

3.3 EMERGENCY CORE COOLING, REACTOR BUILDING COOLING, AND
REACTOR BUILDING SPRAY SYSTEMS

Applicability

Applies to the emergency core cooling, reactor building cooling, and reactor building spray systems.

Objective

To define the conditions necessary to assure immediate availability of the emergency core cooling, reactor building cooling, and reactor building spray systems.

Specification

- 3.3.1 The following equipment shall be operable whenever there is fuel in the reactor vessel and reactor coolant pressure is 350 psig or greater or reactor coolant temperature is 250°F or greater:
- (a) One reactor building spray pump and its associated spray nozzle header.
 - (b) Two low pressure service water pumps for Units 1 and 2, and two low pressure service water pumps for Unit 3. The valve in the discharge from the reactor building cooler (LPSW 108, 2LPSW 108, and 3LPSW 108) shall be locked open.
 - (c) A and B Engineered Safety Feature low pressure injection pumps shall be operable.
 - (d) Two low pressure injection coolers shall be operable.
 - (e) Two BWST level instrument channels shall be operable.
 - (f) The borated water storage tank shall contain a minimum level of 46 feet of water having a minimum concentration of 1,800 ppm boron at a temperature not less than 40°F. The manual valve, LP-28, on the discharge line from the borated water storage tank shall be locked open.
 - (g) The two reactor building emergency sump isolation valves shall be either manually or remote-manually operable.
 - (h) Two reactor building cooling fans and associated cooling units.
 - (i) The Engineered Safety Features valves associated with each of the above systems shall be operable.

- 3.3.2 In addition to 3.3.1 above, the following ECCS equipment shall be operable when the reactor coolant system is above 350°F and irradiated fuel is in the core:
- (a) Two high pressure injection pumps shall be maintained operable to provide redundant and independent flow paths.
 - (b) Engineered Safety Feature valves and interlocks associated with 3.3.2a above shall be operable.
- 3.3.3 In addition to 3.3.1 and 3.3.2 above, the following ECCS equipment shall be operable when the reactor coolant system is above 800 psig:
- (a) The two core flooding tanks shall each contain a minimum of $13 \pm .44$ ft. (1040 ± 30 ft³) of borated water at 600 ± 25 psig.
 - (b) Core flooding tank boron concentration shall not be less than 1,800 ppm boron.
 - (c) The electrically-operated discharge valves from the core flood tanks shall be open and breakers locked open and tagged.
 - (d) One pressure instrument channel and one level instrument channel per core flood tank shall be operable.
- 3.3.4 The reactor shall not be made critical unless the following equipment in addition to 3.3.1, 3.3.2, and 3.3.3 is operable.
- (a) The other reactor building spray pump and its associated spray nozzle header.
 - (b) The remaining reactor building cooling fan and associated cooling unit.
 - (c) Engineered Safety Feature valves and interlocks associated with 3.3.4a and 3.3.4b shall be operable.
- 3.3.5 Except as noted in 3.3.6 below, tests or maintenance shall be allowed during power operation on any component(s) in the high pressure injection, low pressure injection, low pressure service water, reactor building spray, reactor building cooling which will not remove more than one train of each system from service. Components shall not be removed from service so that the affected system train is inoperable for more than 24 consecutive hours. If the system is not restored to meet the requirements of Specification 3.3.1, 3.3.2, 3.3.3, or 3.3.4, within 24 hours, the reactor shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.3.1, 3.3.2, 3.3.3, or 3.3.4 are not met within an additional 48 hours, the reactor shall be placed in a condition below that reactor coolant system condition required in Specification 3.3.1, 3.3.2, 3.3.3, or 3.3.4 for the component degraded.

ponents shall be based on the results of testing as required by Technical Specification 4.5. The maintenance period of up to 24 hours is acceptable if the operability of equipment redundant to that removed from service is demonstrated immediately prior to removal. The basis of acceptability is a likelihood of failure within 24 hours following such demonstration.

It has been shown for the worst design basis loss-of-coolant accident (a 14.1 ft² hot leg break) that the reactor building design pressure will not be exceeded with one spray and two coolers operable. Therefore, a maintenance period of seven days is acceptable for one reactor building cooling fan and its associated cooling unit. (3)

In the event that the need for emergency core cooling should occur, functioning of one train (one high pressure injection pump, one low pressure injection pump, and both core flooding tanks) will protect the core and in the event of a main coolant loop severance, limit the peak clad temperature to less than 2,300^oF and the metal-water reaction to that representing less than 1 percent of the clad.

Three low pressure service water pumps serve Oconee Units 1 and 2 and two low pressure service water pumps serve Oconee Unit 3. There is a manual cross-connection on the supply headers for Units 1, 2, and 3. One low pressure service water pump per unit is required for normal operation. The normal operating requirements are greater than the emergency requirements following a loss-of-coolant accident.

REFERENCES

- (1) FSAR, Section 14.2.2.3
- (2) FSAR, Section 9.5.2
- (3) FSAR, Supplement 13
- (4) FSAR, Section 6.4

The specification requiring testing of the Reactor Building purge isolation is to verify that these components will function as required should a fuel handling accident occur which resulted in the release of significant fission products.

Specification 3.8.11 is required, as the safety analysis for the fuel handling accident was based on the assumption that the reactor had been shutdown for 72 hours.(3)

The off-site doses for the fuel handling accident are within the guidelines of 10 CFR 100; however, to further reduce the doses resulting from this accident, it is required that the spent fuel pool ventilation system be operable whenever the possibility of a fuel handling accident could exist.

REFERENCES

- (1) FSAR, Section 9.7
- (2) FSAR, Section 14.2.2.1
- (3) FSAR, Section 14.2.2.1.2

- 3.8.9 If any of the above specified limiting conditions for fuel loading and refueling are not met, movement of fuel into the reactor core shall cease; action shall be initiated to correct the conditions so that the specified limits are met, and no operations which may increase the reactivity of the core shall be made.
- 3.8.10 The reactor building purge system, including the radiation monitor, RIA 45, which initiates purge isolation, shall be tested and verified to be operable immediately prior to refueling operations.
- 3.8.11 Irradiated fuel shall not be removed from the reactor until the unit has been subcritical for at least 72 hours.
- 3.8.12 Two trains of spent fuel pool ventilation shall be operable with the following exceptions:
- a. With one train of spent fuel pool ventilation inoperable, fuel movement within the storage pool or crane operation with loads over the storage pool may proceed provided the operable spent fuel pool ventilation train is in operation and discharging through the Reactor Building purge filters.
 - b. With no spent fuel pool ventilation filter operable, suspend all operations involving movement of fuel within the storage pool or crane operations with loads over the storage pool until at least one train of spent fuel pool ventilation is restored to operable status.

Bases

Detailed written procedures will be available for use by refueling personnel. These procedures, the above specifications, and the design of the fuel handling equipment as described in Section 9.7 of the FSAR incorporating built-in interlocks and safety features, provide assurance that no incident could occur during the refueling operations that would result in a hazard to public health and safety. If no change is being made in core geometry, one flux monitor is sufficient. This permits maintenance on the instrumentation. Continuous monitoring of radiation levels and neutron flux provides immediate indication of an unsafe condition. The low pressure injection pump is used to maintain a uniform boron concentration. (1) The shutdown margin indicated in Specification 3.8.4 will keep the core subcritical, even with all control rods withdrawn from the core. (2) The boron concentration will be maintained above 1,800 ppm. Although this concentration is sufficient to maintain the core $k_{eff} < 0.99$ if all the control rods were removed from the core, only a few control rods will be removed at any one time during fuel shuffling and replacement. The k_{eff} with all rods in the core and with refueling boron concentration is approximately 0.9. Specification 3.8.5 allows the control room operator to inform the reactor building personnel of any impending unsafe condition detected from the main control board indicators during fuel movement.

3.15 PENETRATION ROOM VENTILATION SYSTEMS

Applicability

Applies to the penetration room ventilation systems.

Objective

To define the conditions necessary to assure immediate availability of the penetration room ventilation systems.

Specification

Two trains of the penetration room ventilation systems shall be operable at all times when containment integrity is required or the reactor shall be shutdown within 12 hours with the following exception:

If one of two trains of a penetration room ventilation system is made or found to be inoperable for any reason, reactor operation is permissible only during the succeeding seven days provided that all active components of the other train of the penetration room ventilation system shall be demonstrated to be operable within 24 hours and daily thereafter.

Bases

A single train of reactor building penetration room ventilation equipment retains full capacity to control and minimize the release of radioactive materials from the reactor building to the environment in post-accident conditions.

3.16 HYDROGEN PURGE SYSTEM

Applicability

Applies to the Reactor Building Hydrogen Purge System.

Objective

To define the conditions necessary to assure the availability of the Reactor Building Hydrogen Purge System.

Specification

If the Reactor Building Hydrogen Purge System should become inoperable, it shall be restored to an operable status within 7 days or the Oconee Units shall be shutdown within 36 hours.

Bases

The hydrogen purge system is composed of a portable purging station and a portion of the Penetration Room Ventilation System. The purge system is operated as necessary to maintain the hydrogen concentration below the control limit. The purge discharge from the Reactor Building is taken from one of the Penetration Room Ventilation System penetrations and discharged to the unit vent. A suction may be taken on the Reactor Building via isolation valve PK-7 (Figure 6-5 of the FSAR) using the existing vent and pressurization connections.

The analysis to determine the effect on the incremental doses at the site boundary, resulting from purging hydrogen from the Reactor Building following a postulated LOCA, requires that the purge be started at 460 hours (19.2 days) following the LOCA to limit hydrogen concentration to 4% by volume. If the Hydrogen Purge System is determined to be inoperable, the requirement to restore the system to an operable status within seven days will provide reasonable assurance of its availability in the event of a LOCA.

4.4.3 HYDROGEN PURGE SYSTEM

Applicability

Applies to the Reactor Building Hydrogen Purge System.

Objective

To verify that the Reactor Building Hydrogen Purge System is operable.

Specification

- 4.4.3.1 An in-place system test shall be performed annually. This test shall consist of a visual inspection, hook-up of the system to one of the three reactor buildings, a flow measurement using flow instruments in the portable purging station and pressure drop measurements across the filter banks. This test shall demonstrate that under simulated emergency conditions the system can be taken from storage and placed into operation within 48 hours. The annual test shall insure the following:

Pressure drop across the combined HEPA filters and charcoal absorber banks is less than six inches of water at the system design flow rate (+10%).

Operability of the heater at rated power when tested in accordance with ANSI N510-1975.

- 4.4.3.2 Additional testing requirements that may be performed without hooking-up the system to one of the reactor buildings are as follows:

Annually and after each complete or partial replacement of the HEPA filter bank or after any structural maintenance on the system housing, a leakage test using cold DOP shall be performed on HEPA units.

Annually and after each complete or partial replacement of the charcoal absorber bank or after any structural maintenance on the system housing, a leakage test using halogenated hydrocarbon shall be performed on the charcoal filters.

The results of the in-place cold DOP and halogenated hydrocarbon tests at design flows on HEPA filters and charcoal absorber banks shall show $\geq 99\%$ DOP removal and $\geq 99\%$ halogenated hydrocarbon removal when tested in accordance with ANSI N510-1975.

Annually a laboratory analysis of a carbon sample from the hydrocarbon purge system carbon shall show $\geq 90\%$ radioactive methyl iodide removal when tested in accordance with ANSI N510-1975 (130°C, 95% R.H.).

The System shall be operated with the heaters on at least ten hours every month.

Annually, it shall be demonstrated that fans operate within $\pm 10\%$ of design flow when tested in accordance with ANSI N510-1975.

In addition to the annual testing requirement, these tests and analyses shall be performed following painting, fire or chemical release in any ventilation zone communicating with the system.

Bases

Pressure drop across the combined HEPA filters and charcoal adsorbers of less than 6 inches of water at the system design flow rate will indicate that the filters and adsorbers are not clogged by excessive amounts of foreign matter. A test frequency of once per year establishes system performance capability.

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. Bypass leakage for the charcoal adsorbers and particulate removal efficiency for HEPA filters are determined by halogenated hydrocarbon and DOP respectively. The laboratory carbon sample test results indicate a radioactive methyl iodide removal efficiency for expected accident conditions. Operation of the fans significantly different from the design flow will change the removal efficiency of the HEPA filters and charcoal adsorbers. If the performances are as specified, the calculated doses would be less than the guidelines stated in 10 CFR 100 for the accidents analyzed.

The frequency of tests and sample analysis are necessary to show that the HEPA filters and charcoal adsorbers can perform as evaluated. Replacement adsorbent should be qualified according to the guidelines of Regulatory Guide 1.52. The charcoal adsorber efficiency test procedures should allow for the removal of one adsorber tray, emptying of one bed from the tray, mixing the adsorbent thoroughly and obtaining at least two samples. Each sample should be at least two inches in diameter and a length equal to the thickness of the bed. If the iodine removal efficiency test results are unacceptable, all adsorbent in the system should be replaced. Any HEPA filters found defective should be replaced with filters qualified pursuant to Regulatory Position C.3.d of Regulatory Guide 1.52.

Operation of the system every month will demonstrate operability of the filters and adsorber system. Operation for ten hours is used to reduce the moisture built up on the adsorbent.

If painting, fire or chemical release occurs during system operation such that the HEPA filter or charcoal adsorber could become contaminated from the fumes, chemicals or foreign materials, the same tests and sample analysis should be performed as required for operational use.

4.5.3 PENETRATION ROOM VENTILATION SYSTEM

Applicability

Applies to testing of the Penetration Room Ventilation System.

Objective

To verify that the Penetration Room Ventilation System is operable.

Specification

4.5.3.1 Annually, the following conditions shall be demonstrated:

- a. Pressure drop across the combined HEPA filters and charcoal adsorber banks is less than six inches of water at the system design flow rate ($\pm 10\%$).
- b. Automatic initiation of each branch of each penetration room ventilation system.
- c. Manual operability of the bypass valve for filter cooling.

4.5.3.2 The following tests and analysis for the penetration room ventilation system shall also be performed.

Annually and after each complete or partial replacement of a HEPA filter bank or after any structural maintenance on the system housing, a leak test using cold DOP shall be performed on HEPA units.

Annually and after each complete or partial replacement of a charcoal adsorber bank or after any structural maintenance on the system housing, a leak test using halogenated hydrocarbon shall be performed on the charcoal filters.

The results of the in-place cold DCP and halogenated hydrocarbon tests at design flows on HEPA filters and charcoal adsorber banks shall show $>99\%$ DOP removal and $>99\%$ halogenated hydrocarbon removal respectively when tested in accordance with ANSI N510-1975.

Annually a laboratory carbon sample from the penetration room ventilation system shall show $>90\%$ radioactive methyl iodide removal when tested in accordance with ANSI N510-1975 (130°C , 95% R.H.).

Annually, it shall be demonstrated that fans operate within $\pm 10\%$ design flow when tested in accordance with ANSI N510-1975.

Each train shall be operated at least 15 minutes every month.

In addition to the annual testing requirement, these tests and analyses shall be performed following painting, fire or chemical releases in any ventilation zone communicating with the system or after 720 hours of system operation.

Bases

Pressure drop across the combined HEPA filters and charcoal adsorbers of less than six inches of water at the system design flow rate will indicate that the filters and adsorbers are not clogged by excessive amounts of foreign matter. A test frequency of once per operating cycle establishes system performance capability.

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. Bypass leakage for the charcoal adsorbers and particulate removal efficiency for HEPA filters are determined by halogenated hydrocarbon and DOP respectively. The laboratory carbon sample test results indicate a radioactive methyl iodide removal efficiency for expected accident conditions. Operation of the fans significantly different from the design flow will change the removal efficiency of the HEPA filters and charcoal adsorbers. If the performances are as specified, the calculated doses would be less than the guidelines stated in 10 CFR 100 for the accidents analyzed.

The frequency of tests and sample analysis are necessary to show that the HEPA filters and charcoal adsorbers can perform as evaluated. Replacement adsorbent should be qualified according to the guidelines of Regulatory Guide 1.52. The charcoal adsorber efficiency test procedures should allow for the removal of one adsorber tray, emptying of one bed from the tray, mixing the adsorbent thoroughly and obtaining at least two samples. Each sample should be replaced. Any HEPA filters found defective should be replaced with filters qualified pursuant to Regulatory Position C.3.d of Regulatory Guide 1.52.

Operation of the system every month will demonstrate operability of the filters and adsorber system. Operation for 15 minutes demonstrates operability and minimizes the moisture build up during testing.

If painting, fire or chemical release occurs during system operation such that the HEPA filter or charcoal adsorber could become contaminated from the fumes, chemicals or foreign materials, the same tests and sample analysis should be performed as required for operational use.

Demonstration of the automatic initiation capability is necessary to assure system performance capability.

4.14 REACTOR BUILDING PURGE FILTERS AND THE SPENT FUEL POOL VENTILATION SYSTEM

Applicability

Applies to testing of the Reactor Building purge filters and the spent fuel pool ventilation system.

Objective

To verify that the Reactor Building purge filters will perform their design function and that when used with the spent fuel pool ventilation system will reduce the off-site dose due to a fuel handling accident.

Specification

Annually, and after each complete or partial replacement of a HEPA filter bank or after any structural maintenance on the system housing, a leak test using cold DOP shall be performed on the Reactor Building purge filter.

Annually and after each complete or partial replacement of a charcoal absorber bank or after any structural maintenance on the system housing, a leak test using halogenated hydrocarbon shall be performed on the Reactor Building purge filter.

The results of the in-place cold DOP and halogenated hydrocarbon tests on HEPA filters and charcoal absorber banks shall show $>99\%$ DOP removal and $>99\%$ halogenated hydrocarbon removal respectively when tested in accordance with ANSI N510-1975.

Annually a laboratory carbon sample from the Reactor Building purge filter shall show $>90\%$ radioactive methyl iodide removal when tested in accordance with ANSI N510-1975 (130°C , 95% R.H.).

Annually, the spent fuel pool ventilation fans shall be shown to operate with $\pm 10\%$ design flow when tested in accordance with ANSI N510-1975.

Each train of the spent fuel pool ventilation shall be operated through the Reactor Building purge filters at least 15 minutes every month.

In addition to the annual testing requirement, these tests and analyses shall be performed following painting, fire or chemical release in any ventilation zone communicating with the system.

Bases

The Reactor Building purge filter is used for the Reactor Building purge system and the spent fuel pool ventilation system. The filter is constructed with a prefilter, an absolute filter and a charcoal filter in series. The 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.

Bypass leakage for the charcoal adsorbers and particulate removal efficiency for HEPA filters are determined by halogenated hydrocarbon and DOP respectively. The laboratory carbon sample test results indicate a radioactive methyl iodide removal efficiency for expected accident conditions. Operation of the fans significantly different from the design flow will change the removal efficiency of the HEPA filters and charcoal adsorbers. If the performances are as specified, the doses for a fuel handling accident would be minimized.

The frequency of tests and sample analysis are necessary to show that the HEPA filters and charcoal adsorbers can perform as evaluated. Replacement adsorbent should be qualified according to the guidelines of Regulatory Guide 1.52. The charcoal adsorber efficiency test procedures should allow for the removal of one adsorber tray, emptying of one bed from the tray, mixing the adsorbent thoroughly and obtaining at least two samples. Each sample should be replaced. Any HEPA filters found defective should be replaced with filters qualified pursuant to Regulatory Position C.3.d of Regulatory Guide 1.52.

Operation of the spent fuel pool ventilation system every month will demonstrate operability of the fans, filters and adsorber system.

If painting, fire or chemical release occurs during system operation such that the HEPA filter or charcoal adsorber could become contaminated from the fumes, chemicals or foreign materials, the same tests and sample analysis should be performed as required for operational use.