

REVISED TECHNICAL SPECIFICATIONS PAGES

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TABLE 3.1.1 (Page 2)
REACTOR PROTECTION SYSTEM INSTRUMENTATION REQUIREMENTS

| Reactor Protection System Trip Function | Applicability Conditions | | | | Trip Level Setting | Minimum Number of Operable Channels Per Trip Systems (1) | Action Required When Equipment Operability is Not Assured (1) |
|--|--------------------------|---------|--------|------|---|---|--|
| | Mode Switch Position | | | | | | |
| | Shutdown | Startup | Refuel | Run | | | |
| Main Steam Line High Radiation RMP-RM-251, A,B,C, & D | | X(9) | | X | ≤ 3 Times normal full power back ground | 2 | A or D |
| Main Steam Line Isolation Valve Closure MS-LMS-86 A,B,C, & D MS-LMS-80 A,B,C, & D | | | | X(6) | ≤ 10% of valve closure | 4 4 | A or C A or C |
| Turbine Control Valve Fast Closure TGF-63/OPC-1,2,3,4 | | | | X(4) | ≥ 1000 psig turbine control fluid | 2 | A or B |
| Turbine Stop Valve Closure SVOS-1(1), SVOS-1(2) SVOS-2(1), SVOS-2(2) | | | | X(4) | ≤ 10% of valve Closure | 2 | A or B |
| Turbine First Stage Permissive MS-PS-14 A,B,C, & D | | X(9) | | X | ≤ 30% first stage press. | 2 | A or B |

LIMITING CONDITIONS FOR OPERATION

3.2 (cont'd.)

D. Radiation Monitoring Systems - Isolation & Initiation Functions

1. Steam Jet Air Ejector Off-Gas System

a. Operability of the Steam Jet Air Ejector Off-Gas System monitor is defined in Table 3.21.A.2.

b. The time delay setting for closure of the steam jet air ejector isolation valves shall not exceed 15 minutes.

c. Other limiting conditions for operation are given on Table 3.2.D and Specifications 3.21.A.2 and 3.21.C.6.

2. Reactor Building Isolation and Standby Gas Treatment Initiation

The limiting conditions for operation are given on Table 3.2.D.

3. Liquid Radwaste Discharge Isolation

The limiting conditions for operation are given on Table 3.2.D and Specification 3.21.B.

4. Control Room Emergency Filter System

The limiting conditions for operation are given on Table 3.2.D and the Section entitled "Additional Safety Related Plant Capabilities."

5. Mechanical Vacuum Pump Isolation

a. The mechanical vacuum pump shall be capable of being automatically isolated and secured by a signal of high radiation in the main steam line tunnel whenever the main steam isolation valves are open.

b. If the limits of 3.2.D.5.a are not met, the vacuum pump shall be isolated.

SURVEILLANCE REQUIREMENTS

4.2 (cont'd.)

D. Radiation Monitoring Systems - Isolation & Initiation Functions

1. Steam Jet Air Ejector Off-Gas System

Instrumentation surveillance requirements are given on Table 4.2.D.

2. Reactor Building Isolation and Standby Gas Treatment Initiation

Instrumentation surveillance requirements are given on Table 4.2.D.

3. Liquid Radwaste Discharge Isolation

Instrumentation surveillance requirements are given on Table 4.2.D.

4. Control Room Emergency Filter System

The instrument surveillance requirements are given on Table 4.2.D.

5. Mechanical Vacuum Pump Isolation

The instrument surveillance requirements are given on Tables 4.1.1, 4.1.2, and 4.2.D.

COOPER NUCLEAR STATION
TABLE 3.2.D
RADIATION MONITORING SYSTEMS THAT INITIATE AND/OR ISOLATE SYSTEMS

| System | Instrument I. D. No. | Setting Limit | Number of Sensor Channels Provided by Design | Action (1) |
|---|-------------------------|---|--|---------------|
| Steam Jet Air Ejector Off-Gas System | RMP-RM-150 A & B | (3) | 2 | A |
| Reactor Building Isolation and Standby Gas Treatment Initiation | RMP-RM-452 A, B, C & D | < 100 mr/hr | 4 | B |
| Liquid Radwaste Discharge Isolation | RMP-RM-1 | (2) | 1 | C |
| Control Room Emergency Filter | RMV-RM-1 | 4×10^3 CPM | 1 | D |
| Mechanical Vacuum Pump Isolation (4) | RMP-RM-251 A, B, C & D | 3 times normal full power background. Alarm at 1.5 times normal full power background | 4 | E |

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TABLE 4.2.D
MINIMUM TEST AND CALIBRATION FREQUENCIES FOR RADIATION MONITORING SYSTEMS

| System | Instrument I.D. No. | Functional Test Freq. | Calibration Freq. | Instrument Check |
|--|------------------------|-------------------------|-----------------------------|---------------------|
| <u>Instrument Channels</u> | | | | |
| Steam Jet Air Ejector Off-Gas System | RMP-RM-150 A & B | (12) | (12) | (12) |
| Reactor Building Isolation and Standby Gas Treatment Initiation | RMP-RM-452 A, B, C & D | (12) | (12) | (12) |
| Liquid Radwaste Discharge Isolation | RMP-RM-1 | (11) | (11) | (11) |
| Control Room Emergency Filter | RMV-RM-1 | Once/Month (1) | Once/3 Months | Once/Day |
| Mechanical Vacuum Pump Isolation | RMP-RM-251 A, B, C & D | | See Tables 4.1.1 & 4.1.2 | |
| <u>Logic Systems</u> | | | | |
| SJAE Off-Gas Isolation | | Once/18 Months | | |
| Standby Gas Treatment Initiation | | Once/18 Months | | |
| Reactor Building Isolation | | Once/18 Months | | |
| Liquid Radwaste Disch. Isolation | | Once/6 Months | | |
| Control Room Emergency Filter | | Once/6 Months | | |
| Mechanical Vacuum Pump Isolation | | Once/Operation Cycle | | |

3.2 BASES (cont'd)

B. Core and Containment Cooling Systems Initiation and Control

The instrumentation which initiates Core Standby Cooling System (CSCS) action is arranged in a dual bus system. As for other vital instrumentation arranged in this fashion, the Specification preserves the effectiveness of the system even during periods when maintenance or testing is being performed. An exception to this is when logic functional testing is being performed.

CORE SPRAY

Initiation and control instrumentation settings ensure that the Core Spray system operates to ensure fuel cladding temperatures do not exceed 2200°F during a design basis LOCA. The basis for the settings is discussed in USAR Section VII-4.

RESIDUAL HEAT REMOVAL (LPCI MODE)

Initiation and control instrumentation settings ensure that the LPCI mode of the Residual Heat Removal system operates to ensure fuel cladding temperatures do not exceed 2200°F during a design basis LOCA. High drywell pressure and reactor water level instrumentation also allow injection water to be diverted for containment spray. The basis for the settings is discussed in USAR Section VII-4.

HPCI

The HPCI high flow and temperature instrumentation are provided to detect a break in the HPCI steam piping including the RHR Condensing Mode Steam. Tripping of this instrumentation results in actuation of HPCI isolation valves. Tripping logic for the high flow is a 1 out of 2 logic.

Temperature is monitored at twelve (12) locations with four (4) temperature sensors at each location. Two (2) sensors at each location are powered by "A" direct current control bus and two (2) by "B" direct current control bus. Each pair of sensors, e.g., "A" or "B", at each location are physically separated and the tripping of either "A" or "B" bus sensor will actuate HPCI isolation valves.

The trip settings of $\leq 300\%$ of design flow for high flow and $\leq 200^\circ\text{F}$ for high temperature are such that core uncover is prevented and fission product release is within limits.

RCIC

The RCIC high flow and temperature instrumentation are arranged the same as that for the HPCI. The trip setting of $\leq 300\%$ for high flow and $\leq 200^\circ\text{F}$ for temperature are based on the same criteria as the HPCI.

ADS

The effective emergency core cooling for small pipe breaks, the HPCI system, must function since reactor pressure does not decrease rapid enough to allow either core spray or LPCI to operate in time. The automatic pressure relief function is provided as a backup to the HPCI in the event the HPCI does not operate. The arrangement of the tripping contacts is such as to provide this function when necessary and minimize spurious operation. The trip settings given in the specification are adequate to assure the above criteria are met. The specification preserves the effectiveness of the system during periods of maintenance, testing, or calibration, and also minimizes the risk of inadvertent operation; i.e., only one instrument channel out of service.

3.2 BASES (Cont'd)

Both instruments are required for trip but the instruments are so designed that any instrument failure gives a downscale trip. The trip setting of 1.0 ci/sec (prior to 30 min. delay) provides an improved capability to detect fuel pin cladding failures to allow prevention of serious degradation of fuel pin cladding integrity which might result from plant operation with a misoriented or misloaded fuel assembly. This limit is more restrictive than 0.39 ci/sec noble gas release rate at the air ejectors (after 30 min. delay) which was used as the source term for an accident analysis of the augmented off-gas system. Using the .39 ci/sec source term, the maximum off-site total body dose would be less than the .5 rem limit.

2. Reactor Building Isolation and Standby Gas Treatment Initiation

Reactor Building Isolation and Standby Gas Treatment initiation is provided in a 1-out-of-2 taken twice logic design via four radiation sensors located on the Reactor Building ventilation exhaust plenum. Each trip system (division) consists of two channels with a 1-out-of-2 logic for upscale trips, and a 2-out-of-2 logic for downscale trips. This trip function is provided to limit the release of radioactivity resulting from a refueling (fuel handling) accident.

Trip settings of 100 mr/hr for the monitors in the ventilation exhaust ducts are based upon initiating normal ventilation isolation and standby gas treatment system operation so that none of the activity released during the refueling accident leaves the Reactor Building via the normal ventilation path but rather all the activity is processed by the standby gas treatment system.

3. Liquid Radwaste Discharge Isolation

The liquid radwaste monitor assures that all liquid discharged to the discharge canal does not exceed the limits of Specification 3.21.B. Upon sensing a high discharge level, an isolation signal is generated which closes the radwaste discharge valve. The set point is adjustable to compensate for variable isotopic discharges and dilution flow rates.

4. Control Room Emergency Filter System

The main control room ventilation isolation is provided by a detector monitoring the intake of the control room ventilation system. Automatic isolation of the normal supply and exhaust and the activation of the emergency filter system is provided by the radiation detector trip function at the predetermined trip level.

5. Mechanical Vacuum Pump

The mechanical vacuum pump isolation prevents the exhausting of radioactive gas through the 1 minute holdup line upon receipt of a main steam line high radiation signal.

E. Drywell Leak Detection

Flow transmitters are used to record the flow of liquid from the drywell sumps. An air sampling system is also provided to detect leakage inside the primary containment.

LIMITING CONDITIONS FOR OPERATION

3.10 (Cont'd)

G. Control Room Emergency Filter System

From and after the date that the Control Room Emergency Filter system is made or found to be inoperable for any reason, refueling operations are permissible only during the succeeding seven days unless the system is sooner made operable. If these conditions cannot be met, refueling operations shall be terminated in an orderly manner.

H. Spent Fuel Cask Handling

1. Fuel cask handling above the 931' level of the Reactor Building will be done in the RESTRICTED MODE only except as specified in 3.10.H.2.
2. Fuel cask handling in other than the RESTRICTED MODE will be permitted in emergency or equipment failure situations only to the extent necessary to get the cask to the closest acceptable stable location.
3. Operation with a failed controlled area limit switch is permissible for 48 hours providing an operator is on the refueling floor to assure the crane is operated within the restricted zone painted on the floor.
4. Spent fuel casks weighing in excess of 140,000 lbs. shall not be handled.

SURVEILLANCE REQUIREMENTS

4.10 (Cont'd)

H. Spent Fuel Cask Handling

1. Prior to fuel cask handling operations, the redundant crane including the rope, hooks, slings, shackles and other operating mechanisms will be inspected.

The rope will be replaced if any of the following conditions exist:

- a. Twelve (12) randomly distributed broken wires in one lay or four (4) broken wires in one strand of one rope lay.
- b. Wear of one-third the original diameter of outside individual wire.
- c. Kinking, crushing, or any other damage resulting in distortion of the rope.
- d. Evidence of any type of heat damage.
- e. Reductions from nominal diameter of more than 1/16 inch for a rope diameter from 7/8" to 1 1/4" inclusive.

2. Prior to operations in the RESTRICTED MODE

- a. the controlled area limit switches will be tested;
- b. the "two-block" limit switches will be tested;
- c. the "inching hoist" controls will be tested.

3. The empty spent fuel cask will be lifted free of all support by a maximum of 1 foot and left hanging for 5 minutes prior to any series of fuel cask handling operations.

3.10 BASES (Cont'd)

D. Time Limitation

The radiological consequences of a fuel handling accident are based upon the accident occurring at least 24 hours after reactor shutdown.

E. Standby Gas Treatment System

Only one of the two Standby Gas Treatment subsystems is needed to clean up the reactor building atmosphere upon containment isolation. If one subsystem is found to be inoperable, there is no immediate threat to the containment system performance and refueling operation may continue while repairs are being made. If both subsystems are inoperable, the plant is brought to a condition where the Standby Gas Treatment System is not required.

F. Core Standby Cooling Systems

During refueling, the system cannot be pressurized, so only the potential need for core flooding exists and the specified combination of the Core Spray or LPCI subsystems can provide this. A more detailed discussion is contained in the bases for 3.5.F.

G. Control Room Emergency Filter System

If the system is found to be inoperable, there is no immediate threat to the control room and refueling operation may continue for a limited period of time while repairs are being made. If the system cannot be repaired within seven days, refueling operations will be terminated.

H. Spent Fuel Cask Handling

The operation of the redundant crane in the Restricted Mode during fuel cask handling operations assures that the cask remains within the controlled area once it has been removed from its transport vehicle (i.e., once it is above the 931' elevation). Handling of the cask on the Refueling Floor in the Unrestricted Mode is allowed only in the case of equipment failures or emergency conditions when the cask is already suspended. The Unrestricted Mode of operation is allowed only to the extent necessary to get the cask to a suitable stationary position so the required repairs can be made. Operation with a failed controlled area microswitch will be allowed for a 48-hour period providing an Operator is on the floor in addition to the crane operator to assure that the cask handling is limited to the controlled area as marked on the floor. This will allow adequate time to make repairs but still will not restrict cask handling operations unduly.

4.10 BASES

A. Refueling Interlocks

Complete functional testing of all refueling interlocks before any refueling outage will provide positive indication that the interlocks operate in the situations for which they were designed. By loading each hoist with a weight equal to the fuel assembly, positioning the refueling platform and withdrawing control rods, the interlocks can be subjected to valid operational tests. Where redundancy is provided in the logic circuitry, tests can be performed to assure that each redundant logic element can independently perform its functions.

LIMITING CONDITIONS FOR OPERATION

3.12 Additional Safety Related Plant Capabilities

Applicability:

Applies to the operating status of the Control Room Emergency Filter system, the Reactor Equipment Cooling system and the Service Water system.

Objective:

To assure the availability of the Control Room Emergency Filter System, the Reactor Equipment Cooling system and the Service Water system upon the conditions for which the capability is an essential response to station abnormalities.

SURVEILLANCE REQUIREMENTS

4.12 Additional Safety Related Plant Capabilities

Applicability:

Applies to the surveillance requirements for the Control Room Emergency Filter System, the Reactor Equipment Cooling system and the Service Water system which are required by the corresponding Limiting Conditions for Operation.

Objective:

To verify that operability or availability under conditions for which these capabilities are an essential response to station abnormalities.

LIMITING CONDITIONS FOR OPERATION

3.12.A (cont'd)

A. Control Room Emergency Filter System

1. Except as specified in Specification 3.12.A.3 below, the Control Room Emergency Filter system, the diesel generators required for operation of this system and the main control room air radiation monitor shall be operable at all times when containment integrity is required.
- 2.a. The results of the in-place cold DOP leak tests on the HEPA filters shall show $\geq 99\%$ DOP removal. The results of the halogenated hydrocarbon leak tests on the charcoal adsorbers shall show $\geq 99\%$ halogenated hydrocarbon removal. The DOP and halogenated hydrocarbon tests shall be performed at a flowrate of ≤ 341 CFM.
- b. The results of laboratory carbon sample analysis shall show $\geq 99\%$ radioactive methyl iodide removal with inlet conditions of: velocity ≥ 22 FPM, ≥ 1.75 mg/m³ inlet iodide concentration, $\geq 95\%$ R.H. and $\leq 30^\circ\text{C}$.
- c. The emergency bypass fan shall be shown to provide 341 CFM $\pm 10\%$.
3. From and after the date that the Control Room Emergency Filter system is made or found to be inoperable for any reason, reactor operations are permissible only during the succeeding seven days unless the system is sooner made operable. Refueling requirements are as specified in Specification 3.10.G.
4. If these conditions cannot be met, reactor shutdown shall be initiated and the reactor shall be in cold shutdown within 24 hours.

SURVEILLANCE REQUIREMENTS

4.12.A (cont'd)

A. Control Room Emergency Filter System

1. At least once per operating cycle, the pressure drop across the combined HEPA filters and charcoal absorber banks shall be demonstrated to be less than 6 inches of water at system design flow rate.
- 2.a. The tests and sample analysis of Specification 3.12.A.2 shall be performed at least once every 18 months for standby service or after every 720 hours of system operation and following significant painting, fire or chemical release in any ventilation zone communicating with the system.
- b. Cold DOP testing shall be performed after each complete or partial replacement of the HEPA filter bank or after any structural maintenance on the system housing.
- c. Halogenated hydrocarbon testing shall be performed after each complete or partial replacement of the charcoal absorber bank or after any structural maintenance on the system housing.
- d. The system shall be operated at least 10 hours every month.
3. At least once per operating cycle automatic initiation of the system shall be demonstrated.

A. Control Room Emergency Filter System

The Control Room Emergency Filter system is designed to filter the control room atmosphere for intake air and/or for recirculation during control room isolation conditions. The system is designed to automatically start upon control room isolation and to maintain the control room pressure to the design positive pressure so that all leakage should be out leakage.

High efficiency particulate absolute (HEPA) filters are installed before the charcoal adsorbers to prevent clogging of the iodine adsorbers. The charcoal adsorbers are installed to reduce the potential intake of radioiodine to the control room. The in-place test results should indicate a system leak tightness of less than 1 percent bypass leakage for the charcoal adsorbers and HEPA filters. The laboratory carbon sample test results should indicate a radioactive methyl iodide removal efficiency of at least 99 percent for expected accident conditions. If the performance of the HEPA filters and charcoal adsorbers are as specified, the resulting doses will be less than the allowable levels stated in Criterion 19 of the General Design Criteria for Nuclear Power Plants, Appendix A to 10 CFR Part 50.

If the system is found to be inoperable, there is no immediate threat to the control room and reactor operation may continue for a limited period of time while repairs are being made. If the system cannot be repaired within seven days, the reactor is shutdown and brought to cold shutdown within 24 hours.

B. Reactor Equipment Cooling (REC) System

The Reactor Equipment Cooling System consists of two, distinct subsystems, each containing two pumps and one heat exchanger. Each subsystem is capable of supplying the cooling requirements of the essential services following design accident conditions with only one pump in either subsystem.

The REC System has additional flexibility provided by the capability of interconnection of the two subsystems and the backup water supply to the critical cooling loop by the Service Water System. This flexibility and the need for only one pump in one critical cooling loop to meet the design accident requirements justifies the 30 day repair time during normal operation and the reduced requirements during head-off operations requiring the availability of the LPCI or Core Spray systems.

C. Service Water System

The Service Water System consists of two, distinct subsystems, each containing two vertical Service Water pumps located in the intake structure, and associated strainer, piping, valving and instrumentation. The pumps discharge to a common header from which independent piping supplies two Seismic Class I cooling water loops and one turbine building loop. Automatic valving is provided to shutoff all supply to the turbine building loop on drop in header pressure thus assuring supply to the Seismic Class I loops each of which feeds one diesel generator, two RHR Service Water booster pumps, one control room basement fan coil unit and one REC heat exchanger. Valves are included in the common discharge header to permit the Seismic Class I Service Water System to be operated as two independent subsystems. The heat exchangers are valved such that they can be individually backwashed without interrupting system operation.

3.12 BASES (cont'd)

During normal operation two or three pumps will be required. Three pumps are used for a normal shutdown.

The loss of all a-c power will trip all operating Service Water pumps. The automatic emergency diesel generator start system and emergency equipment starting sequence will then start one selected Service Water pump in 30-40 seconds. In the meantime, the drop in Service Water header pressure will close the turbine building cooling water isolation valve guaranteeing supply to the reactor building, the control room basement, and the diesel generators from the one Service Water pump.

Due to the redundancy of pumps and the requirement of only one to meet the accident requirements, the 30 day repair time is justified.

D. Battery Room Ventilation

The temperature rise and hydrogen buildup in the battery rooms without adequate ventilation is such that continuous safe operation of equipment in these rooms cannot be assured.

4.12 BASES

A. Cont. 1 Room Emergency Filter System

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. Pressure drop should be determined at least once per operating cycle to show system performance capability.

Tests of the charcoal adsorbers with halogenated hydrocarbon refrigerant should be performed in accordance with ANSI N510-1980.

The frequency of tests and sample analysis are necessary to show that the HEPA filters and charcoal adsorbers can perform as evaluated. The test canisters that are installed with the adsorber trays should be used for the charcoal adsorber efficiency test. Each sample should be at least two inches in diameter and a length equal to the thickness of the bed. If test results are unacceptable, all adsorbent in the system shall be replaced with an adsorbent qualified according to Table 5.1 of ANSI N509-1980. The replacement tray for the adsorber tray removed for the test should meet the same adsorbent quality. Tests of the HEPA filters with DOP aerosol shall be performed in accordance to ANSI N510-1980. Any HEPA filters found defective shall be replaced with filters qualified pursuant to Regulatory Position C.3.d of Regulatory Guide 1.52.

Operation of the system for 10 hours every month will demonstrate operability of the filters and adsorber system and remove excessive moisture built up on the adsorber.

4.12 BASES (cont'd)

If significant painting, fire or chemical release occurs such that the HEPA filter or charcoal adsorber could become contaminated from the fumes, chemicals or foreign material, the same tests and sample analysis shall be performed as required for operational use. The determination of significance shall be made by the operator on duty at the time of the incident. Knowledgeable staff members should be consulted prior to making this determination.

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

B. Reactor Equipment Cooling System

Normal plant operation requires one heat exchanger and three pumps. Therefore, normal equipment rotation will demonstrate pump operability.

Pump rates will be demonstrated every three months as an indication of the pump condition.

C. Service Water System

The Service Water pumps shall be proven operable by their use during normal station operations. Since three pumps are continuously operating during normal operation and only one pump is required during accidents, the normal equipment rotation shall prove the pump operability.

Pump discharge head tests will be run every three months to verify the pumping ability.

Any silting problems caused by the Service Water system will be analyzed during and following the Preoperational Test Program. Any required changes in operating procedures, technical specifications or surveillance requirements will be made prior to CNS commercial operation.

D. Battery Room Ventilation

The ventilation fans will be rotated on a weekly basis to demonstrate operability.