 percent of the weight of a fuel assembly (not including fuel handling tool) shall not be moved over spent fuel, and only one spent fuel assembly will be handled at one time over the reactor or the spent fuel pit.

This restriction does not apply to the movement of the transfer canal door.

11. Two trains of the control and relay room emergency ventilation system shall be OPERABLE. With one train inoperable for any reason, demonstrate the other train is OPERABLE by performing the test in Specification 4.20.A.1. With both trains inoperable, comply with Specification 3.10.C.
12. Two trains of the control room bottled air system shall be OPERABLE. With one train inoperable for any reason, restore the inoperable train to OPERABLE status within 7 days or comply with Specification 3.10.C. With two trains inoperable, comply with Specification 3.10.C.

B. During irradiated fuel movement in the Fuel Building the following conditions are satisfied:

1. The fuel pit bridge area monitor and the ventilation vent stack 2 particulate and gas monitors shall be OPERABLE and continuously monitored to identify the occurrence of a fuel handling accident.
2. A spent fuel cask or heavy loads exceeding 110 percent of the weight of a fuel assembly (not including fuel handling tool) shall not be moved over spent fuel, and only one spent fuel assembly will be handled at one time over the reactor or the spent fuel pit.

This restriction does not apply to the movement of the transfer canal door.

3. A spent fuel cask shall not be moved into the Fuel Building unless the Cask Impact Pads are in place on the bottom of the spent fuel pool.

4. Two trains of the control and relay room emergency ventilation system shall be OPERABLE. With one train inoperable for any reason, demonstrate the other train is OPERABLE by performing the test in Specification 4.20.A.1. With both trains inoperable, comply with Specification 3.10.C.
  5. Two trains of the control room bottled air system shall be OPERABLE. With one train inoperable for any reason, restore the inoperable train to OPERABLE status within 7 days or comply with Specification 3.10.C. With two trains inoperable, comply with Specification 3.10.C.
- C. If any one of the specified limiting conditions for refueling is not met, REFUELING OPERATIONS or irradiated fuel movement in the Fuel Building shall cease, work shall be initiated to correct the conditions so that the specified limit is met, and no operations which increase the reactivity of the core shall be made.
- D. After initial fuel loading and after each core refueling operation and prior to reactor operation at greater than 75% of rated power, the movable incore detector system shall be utilized to verify proper power distribution.
- E. The requirements of 3.0.1 are not applicable.

## Basis

Detailed instructions, the above specified precautions, and the design of the fuel handling equipment, which incorporates built-in interlocks and safety features, provide assurance that an accident, which would result in a hazard to public health and safety, will not occur during unit REFUELING OPERATIONS or irradiated fuel movement in the Fuel Building. When no change is being made in core geometry, one neutron detector is sufficient to monitor the core and permits maintenance of the out-of-function instrumentation. Continuous monitoring of radiation levels and neutron flux provides immediate indication of an unsafe condition.

Potential escape paths for fission product radioactivity within containment are required to be closed or capable of closure to prevent the release to the environment. However, since there is no potential for significant containment pressurization during refueling, the Appendix J leakage criteria and tests are not applicable.

The containment equipment access hatch, which is part of the containment pressure boundary, provides a means for moving large equipment and components into and out of the containment. During REFUELING OPERATIONS, the equipment hatch must be capable of being closed.

The containment airlocks, which are also part of the containment pressure boundary, provide a means for personnel access during periods when CONTAINMENT INTEGRITY is required. Each airlock has a door at both ends. The doors are normally interlocked to prevent simultaneous opening. During periods of unit shutdown when containment closure is not required, the door interlock mechanism may be disabled, allowing both doors to remain open for extended periods when frequent containment entry is necessary. During REFUELING OPERATIONS, containment closure does not have to be maintained, but airlock doors may need to be closed to establish containment closure. Therefore, the door interlock mechanism may remain disabled, but one airlock door must be capable of being closed.

Containment penetrations that terminate in the Auxiliary Building or Safeguards and provide direct access from containment atmosphere to outside atmosphere must be isolated or capable of being closed by at least one barrier during REFUELING OPERATIONS. The other containment penetrations that provide direct access from containment atmosphere to outside atmosphere must be isolated by at least one barrier during REFUELING OPERATIONS. Isolation may be achieved by an OPERABLE isolation valve, a closed valve, a blind flange, or by an equivalent isolation method. Equivalent isolation methods must be evaluated and may include use of a material that can provide a temporary, atmospheric pressure ventilation barrier.

For the personnel airlock, equipment access hatch, and other penetrations, 'capable of being closed' means the openings are able to be closed; they do not have to be sealed or meet the leakage criteria of TS 4.4. Station procedures exist that ensure in the event of a fuel handling accident, that the open personnel airlock and other penetrations can and will be closed. Closure of the equipment hatch will be accomplished in accordance with station procedures and as allowed by dose rates in containment. The radiological analysis of the fuel handling accident does not take credit for closure of the personnel airlock, equipment access hatch or other penetrations.

The fuel building ventilation exhaust and containment ventilation purge exhaust may be diverted through charcoal filters whenever refueling is in progress. However, there is no requirement for filtration since the Fuel Handling Accident analysis takes no credit for these filters. At least one flow path is required for cooling and mixing the coolant contained in the reactor vessel so as to maintain a uniform boron concentration and to remove residual heat.

During refueling, the reactor refueling water cavity is filled with approximately 220,000 gal of water borated to at least 2,300 ppm boron. The boron concentration of this water, established by Specification 3.10.A.9, is sufficient to maintain the reactor subcritical by at least 5%  $\Delta k/k$  in the COLD SHUTDOWN condition with all control rod assemblies inserted. This includes a 1%  $\Delta k/k$  and a 50 ppm boron concentration allowance for uncertainty. This concentration is also sufficient to maintain the core subcritical with no control rod assemblies inserted into the reactor. Checks are performed during the reload design and safety analysis process to ensure the K-effective is equal to or less than 0.95 for each core. Periodic checks of refueling water boron concentration assure the proper shutdown margin. Specification 3.10.A.10 allows the Control Room Operator to inform the manipulator operator of any impending unsafe condition detected from the main control board indicators during fuel movement.

In addition to the above safeguards, interlocks are used during refueling to assure safe handling of the fuel assemblies. An excess weight interlock is provided on the lifting hoist to prevent movement of more than one fuel assembly at a time. The spent fuel transfer mechanism can accommodate only one fuel assembly at a time.

Upon each completion of core loading and installation of the reactor vessel head, specific mechanical and electrical tests will be performed prior to initial criticality.

The fuel handling accident has been analyzed based on the methodology outlined in Regulatory Guide 1.183. The analysis assumes 100% release of the gap activity from the assembly with maximum gap activity after a 100-hour decay period following operation at 2605 MWt.

Detailed procedures and checks insure that fuel assemblies are loaded in the proper locations in the core. As an additional check, the movable incore detector system will be used to verify proper power distribution. This system is capable of revealing any assembly enrichment error or loading error which could cause power shapes to be peaked in excess of design value.

#### References

UFSAR Section 5.2	Containment Isolation
UFSAR Section 6.3	Consequence Limiting Safeguards
UFSAR Section 9.12	Fuel Handling System
UFSAR Section 11.3	Radiation Protection
UFSAR Section 13.3	Table 13.3-1
UFSAR Section 14.4.1	Fuel Handling Accidents
FSAR Supplement:	Volume I: Question 3.2

If the requirements of Specification 3.19.B.1, 3.19.B.2, or 3.19.B.3 are not met within 48 hours after achieving HOT SHUTDOWN, both units shall be placed in COLD SHUTDOWN within the next 30 hours.

#### Basis

Following a design basis accident, the containment will be depressurized to 0.5 psig in less than 1 hour and to subatmospheric pressure within 4 hours. The radiological consequences analysis demonstrates acceptable results provided the containment pressure does not exceed 0.5 psig for the interval from 1 to 4 hours following the Design Basis Accident. Beyond 4 hours, containment pressure is assumed to be less than 0.0 psig, terminating leakage from containment. The main control room is maintained at a positive differential pressure using bottled air during the first hour, when the containment leakrate is greatest.

The main control room is contained in the control room pressure boundary or envelope, which is defined in the Technical Specification 3.23 Basis.

The control room pressure boundary is permitted to be opened intermittently under administrative control without declaring the boundary inoperable. The administrative control must provide the capability to re-establish the control room pressure boundary. For normal ingress into and egress from the pressure boundary, the individual entering or exiting the area has control of the door.

### 3.22 AUXILIARY VENTILATION EXHAUST FILTER TRAINS

#### Applicability

Applies to the ability of the safety-related system to remove particulate matter and gaseous iodine following a LOCA.

#### Objective

To specify requirements to ensure the proper function of the system.

#### Specification

- A. Whenever either unit's Reactor Coolant System temperature and pressure is greater than 350°F and 450 psig, respectively, two auxiliary ventilation exhaust filter trains shall be OPERABLE with:
1. Two filter exhaust fans;
  2. Two HEPA filter and charcoal adsorber assemblies.
- B. With one train of the exhaust filter system inoperable for any reason, return the inoperable train to an operable status within 7 days or be in at least Hot Shutdown within the next 6 hours and in Cold Shutdown within the following 48 hours.

Basis

The purpose of the filter trains located in the auxiliary building is to provide standby capability for removal of particulate and iodine contaminants from the exhaust air of the charging pump cubicles of the auxiliary building, fuel building, decontamination building, containment (during shutdown) and safeguards building adjacent to the containment which discharge through the ventilation vent and could require filtering prior to release. During normal plant operation, the exhaust from any one of these areas can be diverted, if required, through the auxiliary building filter trains remotely from the control room. The safeguards building exhaust and the charging pump cubicle exhaust are automatically diverted through the filter trains in the event of a LOCA (diverted on a safety injection system signal). The fuel building exhaust and purge exhaust are not required to be aligned to pass through the filters during spent fuel handling since the Fuel Handling Accident analysis takes no credit for these filters.

High efficiency particulate air (HEPA) filters are installed before the charcoal adsorbers to prevent clogging of the iodine adsorbers. The charcoal adsorbers are installed to reduce the potential release of radioiodine to the environment.