TABLE 1-1

Frequency Notation

| Notation | Test Frequency/Requirements | Surveillance Interval |
|---|---|---|
| Shift (S) | At least twice per calendar day | N.A. |
| Daily (D) | At least once per calendar day | N.A. |
| Weekly (W) | At least once per week | 7 days |
| Monthly (M) | At least once per month | 31 days |
| Quarterly (Q) | At least once per three months | 92 days |
| Semi-Annually(SA) | At least once per six months | 6 months |
| Annually (A) | At least once per 12 months | 12 months |
| Refueling Interval (R#) | At least once every 24 months# | 24 months# |
| Refueling Interval (R) | At least once every 18 months | 18 months |
| S/U | Prior to each reactor startup | -- |
| P | Completed prior to each release | -- |
| N.A. | Not Applicable | |

Amendment No.

Enclosure 1

## 2.3 LIMITING SAFETY SYSTEM SETTINGS, PROTECTIVE INSTRUMENTATION

### Applicability

Applies to trip settings for instruments monitoring reactor power and reactor coolant pressure, temperature, flow, and pressurizer level.

### Objective

To provide for automatic protective action such that the principal process variables do not exceed a safety limit.

### Specifications

1. Protective instrumentation for reactor trip settings shall be as follows:

   A. Startup protection

      (1) High flux, power range (low setpoint): ≤ 25% of rated power.

   B. Core limit protection

      (1) High flux, power range (high setpoint): ≤ 109% of rated power.

      (2) High pressurizer pressure: ≤ 2363 psig.

      (3) Low pressurizer pressure: ≥ 1928 psig.

      (4) Overtemperature $\Delta T$:

      $$\Delta T \leq \Delta T_o \, [K_1 - K_2 \, (T - T') + K_3 \, (P - P') - f \, (\Delta I)]$$

      where:

      $\Delta T$ = Measured $\Delta T$ by hot and cold leg RTDs, $^{o}F$

      $\Delta T_o \leq$ Indicated $\Delta T$ at rated power, $^{o}F$

      $T$ = Average temperature, $^{o}F$

      $T'$ = Design full power $T_{avg}$ at rated power, $\leq 579.7^{o}F$

$T^*$ = Indicated full power $T_{avg}$ at rated power $\leq 579.7^{\circ}F$

$K_4 \leq 1.074$

$K_5$ = Zero for decreasing average temperature

$K_5 \geq 0.188$, for increasing average temperature (sec/$^{\circ}$F)

$K_6 \geq 0.0015$ for $T \geq T^*$; $K_6 = 0$ for $T < T^*$

$\frac{dT}{dt}$ = Rate of change of $T_{avg}$

(6) Low reactor coolant loop flow:

(a) ≥ 92% of normal indicated loop flow.

(b) Low reactor coolant pump frequency: ≥ 57.5 cps.

(7) Undervoltage: ≥ 70% of normal voltage.

C. Other reactor trips

(1) High pressurizer water level: ≤ 90% of span.

(2) Low-low steam generator water level: ≥ 7% of narrow range instrument span.

2. Protective instrumentation settings for reactor trip interlocks shall satisfy the following conditions:

A. The reactor trips on low pressurizer pressure, high pressurizer level, and low reactor coolant flow for two or more loops shall be unblocked when:

(1) Power range nuclear flux ≥ 10% of rated power, or

(2) Turbine first stage pressure ≥ 10% of equivalent full load.

B. The single loop loss of flow reactor trip may be bypassed when the power range nuclear instrumentation indicates ≤ 60% of rated power.

## 3.3 ENGINEERED SAFETY FEATURES

### Applicability

Applies to the operating status of the Engineered Safety Features.

### Objective

To define those limiting conditions for operation that are necessary (1) to remove decay heat from the core in emergency or normal shutdown situations, (2) to remove heat from containment in normal operating and emergency situations, (3) to remove airborne iodine from the containment atmosphere following a Design Basis Accident, (4) to minimize containment leakage to the environment subsequent to a Design Basis Accident.

### Specifications

The following specifications apply except during low-temperature physics tests.

A. SAFETY INJECTION AND RESIDUAL HEAT REMOVAL SYSTEMS

1. The reactor shall not be made critical except for low-temperature physics tests, unless the following conditions are met:

   a. The refueling water storage tank contains not less than 345,000 gallons of water with a boron concentration of at least 2000 ppm.

   b. Deleted

   c. The four accumulators are pressurized to at least 615 psig and each contains a minimum of 775 $ft^3$ and a maximum of 815 $ft^3$ of water with a boron concentration of at least 2000 ppm. None of these four accumulators may be isolated.

Table 3.

Engineered Safety Features Initiation Instrument Setting Limits

| No. | Functional Unit | Channel | Setting Limits |
|---|---|---|---|
| 1. | High Containment Pressure (Hi Level) | Safety Injection | $\leq$ 2.0 psig |
| 2. | High Containment Pressure (Hi-Hi Level) | a. Containment Spray<br>b. Steam Line Isolation | $\leq$ 30 psig |
| 3. | Pressurizer Low Pressure | Safety Injection | $\geq$ 1833 psig |
| 4. | High Differential Pressure Between Steam Lines | Safety Injection | $\leq$ 150 psi |
| 5. | High Steam Flow in 2/4 Steam Lines Coincident with Low $T_{avg}$ or Low Steam Line Pressure | a. Safety Injection<br>b. Steam Line Isolation | $\leq$ 40% of full steam flow at zero load<br>$\leq$ 40% of full steam flow at 20% load<br>$\leq$ 110% of full steam flow at full load<br>$\geq$ 540°F $T_{avg}$<br>$\geq$ 600 psig steam line pressure |
| 6. | Steam Generator Water Level (Low-Low) | Auxiliary Feedwater | $\geq$ 7% of narrow range instrument span each steam generator |
| 7. | Station Blackout (Undervoltage) | Auxiliary Feedwater | $\geq$ 40% nominal voltage |
| 8a. | 480V Emergency Bus Undervoltage (Loss of Voltage) | ------ | 220V + 100V, -20V<br>3 sec ± 1 sec |
| 8b. | 480V Emergency Bus Undervoltage (Degraded Voltage) | ------ | 403V ± 5V<br>180 sec ± 30 sec |

4.0 SURVEILLANCE REQUIREMENTS

4.0.1 Surveillance Interval Extension

Unless otherwise noted, each surveillance requirement shall be performed within the specified surveillance interval with a maximum allowable extension not to exceed 25 percent of the specified interval. Excluded from this provision are the following surveillances whose intervals are solely defined by the applicable Technical Specification paragraphs and cannot be extended.

4.2.1 Inservice Testing - Those tests with a current two year interval whose basis is 10 CFR 50, Appendix J.

4.4A Integrated Leakage Rate

4.4B Sensitive Leakage Rate

4.4D Containment Isolation Valves

4.13 Steam Generator Tube Inservice Inspection.

Basis

Specification 4.0.1 establishes the limit for which the specified time interval for Surveillance Requirements may be extended. It permits an allowable extension of the normal surveillance interval to facilitate surveillance scheduling and consideration of plant operating conditions that may not be suitable for conducting the surveillance; e.g., transient conditions or other ongoing surveillance or maintenance activities. It also provides flexibility to accommodate the length of a fuel cycle for surveillances that are specified to be performed at least once each Refueling Interval. It is not intended that this provision be used repeatedly as a convenience to extend surveillance intervals beyond that specified for surveillances that are not performed once each Refueling Interval. Likewise, it is not the intent that Refueling Interval surveillances be performed during power operation unless it is consistent with safe plant operation. The limitation of Specification 4.0.1 is based on engineering judgement and the recognition that the most probable result of any particular surveillance being performed is the verification of conformance with the Surveillance Requirements. This provision is sufficient to ensure that the reliability ensured through surveillance activities is not significantly degraded beyond that obtained from the specified surveillance interval.

## 4.1 OPERATIONAL SAFETY REVIEW

### Applicability

Applies to items directly related to safety limits and limiting conditions for operation.

### Objective

To specify the minimum frequency and type of surveillance to be applied to plant equipment and conditions.

### Specifications

a. Calibration, testing and checking of analog channels, and testing of logic channels shall be performed as specified in Table 4.1-1.

b. Sampling and equipment tests shall be conducted as specified in Tables 4.1-2 and 4.1-3, respectively.

c. Performance of any surveillance test outlined in these specifications is not immediately required if the plant condition is the same as the condition into which the plant would be placed by an unsatisfactory result of that test. Such tests will be performed before the plant is removed from the subject condition that has precluded the immediate need to run the test. If the test provisions require that a minimum higher system condition must first be established, the test will be performed promptly upon achieving this minimum condition. The following surveillance tests, however, must be performed without the above exception:

Table 4.1-1

Minimum Frequencies for Checks, Calibrations and Tests of Instrument Channels

| | Channel Description | Check | Calibrate | Test | Remarks |
|---|---|---|---|---|---|
| 1. | Nuclear Power Range | S | D (1)<br>M* (3) | Q (2) | 1) Heat balance calibration<br>2) Signal to delta T; bistable action (permissive, rod stop, trips)<br>3) Upper and lower chambers for axial offset. |
| 2. | Nuclear Intermediate Range | S (1) | N.A. | S/U**(2) | 1) Once/shift when in service<br>Log level; bistable action (permissive, rod stop, trip) |
| 3. | Nuclear Source Range | S (1) | N.A. | S/U**(2) | 1) Once/shift when in service<br>2) Bistable action (alarm, trip) |
| 4. | Reactor Coolant Temperature | S | R | Q (1) | 1) Overtemperature - delta T<br>2) Overpower - delta T |
| 5. | Reactor Coolant Flow | S | R# | Q | |
| 6. | Pressurizer Water Level | S | R# | Q | |
| 7. | Pressurizer Pressure (High & Low) | S | R# | Q | |
| 8. | 6.9 kV Voltage & Frequency | N.A. | R | Q | Reactor Protection circuits only |
| 9. | Analog Rod Position | S | R | M | |

* By means of the movable incore detector system.

** Prior to each reactor startup if not done previous week.

Table 4.1-1

Minimum Frequencies for Checks, Calibrations and Tests of Instrument Channels

| | Channel Description | Check | Calibrate | Test | Remarks |
|---|---|---|---|---|---|
| 10. | Rod Position Bank Counters | S | N.A. | N.A. | With analog rod position |
| 11. | Steam Generator Level | S | R# | Q | |
| 12. | Charging Flow | N.A. | R# | N.A. | |
| 13. | Residual Heat Removal Pump Flow | N.A. | R# | N.A. | |
| 14. | Boric Acid Tank Level | W | R | N.A. | Bubbler tube rodded during calibration |
| 15. | Refueling Water Storage Tank Level | W | R | N.A. | |
| 16. | DELETED | | | | |
| 17. | Volume Control Tank Level | N.A. | R | N.A. | |
| 18a. | Containment Pressure | D | R | Q | Wide Range |
| 18b. | Containment Pressure | S | R | Q | Narrow Range |
| 18c. | Containment Pressure (PT-3300, PT-3301) | M | R | N.A. | High Range |
| 19. | Process Monitoring System | D | R | M | |
| 19a. | Area Radiation Monitoring System | D | R | M | |
| 19b. | Area Radiation Monitoring System (VC) | D | R# | M | |

Table 4.1-1

Minimum Frequencies for Checks, Calibrations and Tests of Instrument Channels

| | Channel Description | Check | Calibrate | Test | Remarks |
|---|---|---|---|---|---|
| 20. | Boric Acid Make-up Flow Channel | N.A. | R | N.A. | |
| 21a. | Containment Sump and Recirculation Sump Level (Discrete) | S | R# | R# | Discrete Level Indication Systems. |
| 21b. | Containment Sump, Recirculation Sump and Reactor Cavity Level (Continuous) | S | R# | R# | Continuous Level Indication Systems. |
| 21c. | Reactor Cavity Level Alarm | N.A. | R# | R# | Level Alarm System |
| 21d. | Containment Sump Discharge Flow | S | R | M | Flow Monitor |
| 21e. | Containment Fan Cooler Condensate Flow | S | R# | M* | |
| 22a. | Accumulator Level | S | R# | N.A. | |
| 22b. | Accumulator Pressure | S | R# | N.A. | |
| 23. | Steam Line Pressure | S | R | Q | |
| 24. | Turbine First Stage Pressure | S | R# | Q | |
| 25. | Reactor Trip Logic Channel Testing | N.A. | N.A. | M[1] | |
| 26. | Turbine Overspeed Protection Trip Channel (Electrical) | N.A. | R# | M | |

* Monthly visual inspection of condensate weirs only.

Table 4.1-1

Minimum Frequencies for Checks, Calibrations and Tests of Instrument Channels

| | Channel Description | Check | Calibrate | Test | Remarks |
|---|---|---|---|---|---|
| 27. | Turbine Trip | | | | |
| | a. Low Auto Stop Oil Pressure | N.A. | R | N.A. | |
| 28. | Control Rod Protection (for use with LOPAR fuel) | N.A. | R | * | |
| 29. | Loss of Power | | | | |
| | a. 480v Emergency Bus Undervoltage (Loss of Voltage) | N.A. | R | R | |
| | b. 480v Emergency Bus Undervoltage (Degraded Voltage) | N.A. | R | R | |
| | c. 480v Emergency Bus Undervoltage (Alarm) | N.A. | R | M | |
| 30. | Auxiliary Feedwater | | | | |
| | a. Steam Generator Water Level (Low-Low) | S | R | R | |
| | b. Low-Low Level AFWS Automatic Actuation Logic | N.A. | N.A. | M | Test one logic channel per month on an alternating basis. |
| | c. Station Blackout (Undervoltage) | N.A. | R | R | |

* Within 31 days prior to entering a condition in which the Control Rod Protection System is required to be operable unless the reactor trip breakers are manually opened during RCS cooldown prior to $T_{cold}$ decreasing below 350°F and the breakers are maintained opened during RCS cooldown when $T_{cold}$ is less than 350°F.

Table 4.1-1

Minimum Frequencies for Checks, Calibrations and Tests of Instrument Channels

| | Channel Description | Check | Calibrate | Test | Remarks |
|---|---|---|---|---|---|
| | d. Trip of Main Feedwater Pumps | N.A. | N.A. | R | |
| 31. | Reactor Coolant System Subcooling Margin Monitor | M | R | N.A. | |
| 32. | PORV Position Indicator (Limit Switch) | M | R# | R# | |
| 33. | PORV Block Valve Position Indicator (Limit Switch) | M* | R# | R# | |
| 34. | Safety Valve Position Indicator (Acoustic Monitor) | M | R# | R# | |
| 35. | Auxiliary Feedwater Flow Rate | M | R | R | |
| 36. | PORV Actuation/ Reclosure Setpoints | N.A. | R# | N.A. | |
| 37. | Overpressure Protection System (OPS) | N.A. | R# | ** | |

* Except when block valve operator is deenergized.

** Within 31 days prior to entering a condition in which OPS is required to be operable and at monthly intervals thereafter when OPS is required to be operable.

Table 4.1-1

Minimum Frequencies for Checks, Calibrations and Tests of Instrument Channels

| | Channel Description | Check | Calibrate | Test | Remarks |
|---|---|---|---|---|---|
| 38. | Wide Range Plant Vent Noble Gas Effluent Monitor (R-27) | S | R | N.A. | |
| 39. | Main Steam Line Radiation Monitor (R-28, R-29, R-30, R-31) | S | R | N.A. | |
| 40. | High Range Containment Radiation Monitor (R-25, R-26) | S | R* | N.A. | |
| 41. | Containment Hydrogen Monitor | Q | Q** | N.A. | |

* Acceptable criteria for calibration are provided in Table II.F-13 of NUREG-0737.

** Calibration will be performed using calibration span gas.

Table 4.1-1

Minimum Frequencies for Checks, Calibrations and Tests of Instrument Channels

| | Channel Description | Check | Calibrate | Test | Remarks |
|---|---|---|---|---|---|
| 42. | Manual Reactor Trip | N.A. | N.A. | R# | Includes: 1) Independent verification of reactor trip and bypass breakers undervoltage trip circuit operability up to and including matrix contacts of RT-11/RT-12 from both manual trip initiating devices, 2) independent verification of reactor trip and bypass breaker shunt trip circuit operability through trip actuating devices from both manual trip initiating devices. |
| 43. | Reactor Trip Breaker | N.A. | N.A. | M[1] | Includes independent verification of undervoltage and shunt trip attachment operability. |
| 44. | Reactor Trip Bypass Breaker | N.A. | N.A. | M[1] | Includes: 1) Automatic undervoltage trip, 2) Manual shunt trip from either the logic test panel or locally at the switchgear prior to placing breaker into service. |
| 45. | Service Water Inlet Temperature Monitoring Instrumentation | S | R | A | The test shall take place prior to T.S. 3.3.F.b Applicability. |

1 Each train shall be tested at least every 62 days on a staggered test basis (i.e., one train per month).

Table 4.1-3

Frequencies for Equipment Tests

| | | Check | Frequency | Maximum Time Between Tests |
|---|---|---|---|---|
| 1. | Control Rods | Rod drop times of all control rods | Refueling # Interval | * |
| 2. | Control Rods | Movement of at least 10 steps in any one direction of all control rods | Every 31 days during reactor critical operations | * |
| 3. | Pressurizer Safety Valves | Setpoint | Refueling # Interval | * |
| 4. | Main Steam Safety Valves | Setpoint | Refueling Interval | * |
| 5. | Containment Isolation System | Automatic Actuation | Refueling Interval | * |
| 6. | Refueling System Interlocks | Functioning | Each refueling shutdown prior to refueling operation | Not Applicable |
| 7. | Diesel Fuel Supply | Fuel Inventory | Weekly | 10 days |
| 8. | Turbine Steam Stop Control Valves | Closure | Monthly** | 45 days** |
| 9. | Cable Tunnel Ventilation Fans | Functioning | Monthly | 45 days |

* See Specification 1.9.

** This test may be waived during end-of-cycle operation when reactor coolant boron concentration is equal to or less than 150 ppm, due to operational limitations.

F. REPORT OF TEST RESULTS

Each integrated leakage rate test shall be the subject of a summary technical report to be submitted to the Nuclear Regulatory Commission pursuant to Specification 6.9.2.a and in accordance with the requirements of Appendix J to 10 CFR 50, effective issue date March 16, 1973. Each report shall include leakage test results and a summary analyses of sensitive leak rate, air lock, and containment isolation valve tests performed since the previous integrated leakage rate test.

G. VISUAL INSPECTION

A detailed visual examination of the accessible interior and exterior surfaces of the containment structure and its components shall be performed at each Refueling Interval (#) and prior to any integrated leak test to uncover any evidence of deterioration which may affect either the containment structural integrity or leak-tightness. The discovery of any significant deterioration shall be accompanied by corrective actions in accord with acceptable procedures, non-destructive tests and inspections, and local testing where practical, prior to the conduct of any integrated leak test. Such repairs shall be reported as part of the test results.

H. RESIDUAL HEAT REMOVAL SYSTEM

1. Test

a. (1) The portion of the Residual Heat Removal System that is outside the containment shall be tested either by use in normal operation or hydrostatically tested at 350 psig at the interval specified below.

(2) The piping between the residual heat removal pumps suctions and the containment isolation valves in the residual heat removal pump suction line from the containment sump shall be hydrostatically tested at no less than 100 psig at the interval specified below.

b. Visual inspection shall be made for excessive leakage during these tests from components of the system. Any significant leakage shall be measured by collection and weighing or by another equivalent method.

2. Acceptance Criterion

The maximum allowable leakage from the Residual Heat Removal System components located outside of the containment shall not exceed two gallons per hour.

3. Corrective Action

Repairs or isolation shall be made as required to maintain leakage within the acceptance criterion.

4. Test Frequency

Tests of the Residual Heat Removal System shall be conducted at least once every Refueling Interval#.

Basis

The containment is designed for a calculated peak accident pressure of 47 psig(1). While the reactor is operating, the internal environment of the containment will be air at essentially atmospheric pressure and an average maximum temperature of approximately 130°F. With these initial conditions, the peak accident pressure and temperature of the steam-air mixture will not exceed the containment design pressure and temperature of 47 psig and 271°F.

d. Verify that the mechanical stops on Valves 856 A, C, D and E are set at the position measured and recorded during the most recent ECCS operational flow test or flow tests performed in accordance with (c) above. This surveillance procedure shall be performed following any maintenance on these valves or their associated motor operators and at a convenient outage if the position of the mechanical stops has not been verified in the preceding three months.

B. CONTAINMENT SPRAY SYSTEM

1. System tests shall be performed at each reactor refueling interval. The tests shall be performed with the isolation valves in the spray supply lines at the containment and the spray additive tank isolation valves blocked closed. Operation of the system is initiated by tripping the normal actuation instrumentation.

2. The spray nozzles shall be tested for proper functioning at least every five years.

3. The test will be considered satisfactory if visual observations indicate all components have operated satisfactorily.

C. HYDROGEN RECOMBINER SYSTEM

1. A complete recombiner system test shall be performed at each Refueling Interval (#) on each unit. The test shall include verification of ignition and attainment of normal operating temperature.

2. A complete control system test shall be performed at intervals not greater than six months on each unit. The test shall consist of a complete dry run startup using artificially generated signals to simulate light off.

3. The above tests will be considered satisfactory if visual observations and control panel indication indicate that all components have operated satisfactorily.

4. Each recombiner air-supply blower shall be started at least at two-month intervals. Acceptable levels of performance shall be that the blowers start, deliver flow, and operate for at least 15 minutes.

## D. CONTAINMENT AIR FILTRATION SYSTEM

Each air filtration unit specified in Specification 3.3.B shall be demonstrated to be operable:

1. At least once per 31 days by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that the unit operates for at least 15 minutes.

2. At least once every Refueling Interval (#), or (1) after any structural maintenance on the HEPA filters or charcoal adsorber housings, or (2) at any time painting, fire or chemical releases could alter filter integrity by:

   a. verifying a system flow rate at ambient conditions of 65,600 cfm ±10% during filtration unit operation when tested in accordance with ANSI N510-1975. Verify that the flow rate through the charcoal adsorbers is ≥ 8,000 cfm.

   b. verifying that the HEPA filters and/or charcoal adsorbers satisfy the in-place testing acceptance criteria and uses the test procedures of Regulatory Positions C.5.a and C.5.c of Regulatory Guide 1.52, Revision 2, March 1978, at ambient conditions and at a flow rate of 65,600 cfm ±10% for the HEPA filters.

   c. verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a (except for Position C.6.a(1)) of Regulatory Guide 1.52, Revision 2, March 1978.

3. After every 720 hours of charcoal adsorber operation, by verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a (except for Position C.6.a(1)) of Regulatory Guide 1.52, Revision 2, March 1978.

4. At least once every Refueling Interval (#) by:

   a. Verifying that the pressure drop across the moisture separator and HEPA filters is less than 6 inches Water Gauge while operating the filtration unit at ambient conditions and at a flow rate of 65,600 cfm ±10%.

   b. Verifying that the unit starts automatically on a Safety Injection Test Signal.

5. After each complete or partial replacement of a HEPA filter bank, by verifying that the HEPA filter banks remove greater than or equal to 99% of the DOP when they are tested in-place in accordance with ANSI N510-1975 while operating the unit at ambient conditions and at a flow rate of 65,600 cfm ±10%.

6. After each complete or partial replacement of a charcoal adsorber bank, verify that the flow rate through the charcoal adsorbers is ≥8,000 cfm when the system is operating at ambient conditions and a flow rate of 65,600 cfm ±10% when tested in accordance with ANSI N510-1975.

E. CONTROL ROOM AIR FILTRATION SYSTEM

The control room air filtration system specified in Specification 3.3.H shall be demonstrated to be operable:

1. At least once per 31 days by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that the system operates for at least 15 minutes.

2. At least once every Refueling Interval or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) at any time painting, fire or chemical releases could alter filter integrity by:

   a. verifying a system flow rate, at ambient conditions, of 1840 cfm ±10% during system operation when tested in accordance with ANSI N510-1975.

   b. verifying that, with the system operating at ambient conditions and at a flow rate of 1840 CFM ±10% and exhausting through the HEPA filters and charcoal adsorbers, the total bypass flow of the system to the facility vent, including leakage through the system diverting valves, is less than or equal to 1% when the system is tested by admitting cold DOP at the system intake.

   c. verifying that the system satisfies the in-place testing acceptance criteria and uses the test procedures of Regulatory Positions C.5.a, C.5.c and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, at ambient conditions and at a flow rate of 1840 cfm ±10%.

d. verifying, within 31 days after removal, that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.

3. After every 720 hours of charcoal adsorber operation, by verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1973, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.

4. At least once every Refueling Interval by:

   a. verifying that the pressure drop across the combined HEPA filters and charcoal adsorber banks is less than 6 inches water gauge while operating the system at ambient conditions and at a flow rate of 1840 cfm ±10%.

   b. verifying that, on a Safety Injection Test Signal or a high radiation signal in the control room, the system automatically switches into a recirculation mode of operation with flow through the HEPA filters and charcoal adsorber banks.

   c. verifying that the system maintains the control room at a neutral or positive pressure relative to the outside atmosphere during system operation.

5. After each complete or partial replacement of an HEPA filter bank, by verifying that the HEPA filter banks remove greater than or equal to 99% of the DOP when they are tested in-place in accordance with ANSI N510-1975 while operating the system at ambient conditions and at a flow rate of 1840 cfm ±10%.

6. After each complete or partial replacement of a charcoal adsorber bank, by verifying that the charcoal adsorbers remove greater than or equal to 99.95% of a halogenated hydrocarbon refrigerant test gas when they are tested in-place in accordance with ANSI N510-1975 while operating the system at ambient conditions and at a flow rate of 1840 cfm ±10%.

7. Each toxic gas detection system shall be demonstrated operable by performance of a channel check at least once per day, a channel test at least once per 31 days and a channel calibration at least once each Refueling Interval.

F. <u>FUEL STORAGE BUILDING AIR FILTRATION SYSTEM</u>

The fuel storage building air filtration system specified in Specification 3.8 shall be demonstrated operable:

1. At least once per 31 days by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that the system operates for at least 15 minutes.

2. At each refueling, prior to refueling operations, or (1) after any structural maintainance on the HEPA filter or charcoal adsorber housings, or (2) at any time painting, fire or chemical releases could alter filter integrity by:

    a. verifying a system flow rate at ambient conditions of 20,000 cfm ±10% during system operation when tested in accordance with ANSI N510-1975.

    b. verifying that the system satisfies the in-place testing acceptance criteria and uses the test procedures of Regulatory Positions C.5.a, C.5.c and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, at ambient conditions and at a flow rate of 20,000 cfm ±10%.

c. verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.

3. Prior to handling spent fuel which has decayed for less than 35 days, verify within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978. Such an analysis is good for 720 hours of charcoal adsorber operation. After 720 hours of operation, if spent fuel with a decay time of less than 35 days is still being handled, a new sample is required along with a new analysis.

4. At each refueling prior to refueling operations by:

   a. verifying that the pressure drop across the combined HEPA filters and charcoal adsorber banks is less than 6 inches water gauge while operating the system at ambient conditions and at a flow rate of 20,000 cfm ±10%.

   b. verifying that the system maintains the spent fuel storage pool area at a pressure less than that of the outside atmosphere during system operation.

5. After each complete or partial replacement of a HEPA filter bank, by verifying that the HEPA filter banks remove greater than or equal to 99% of the DOP when they are tested in-place in accordance with ANSI N510-1975 while operating the system at ambient conditions and at a flow rate of 20,000 cfm ±10%.

6. After each complete or partial replacement of a charcoal adsorber bank, by verifying that the charcoal adsorbers remove greater than or equal to 99.95% of a halogenated hydrocarbon refrigerant test gas when they are tested in-place in accordance with ANSI N510-1975 while operating the system at ambient conditions and at a flow rate of 20,000 cfm ±10%.

G. <u>POST-ACCIDENT CONTAINMENT VENTING SYSTEM</u>

The post-accident containment venting system shall be demonstrated operable:

1. At least once every Refueling Interval, or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) at any time painting, fire or chemical releases could alter filter integrity by:

   a. verifying no flow blockage by passing flow through the filter system.

   b. verifying that the system satisfies the in-place testing acceptance criteria and uses the test procedures of Regulatory Positions C.5.a, C.5.c and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, at ambient conditions and at a flow rate of 200 cfm ±10%.

   c. at Refueling Intervals (#), verify within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.

2. After every 720 hours of charcoal adsorber operation, by verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.

3. At least once every Refueling Interval by:

   a. verifying that the pressure drop across the combined HEPA filters and charcoal adsorber banks is less than 6 inches water gauge while operating the system at ambient conditions and at a flow rate of 200 cfm ±10%.

   b. verifying that the system valves can be manually opened.

4. After each complete or partial replacement of a HEPA filter bank, by verifying that the HEPA filter banks remove greater than or equal to 99% of the DOP when they are tested in-place in accordance with ANSI N510-1975 while operating the system at ambient conditions and at a flow rate of 200 cfm ±10%.

5. After each complete or partial replacement of a charcoal adsorber bank, by verifying that the charcoal adsorbers remove greater than or equal to 99.95% of a halogenated hydrocarbon refrigerant test gas when they are tested in-place in accordance with ANSI N510-1975 while operating the system at ambient conditions and at a flow rate of 200 cfm ±10%.

Basis

The Safety Injection System and the Containment Spray System are principal plant safeguards that are normally inoperative during reactor operation. Complete systems tests cannot be performed when the reactor is operating because a safety injection signal causes reactor trip, main feedwater isolation and containment isolation, and a Containment Spray System test requires the system to be temporarily disabled. The method of assuring operability of these systems is, therefore, to combine systems tests to be performed during plant refueling shutdowns, with more frequent component tests, which can be performed during reactor operation.

The refueling systems tests demonstrate proper automatic operation of the Safety Injection and Containment Spray Systems. With the pumps blocked from starting, a test signal is applied to initiate automatic action and verification made that the components receive the safety injection signal in the proper sequence. The test demonstrates the operation of the valves, pump circuit breakers, and automatic circuitry[1].

During reactor operation, the instrumentation which is depended on to initiate safety injection and containment spray is generally checked daily and the initiating circuits are tested monthly (in accordance with Specification 4.1). The testing of the analog channel input is accomplished in the same manner as for the reactor protection system. The engineered safety features logic system is tested by means of test switches to simulate inputs from the analog channels. The test switches interrupt the logic matrix output to the master relay to prevent actuation. Verification that the logic is accomplished is indicated by the matrix test light. Upon completion of the logic checks, verification that the circuit from the logic matrices to the master relay is complete is accomplished by use of an ohm-meter to check continuity.

Other systems that are also important to the emergency cooling function are the accumulators, the Component Cooling System, the Service Water System and the containment fan coolers. The accumulators are a passive safeguard. In accordance with Specification 4.1, the water volume and pressure in the accumulators are checked periodically. The other systems mentioned operate when the reactor is in operation and, by these means, are continuously monitored for satisfactory performance.

For the four flow distribution valves (856 A, C, D and E), verification of the valve mechanical stop adjustments is performed periodically to provide assurance that the high head safety injection flow distribution is in accordance with flow values assumed in the core cooling analysis.

The hydrogen recombiner system is an engineered safety feature which would be used only following a loss-of-coolant accident to control the hydrogen evolved in the containment. The system is not expected to be started until approximately 13 days have elapsed following the accident. At this time the hydrogen concentration in the containment will have reached 2% by volume, which is the design concentration for starting the recombiner system. Actual starting of the system will be based upon containment atmosphere sample analysis. The complete functional tests of each unit at refueling shutdown will demonstrate the proper operation of the recombiner system. More frequent tests of the recombiner control system and air-supply blowers will assure operability of the system. The biannual testing of the containment atmosphere sampling system will demonstrate the availability of this system.

The charcoal portion of the in-containment air recirculation system is a passive safeguard which is isolated from the cooling air flow during normal reactor operation. Hence the charcoal should have a long useful lifetime. The filter frames that house the charcoal are stainless steel and should also last indefinitely. However, the required periodic visual inspections will verify that this is the case. The iodine removal efficiency cannot be measured with the filter cells in place. Therefore, at periodic intervals a representative sample of charcoal is to be removed and tested to verify that the efficiency for removal of methyl iodide is obtained(2). Such laboratory charcoal sample testing together with the specified in-place testing of the HEPA filters will provide further assurance that the criteria of 10 CFR 100 continue to be met.

The control room air filtration system is designed to filter the control room atmosphere for intake air and/or for recirculation during control room isolation conditions. The control room air filtration system is designed to automatically start upon control room isolation. High-efficiency particulate absolute (HEPA) filters are installed upstream of the charcoal adsorbers to prevent clogging of these adsorbers. The charcoal adsorbers are installed to reduce the potential intake of radioiodine by control room personnel. The required in-place testing and the laboratory charcoal sample testing of the HEPA filters and charcoal adsorbers will provide assurance that Criterion 19 of the General Design Criteria for Nuclear Power Plants, Appendix A to 10 CFR Part 50 continues to be met.

The fuel storage building air filtration system is designed to filter the discharge of the fuel storage building atmosphere to the plant vent. This air filtration system is designed to start automatically upon a high radiation signal. Upon initiation, isolation dampers in the ventilation system are designed to close to redirect air flow through the air treatment system. HEPA filters and charcoal adsorbers are installed to reduce potential releases of radioactive material to the atmosphere. Nevertheless, as required by Specification 3.8.B.6, the fuel storage building air filtration system must be operating whenever spent fuel is being moved unless the spent fuel has had a continuous 35-day decay period. The required in-place testing and the laboratory charcoal sample testing of the HEPA filters and charcoal adsorbers will provide added assurance that the criteria of 10 CFR 100 continue to be met.

The post-accident containment venting system may be used in lieu of hydrogen recombiners for removal of combustible hydrogen from the containment building atmosphere following a design basis accident. As was the case for hydrogen recombiner use, this system is not expected to be needed until approximately 13 days have elapsed following the accident. Use of the system will be based upon containment atmosphere sample analysis and availability of the hydrogen recombiners. When in use, HEPA filters and charcoal adsorbers will filter the containment atmosphere discharge prior to release to the plant vent. The required in-place testing and laboratory charcoal sample testing will verify operability of this venting system and provide further assurance that releases to the environment will be minimized.

As indicated for all four of the previously mentioned engineered safety feature (ESF) air filtration systems, high-efficiency particulate absolute (HEPA) filters are installed upstream of the charcoal adsorbers to prevent clogging of these adsorbers. The charcoal adsorbers are installed to reduce the potential release of radioiodine to the environment. The laboratory charcoal sample testing periodically verifies that the charcoal meets the iodine removal efficiency requirements of Regulatory Guide 1.52, Revision 2. Should the charcoal of any of these filtration systems fail to satisfy the specified test acceptance criteria, the charcoal will be replaced with new charcoal which satisfies the requirements for new charcoal outlined in Regulatory Guide 1.52, Revision 2.

<u>References</u>

(1) UFSAR Section 6.2
(2) UFSAR Section 6.4

4. Each diesel generator shall be given a thorough inspection at least annually following the manufacturer's recommendations for this class of stand-by service.

The above tests will be considered satisfactory if the required minimum safeguards equipment operated as designed.

B. DIESEL FUEL TANKS

A minimum oil storage of 48,000 gallons will be maintained for the station at all times.

C. STATION BATTERIES (NOS. 21, 22, 23 & 24)

1. Every month, the voltage of each cell, the specific gravity and temperature of a pilot cell in each battery and each battery voltage shall be measured and recorded.

2. Every 3 months, each battery shall be subjected to a 24-hour equalizing charge, and the specific gravity of each cell, the temperature reading of every fifth cell, the height of electrolyte, and the amount of water added shall be measured and recorded.

3. Each time data is recorded, new data shall be compared with old to detect signs of abuse or deterioration.

4. At least once every Refueling Interval (#), each battery shall be subjected to a load test and a visual inspection of the plates.

D. GAS TURBINE GENERATORS

1. At monthly intervals, at least one gas turbine generator shall be started and synchronized to the power distribution system for a minimum of thirty (30) minutes with a minimum electrical output of 750 kW.

E. GAS TURBINE FUEL SUPPLY

1. At weekly intervals, the minimum gas turbine fuel volume shall be verified to be available and shall be documented in the plant log.

Basis

The tests specified in Specifications 4.6.A, 4.6.B and 4.6.C are designed to demonstrate that the diesel generators will provide power for operation of equipment. They also assure that the emergency diesel generator system controls and the control systems for the safeguards equipment will function automatically in the event of a loss of all normal 480v ac station service power.

The testing frequency specified will be often enough to identify and correct any mechanical or electrical deficiency before it can result in a system failure. The fuel supply is continuously monitored. An abnormal condition in these systems would be signaled without having to place the diesel generators themselves on test.

Each diesel generator has a continuous rating of 1750 kW with a 2 hours within an 24 hour period rating of 2100 kW and a 1/2 hour within any 24 hour period rating of 2300 kW. Two diesels operating within these ratings can power the minimum safeguards loads. A minimum oil storage of 48,000 gallons will provide for operation of the minimum required engineered safeguards on emergency diesel power for a period of 168 hours.

Station batteries will deteriorate with time, but precipitous failure is extremely unlikely. The surveillance specified is that which has been demonstrated over the years to provide an indication of a cell becoming unserviceable long before it fails. The periodic equalizing charge will ensure that the ampere-hour capability of the batteries is maintained.

The Refueling Interval load test for each battery, together with the visual inspection of the plates, will assure the continued integrity of the batteries.

## 4.7 MAIN STEAM STOP VALVES

Applicability

Applies to periodic testing of the main steam stop valves.

Objective

To verify the ability of the main steam stop valves to close upon signal.

Specification

The main steam stop valves shall be tested at least once every Refueling Interval (#). Closure time of five seconds or less shall be verified.

Basis

The main steam stop valves serve to limit an excessive Reactor Coolant System cooldown rate and resultant reactivity insertion following a main steam break incident[1]. Their ability to close upon signal should be verified at each scheduled refueling shutdown. A closure time of five seconds was selected as being consistent with expected response time for instrumentation as detailed in the steam line break incident analysis[2].

References


(1) UFSAR - Section 10.4

(2) UFSAR - Section 14.2.5

## 4.8 AUXILIARY FEEDWATER SYSTEM

### Applicability

Applies to periodic testing requirements of the Auxiliary Feedwater System.

### Objective

To verify the operability of the Auxiliary Feedwater System and its ability to respond properly when required.

### Specifications

A. The following surveillance tests shall be performed at least once every Refueling Interval:

1. Verification of proper operation of auxiliary feedwater system components and initiating logic upon receipt of test signals for each mode of automatic initiation.

2. Verification of the capability of each auxiliary feedwater pump to deliver full flow to the steam generators[1].

B. The above tests shall be considered satisfactory if control board indication and subsequent visual observation of the equipment demonstrate that all components have operated properly.

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1. In this instance Refueling Interval is defined as R#.

## Basis

The capacity of any one of the three auxiliary feedwater pumps is sufficient to meet decay heat removal requirements. Testing of the auxiliary feedwater system will verify its operability. These specifications establish those surveillance tests to be performed at Refueling Intervals to verify operability of both the automatic initiation circuitry and the individual components necessary for proper functioning of the auxiliary feedwater system. This testing will verify proper component actuation upon receipt of all required automatic initiation signals and will verify that adequate system flow rates and pressures are obtained with proper valve positioning and pump full-flow operation. Both control room instrumentation and visual observation of the equipment will be used to verify proper component operation.

The periodic "operational readiness" testing required by the ASME Code Section XI for pumps and valves in the auxiliary feedwater system is conducted as specified in the Indian Point Unit No. 2 Inservice Inspection and Testing Program and is therefore not included in these specifications.

## References

UFSAR - Sections 10.4, 14.1.9, 14.1.12 and 14.4.6

## 4.12 SHOCK SUPPRESSORS (SNUBBERS)

### Applicability

Applies to the inspection and testing of all hydraulic snubbers listed in Table 3.12-1.

### Objective

To verify that snubbers will perform their design functions in the event of a seismic or other transient dynamic event.

### Specifications

The following surveillance requirements apply to those snubbers listed in Table 3.12-1.

A. VISUAL INSPECTION

Snubbers whose seal material has been demonstrated by operating experience, laboratory testing, or analysis to be compatible with the operating environment shall be visually inspected to verify operability in accordance with the following schedule:

| No. Inoperable Snubbers per Inspection Period | Next Required Visual Inspection Period |
|---|---|
| 0 | 24 months ±25% # |
| 1 | 16 months ±25% # |
| 2 | 8 months ±25% # |
| 3,4 | 164 days ±25% # |
| 5,6,7 | 80 days ±25% # |
| ≥8 | 40 days ±25% # |

The required inspection interval shall not be lengthened more than one step at a time.

Snubbers are categorized in Table 3.12-1 as accessible or inaccessible during reactor operation. These two groups may be inspected independently according to the above schedule except as noted below.

If snubber inoperability is identified due to excessive fluid leakage from the external tubing associated with the twenty-four snubbers installed at the steam generators, this group of snubbers may be inspected independently according to the above schedule.

Visual inspection shall verify that (1) there is no visual indication of damage or impaired operability, (2) attachments to the foundation or supporting structure are secure, and (3) in those locations where snubber movement can be manually induced without disconnecting the snubber, the snubber has freedom of movement and is not frozen. Snubbers which appear inoperable as a result of visual inspection may be determined operable for the purpose of establishing the next visual inspection interval, provided that (1) the cause of the rejection is clearly established and remedied for that particular snubber and for other snubbers that may be generically susceptible, and (2) the affected snubber is functionally tested in the as-found condition and determined operable per Specification 4.12.C, as applicable. However, when a fluid port of a hydraulic snubber is found to be uncovered, the snubber shall be declared inoperable, and cannot be determined operable via functional testing for the purpose of establishing the next visual inspection period unless the test is started with the piston in the as-found setting, extending the piston rod in the tension mode direction. All snubbers connected to an inoperable common hydraulic fluid reservoir shall be counted as inoperable snubbers.

B. FUNCTIONAL TESTING

1. At least once every Refueling Interval (#) a representative sample of 10% of all the safety-related hydraulic snubbers shall be functionally tested for operability, including verification of proper piston movement,

lock-up rate and bleed. For each hydraulic snubber found inoperable, an additional 10% of the total installed of that type of hydraulic snubber shall be functionally tested. This additional testing will continue until no failures are found or until all snubbers of the same type have been functionally tested.

At least 25% of the snubbers in the representative sample shall include snubbers from the following three categories:

1. the first snubber away from each reactor vessel nozzle,

2. snubbers within 5 feet of heavy equipment (valve, pump, turbine, motor, etc.), and

3. snubbers within 10 feet of the discharge from a safety relief valve.

Snubbers identified as "Especially Difficult to Remove" or in "High-Radiation Zones During Shutdown" shall also be included in the representative samples.* Table 3.12-1 shall be used as the basis for the sampling plan.

In addition to the regular sample, snubbers which failed the previous functional test shall be retested during the next test period. If a spare snubber has been installed in place of a failed snubber, then both the failed snubber (if it is repaired and currently installed in another position) and the spare snubber shall be retested. Test results of these snubbers may not be included for the re-sampling.

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* Permanent or other exemptions from functional testing for individual snubbers in these categories may be granted by the Commission only if a justifiable basis for exemption is presented and/or snubber life destructive testing was performed to qualify snubber operability for all design conditions.

2. For the snubber(s) found inoperable, an engineering evaluation shall be performed on the components which are supported by the snubber(s). The purpose of this engineering evaluation shall be to determine if the components supported by the snubber(s) were adversely affected by the inoperability of the snubber(s) in order to ensure that the supported component remains capable of meeting its designed service.

3. If any snubber selected for functional testing either fails to lockup or fails to move, i.e., frozen in place, the cause will be evaluated, and if found to be caused by a manufacturer or design deficiency, all snubbers of the same manufacturer and model which are susceptible to the same defect and located in a similar environment shall be functionally tested. This testing requirement shall be independent of the requirements stated above for snubbers not meeting the functional test acceptance criteria.

C. <u>FUNCTIONAL TEST ACCEPTANCE CRITERIA</u>

The snubber functional test shall verify that:

1. Activation (restraining action) is achieved within the specified range of velocity or acceleration in both tension and compression.

2. Snubber bleed, or release rate, where required, is within the specified range in compression or tension. For snubbers specifically required to not displace under continuous load, the ability of the snubber to withstand load without displacement shall be verified.

D. <u>RECORD OF SNUBBER SERVICE LIFE</u>

A record of the service life of each snubber, the date at which the designated service life commences and the installation and maintenance records on which the designated service life is based shall be maintained as required by Specification 6.10.2.n. Concurrently with the first visual inspection and at least once during every Refueling Interval (#), the installation and maintenance records for each snubber listed in Table 3.12-1 shall be reviewed to verify that the indicated service life has not been exceeded or will not be exceeded prior to the next scheduled snubber service life review. If the indicated service life will be exceeded prior to the next scheduled snubber service life review, the snubber service life shall be re-evaluated or the snubber shall be replaced or reconditioned so as to extend its service life beyond the date of the next scheduled service life review. This re-evaluation, replacement, or reconditioning shall be indicated in the records.

Basis

The visual inspection frequency is based upon maintaining a constant level of snubber protection. Therefore, the required inspection interval varies inversely with the observed snubber failures and is determined by the number of inoperable snubbers found during an inspection. Inspections performed before that interval has elapsed may be used as a new reference point to determine the next inspection. However, the results of such early inspections performed before the original required time interval has elapsed (nominal time less 25%) may not be used to lengthen the required inspection interval. Any inspection whose results require a shorter inspection interval will override the previous schedule.

When the cause of the rejection of a snubber is clearly established and remedied for that snubber and for any other snubbers that may be generically susceptible and verified operable by inservice functional testing, that snubber may be exempted from being counted as inoperable. Generically susceptible snubbers are those which are of a specific make or model and have the same design features directly related to rejection of the snubber by visual inspection, and are similarly located or exposed to the same environmental conditions such as temperature, radiation, and vibration.

To further increase the assurance of snubber reliability, functional tests will be performed once each refueling cycle. Ten percent of the installed hydraulic snubbers represents an adequate sample for such tests. Selection of a representative sample of hydraulic snubbers provides a confidence level within acceptable limits that these supports will be in an operable condition. Observed failures of these sample snubbers shall require functional testing of additional units of the same type.

When a snubber is found inoperable, an engineering evaluation is performed, in addition to the determination of the snubber mode of failure, in order to determine if any safety-related component or system has been adversely affected by the inoperability of the snubber. The engineering evaluation shall determine whether or not the snubber mode of failure has imparted a significant effect or degradation on the supported component or system.

The service life of a snubber is evaluated via manufacturer input and information through consideration of the snubber service conditions and associated installation and maintenance records (newly installed snubber, seal replaced, spring replaced, in high-radiation area, in high-temperature area, etc.). The requirement to monitor the snubber service life is included to ensure that the snubbers periodically undergo a performance evaluation in view of their age and operating conditions. These records will provide a statistical basis for future consideration of snubber service life. The requirements for the maintenance of records and the snubber service life review are not intended to affect plant operations.

Reference

(1) Report: H. R. Erickson, Bergen Paterson to K. R. Goller, NRC, October 7, 1974; Subject: Hydraulic Shock Sway Arrestors

f. Defect is a degradation of such severity that it exceeds the plugging limit. A tube containing a defect is defective.

g. Plugging Limit is the degradation depth at or beyond which the tube must be plugged.

h. Hot-Leg Tube Examination is an examination of the hot-leg side tube length. This shall include the length from the point of entry at the hot-leg tube sheet around the U-bend to the top support of the cold leg.

i. Cold-Leg Tube Examination is an examination of the cold-leg side tube length. This shall include the tube length between the top support of the cold leg and the face of the cold-leg tube sheet.

2. Extent and Frequency of Examination

a. Steam generator examinations shall be conducted not less than 12 months nor later than twenty four calendar months after the previous examination.

b. Scheduled examinations shall include each of the four steam generators in service.

c. Unscheduled steam generator examinations shall be required in the event there is a primary to secondary leak exceeding technical specifications, a seismic occurrence greater than an operating basis earthquake, a loss-of-coolant accident requiring actuation of engineered safeguards, or a major steamline or feedwater line break.

d. Unscheduled examinations may include only the steam generator(s) affected by the leak or other occurrence.

e. In case of an unscheduled steam generator examination, the profilometry tensile strain criterion shall be the same as contained in the approved program for the last scheduled steam generator inspection.

3. Basic Sample Selection and Examination

a. At least 12% of the tubes in each steam generator to be examined shall be subjected to a hot-leg examination.

b. At least 25% of the tubes inspected in Specification 4.13.A.3.a above shall be subjected to a cold-leg examination.

c. Tubes selected for examination shall include, but not be limited to, tubes in areas of the tube bundle in which degradation has been reported, either at Indian Point 2 in prior examinations, or at other utilities with similar steam generators.

d. Examination for deformation ("dents") shall be either by eddy current or by profilometry.

e. Examination for degradation other than deformation shall be by eddy current techniques, using a 700-mil diameter probe. If the 700-mil diameter probe cannot pass through the tube, a 610-mil diameter probe shall be used. For examination of the U-bends and cold-legs of tubes in rows 2 through 5, a 540-mil diameter probe may be used, provided it is justified by profilometry measurement within the tensile strain criterion.

4. Additional Examination Criteria

1. Degradation Not Caused by Denting

a. If 5% of more of the tubes examined in a steam generator exhibit degradation or if any of the tubes examined in a steam generator are defective, additional examinations shall be required as specified in Table 4.13-1.

b. Tubes for additional examination shall be selected from the affected area of the tube array and the examination may be limited to that region of the tube where degradation or defective tube(s) were detected.

c. The second and third sample inspections in Table 4.13-1 may be limited to the partial tube inspection only, concentrating on tubes in the areas of the tube sheet array and on the portion of the tube where tubes with imperfections were found.

2. Degradation Caused by Denting

a. Additional examinations, for degradation caused by denting, shall be performed as described in the most recent steam generator examination program approved by the NRC.

B. <u>ACCEPTANCE CRITERIA AND CORRECTIVE ACTION</u>

1. Tubes shall be considered acceptable for continued service if:

a. depth of degradation is less than 40% of the tube wall thickness, and

b. the tube will permit passage of a 0.540" diameter probe and the strain in the tube wall (if measured) is less than the tensile strain criterion as specified in the approved examination program, or the tube will permit passage of a 0.610" diameter probe, in the absence of strain measurement.

2. Tubes that are not considered acceptable for continued service shall be plugged.

C. REPORTS AND REVIEW AND APPROVAL OF RESULTS

1. The proposed steam generator examination program shall be submitted for NRC staff review and concurrence at least 60 days prior to each scheduled examination.

2. The results of each steam generator examination shall be submitted to NRC within 45 days after the completion of the examination. A significant increase in the rate of denting or significant change in steam generator condition shall be reportable immediately.

3. An evaluation which addresses the long term integrity of small radius U-bends beyond row 1 shall be submitted within 60 days of any finding of significant hourglassing (closure) of the upper support plate flow slots.

4. Restart after the scheduled steam generator examination need not be subject to NRC approval.

Basis

Inservice examination of steam generator tubing is essential if there is evidence of mechanical damage or progressive deterioration in order to assure continued integrity of the tubing. Inservice examination of steam generator tubing also provides a means of characterizing the nature and cause of any tube degradation so that corrective measures can be taken.

An essentially 100% tube examination was performed on each tube in each steam generator by eddy current techniques prior to service in order to establish a baseline condition for the tubing. No significant baseline imperfections were identified. In addition, prior to the discontinuance of phosphate treatment and the institution of all-volatile treatment (AVT), a baseline inspection was conducted in March, 1975 before the resumption of power operation.

Wastage-type defects are unlikely with the all-volatile treatment (AVT) of secondary coolant; however, even if this type of defect occurs, the steam generator tube examination will identify tubes with significant degradation from this effect.

The results of steam generator tube burst and collapse tests have demonstrated that tubes having wall thickness of not less than 0.025 inch have adequate margins of safety against failure due to loads imposed by normal plant operation and design basis accidents. An allowance of 10% for tube degradation that may occur between inservice tube examinations added to the 40% degradation depth provided in the acceptance criteria provides an adequate margin to assure that tubes considered acceptable for continued operation will not have a minimum tube wall thickness of less than the acceptable 50% of normal tube wall thickness (i.e. 0.025 inch) during the service life-time of the tubes. Steam generator tube examinations of other operating plants have demonstrated the capability to reliably detect wastage type defects that have penetrated 20% of the original 0.050 inch wall thickness.

Examination of samples of tubes and support plates removed from steam generators have revealed that "denting" is caused by the accretion of steel corrosion products in the tube/support plate annuli. As these corrosion products are more voluminous than the support plate material from which they are derived, a compressive force is exerted on the tubes in the plane of the support plates, resulting in deformation of the tubes. If the deformation results in an ovalization of the tubes, the resulting strain is low and there is no risk of development of stress corrosion cracking in the tubes. However, if the deformation results in an irregular tube shape, the resulting strain may be high enough for the tube to become susceptible to stress corrosion cracking inservice, and it should be preventively repaired. Beginning with the steam generator examination to be conducted during the Cycle 5/6 Refueling Outage, the tensile strain criterion for profilometry shall be 25%. The 25% strain criterion is based on a review of data currently available from operating steam generators, and will be revised as necessary as more experience is gained with the evaluation of this measurement. In the future, this criterion may be revised, either higher or lower, based on steam generator examination results. The profilometry criterion to be used for any steam generator examination shall be established in the most recent program approved by NRC.

A first report on the R&D work leading to the development of profilometry, entitled "Profilometry of Steam Generator Tubes" dated August, 1980, was forwarded to the NRC by Con Edison. Additional R&D work has improved the accuracy of the profilometer and the calculation of strain in a deformed tube.

Before the development of profilometry, a minor diameter of 0.610" was established as the criterion for continuing a tube inservice. This criterion was used successfully for several years at Indian Point Unit 2 and at other plants, and appears to be sufficiently conservative so that it can be continued in the absence of more accurate strain determination by means of profilometry.

This program for inservice inspection of steam generator tubes exceeds the requirements of Regulatory Guide 1.83, Revision 1, dated July 1975.

Tabl[illegible]13-1

Steam Generator Tube Inspection

| First Sample Inspection | | | Second Sample Inspection | | Third Sample Inspection | |
|---|---|---|---|---|---|---|
| Minimum Size | Result | Action | Result | Action | Result | Action |
| | C-1 | ------- | --- | ------- | - - > | Go to power. |
| 12% tubes per steam generator hot leg plus 3% tubes per steam generator cold leg | C-2 | Plug defective tubes. Inspect additional 6% tubes in this S.G. | C-1 - | ------- | - - > | Go to power. |
| | | | C-2 | Plug defective tubes. Inspect additional 12% tubes in this S.G | C-1-> | Go to power. |
| | | | | | C-2-> | Plug defective tubes. Go to power. |
| | | | | | C-3-> | Go to first sample. C-3 action. |
| | | | C-3 | Go to first sample. C-3 action. | | |
| | C-3 | Inspect all tubes this S.G. Plug defective tubes. Inspect 6% tubes in each other S.G. if not included in the examination program. | All other S.G.s C-1 - | ------------- | - - - > | Go to power. |
| | | | Some S.G.s C-2 but no add'l C-3 | Go to second sample. C-2 action. | | |
| | | | Add'l S.G. C-3 | Inspect all tubes in all S.G.s. Plug defective tubes. | - - > | Report to NRC. NRC approval req'd prior to startup. |

Table 4.13-1

Steam Generator Tube Inspection

| | |
|---|---|
| Category C-1 | Less than 5% of the total tubes inspected are degraded tubes and none of them is defective. |
| Category C-2 | One or more of the total tubes inspected is defective but less than 1% of the tubes inspected are defective and less than 10% of the tubes inspected are degraded tubes. |
| Category C-3 | More than 10% of the total inspected are degraded or more than 1% of the tubes inspected are defective. |

## 4.14 FIRE PROTECTION AND DETECTION SYSTEMS

### Applicability

This specification applies to the surveillance requirements of fire protection and detection systems provided for protection of safe shutdown systems.

### Objective

To verify the operability of fire protection and detection systems.

### Specifications

A. HIGH-PRESSURE WATER FIRE PROTECTION SYSTEM TESTING

1. Testing Requirements

| Item | Frequency |
|---|---|
| a. City Water Tank and Fire Water Tank Minimum Water Volume | once/week |
| b. Diesel-Pump Starting Battery Bank Operability<br>Verify that the electrolyte level of each battery is above the plates, and the overall battery bank voltage is ≥ 24 volts. | once/week |
| c. Main Fire Pump Operability<br>Each pump operating for at least 15 minutes. | once/month |

| | | |
|---|---|---|
| d. | Diesel Engine Operability<br>The diesel starts and operates for at least 30 minutes. | once/month |
| e. | Diesel Fire Pump Fuel Supply<br>Verify that the diesel-driven fire pump fuel storage tank contains at least 50 gallons of fuel. | once/month |
| f. | Valve Position Check<br>Verification that each valve (manual, power-operated or automatic) in the flow path necessary for proper functioning of any portion of this system required for protection of safe shutdown systems is in its correct position. If the valve has an installed monitoring system, the valve position can be checked via that monitoring system. | once/month |
| g. | Valve Cycling Test<br>Exercise each valve necessary for proper functioning of any portion of this system required for protection of safe shutdown systems through at least one complete cycle: | |
| | (i) Valves testable with plant on-line. | once/12 months |
| | (ii) Valves not testable with plant on-line. | R# |

h. <u>System Functional Test</u> R

Verification of proper automatic actuation of this system throughout its operating sequence.

i. <u>Main Fire Pump Capacity and System Flow Checks</u> R#

The motor-driven pumps shall be verified to have a capacity of at least 1500 gpm each at a net pressure of ≥ 93 psig. The diesel-driven pump shall be verified to have a capacity of at least 2500 gpm with a discharge pressure of ≥ 109 psig.

j. <u>Diesel Engine Inspection</u> R#

Subject the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for the class of service.

k. <u>Diesel Engine Functional Test</u> R

Verification that the diesel starts on the auto-start signal and operates for at least 30 minutes while loaded with the fire pump.

l. Diesel Engine Battery Inspection — R#

Verification that the batteries and battery racks show no visual indication of physical damage or deterioration, and that the battery-to-battery terminal connections are clean, tight, free of corrosion and coated with anti-corrosion material.

m. System Flow Test — once/3 years

Performance of a flow test in accordance with Chapter 5, Section 11 of the Fire Protection Handbook, 14th Edition, published by the National Fire Protection Association for any portion of this system required for protection of safe shutdown systems.

B. ELECTRICAL TUNNEL, DIESEL GENERATOR BUILDING AND CONTAINMENT FAN COOLER FIRE PROTECTION SPRAY SYSTEMS TESTING

1. Testing Requirements:

| Items | Frequency |
|---|---|
| a. Valve Cycling Test<br>Exercise each valve necessary for proper functioning of any portion of this system required for protection of safe shutdown systems through at least one complete cycle: | |
| (i) Valves testable with plant on-line. | once/12 months |

(ii) Valves not testable with plant on-line. — R#

b. System Functional Test — R
Includes simulated automatic actuation of spray system and verification that automatic valves in the flow path actuate to their correct position.

c. Spray Header Visual Inspection — R
To verify integrity.

d. Visual Inspection of Each Spray Nozzle — R#
To verify no blockage.

e. Air Flow Test — once/3 years
Perform air flow test through each spray header and verify each spray nozzle is unobstructed.

2. The requirements of Specification 4.14.B.1 shall not apply to self-actuated type spray nozzles which are capable of only one actuation and cannot be periodically cycled or tested. These self-actuated spray nozzles shall be visually inspected at least once per Refueling Interval (#) to verify that no nozzle damage exists and that the nozzles are unobstructed.

C. PENETRATION FIRE BARRIER INSPECTIONS

1. The penetration fire barriers listed in Specification 3.13.C.1 shall be verified to be functional by visual inspection:

a. At least once per Refueling Interval.

b. Prior to declaring a fire penetration barrier functional following repairs or maintenance.

D. FIRE DETECTION SYSTEMS TESTING

1. The operability of the fire detection instruments utilized in satisfying the requirements of Specification 3.13.D.1, including the actuation of appropriate alarms (Channel Functional Test), shall be verified as follows:

| Item | Frequency |
| --- | --- |
| a. Smoke Detectors | |
| (i) Those testable during plant operation (i.e., all except items 11 and 22 in Table 3.13-1). | once/6 months |
| (ii) Those not testable during plant operation (item 11 and 22 in Table 3.13-1) | R<br>R# |
| b. Heat Detectors | |
| (i) Those associated with the Diesel Generator Building (item 7 in Table 3.13-1) | once/6 months |
| (ii) Those associated with the Electrical Tunnel (item 4 in Table 3.13-1). | once/12 months |

(iii) Those associated with the Containment Fan Cooler Units (item 10 in Table 3.13-1). R#

E. FIRE HOSE STATION AND HYDRANT TESTING

1. Fire hose stations and hydrants described in Specification 3.13.E.1 shall be demonstrated operable by the following surveillance testing requirements:

| Item | Frequency |
|---|---|
| a. Visual Inspection Test<br>Visual inspection of the hose stations and hose houses to assure all required equipment is at the station or hose house. | once/month |
| b. Hydrant Inspection | |
| 1. Visually inspect each hydrant barrel to verify it is drained. | once/year (in the fall) |
| 2. Flow test each hydrant to demonstrate hydrant and hydrant valve operability. | once/year (in the spring) |
| c. Hose Removal Check<br>Removal of the hose for inspection and replacement of all degraded gaskets in couplings. | R#<br>for interior fire hose; once/year for outside fire hose. |

| | |
|---|---|
| d. Hose Flow Test<br>Partial opening of each hose station valve to verify valve operability and no flow blockage. | once/3 years |
| e. Hose Hydrostatic Test<br>Conduct a hose hydrostatic test at a pressure at least 50 psig greater than the maximum pressure available at any hose station. | once/3 years for interior fire hose; once/year for outside fire hose. |

F. CABLE SPREADING ROOM HALON SYSTEM

1. The Cable Spreading Room Halon System required operable by Specification 3.13.F.1 shall be demonstrated operable by the following surveillance requirements:

| Item | Frequency |
|---|---|
| a. Halon Storage Tanks<br>Verification of charge weight and pressure. | once/6 months |
| b. System Functional Test<br>Verification that the system, including ventilation dampers and fans, actuates properly upon receipt of a manual simulated test signal. | R |
| c. Air Flow Test<br>Performance of an air flow test through headers and nozzles to verify no blockage. | R |

Basis

These specifications establish the surveillance program for fire protection and detection systems provided to protect equipment utilized for safe shutdown of the unit. This surveillance program is intended to verify the operability of these systems and will identify for corrective action any conditions which could prevent any portion of those systems from performing its intended function.

The fire protection and detection systems are described in Revision 1 to "Review of the Indian Point Station Fire Protection Program" submitted to the NRC by letter dated April 15, 1977 and also in the Fire Protection Safety Evaluation Report issued by the NRC Regulatory Staff in conjunction with Amendment No. 46 to DPR-26 on January 31, 1979.

4.16 REACTOR COOLANT SYSTEM AND CONTAINMENT FREE VOLUME LEAKAGE DETECTION AND REMOVAL SYSTEMS SURVEILLANCE

Applicability

Applies to the surveillance and monitoring of leakage detection and removal systems provided for determining and removing reactor coolant leakage and leakage into the containment free volume. Applies to the testing of certain LPI/RHR check valves[1,2].

Objective

To verify compliance with operational leakage limits of Specification 3.1.F. To specify a test to check for RCS leakage through certain check valves.

Specifications

A. For the purposes of demonstrating compliance with the operational leakage limits of Specification 3.1.F., the following shall be performed:

1. At least once a shift, monitor the leakage detection systems required by Specification 3.1.F.1.a(6).

2. At least once a shift, monitor the containment sump inventory and discharge.

3. At least once a shift, monitor the recirculation sump inventory and the reactor cavity inventory.

4. At least once daily, perform a reactor coolant system water inventory balance.

5. For the RCS/RHR pressure isolation valves, periodic leakage testing* shall be accomplished every time the plant is placed in the cold shutdown condition for refueling, each time the plant is placed in a cold shutdown condition for at least 72 consecutive hours if testing has not been accomplished in the preceding 9 months, and prior to returning the valve to service after maintenance, repair or replacement work is performed.

B. A test shall be performed, whenever the RCS pressure decreases to 700 psig (i.e. within 100 psig of the RHR design pressure) or whenever the RHR is secured to go to hot shutdown, to check for leakage through SIS low head injection line check valves 897A-D and RHR check valves 838A-D.

C. The containment sump pumps required to be operable by Specification 3.1.F.1.a(1) shall be demonstrated to be operable by performance of the following surveillance program:

1. At monthly intervals, each sump pump shall be started and a discharge flow of at least 25 gpm verified.

2. At Refueling Intervals, each sump pump shall be operated under visual observation to verify that the pumps start and stop at the appropriate setpoints and that the discharge flow is at least 25 gpm per pump.

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* To satisfy ALARA requirements, leakage may be measured indirectly (as from the performance of pressure indicators) if accomplished in accordance with approved procedures and supported by computations showing that the method is capable of demonstrating valve compliance with the leakage criteria. Minimum test differential pressure shall not be less than 150 psid.

## 4.18 OVERPRESSURE PROTECTION SYSTEM

Applicability

This specification applies to the surveillance requirements for the OPS provided for prevention of RCS overpressurization.

Objective

To verify the operability of OPS.

Specifications

A. When the OPS PORVs are being used for overpressure protection as required by Specification 3.1.A.4, their associated series MOVs shall be verified to be open at least twice weekly with a maximum time between checks of 5 days.

B. When RCS venting is being used for overpressure protection as permitted by Specification 3.1.A.4, the vent(s) shall be verified to be open at least daily. When the venting pathway is provided with a valve which is locked, sealed, or otherwise secured in the open position, then only these valves need be verified to be open at monthly intervals.

C. When pressurizer pressure and level control is being used for overpressure protection, as permitted by Specification 3.1.A.4, then these parameters shall be verified to be within their limits at least once per shift.

D. When safety injection pumps and/or charging pumps are required to be de-energized per Specification 3.1.A.4, the pumps shall be demonstrated to be inoperable at monthly intervals by verifying lockout of the pump circuit breakers at the 480 volt switchgear, or once per shift if other means of de-energizing the pumps are used.

E. The PORV backup nitrogen system shall be demonstrated to be operable at Refueling Intervals (#).

## 4.20 REACTOR COOLANT SYSTEM VENTS

### Applicability

Applies to the periodic testing requirements for the reactor coolant system vents at Refueling Intervals (#).

### Objective

To verify the operability of the reactor coolant system vents and their ability to exhaust noncondensible gases from the primary system when required.

### Specification

A. Each reactor coolant system vent shall be demonstrated operable at refueling intervals by verifying flow through the reactor coolant system vents during cold shutdown.

### Basis

The requirement in Specification 4.20.A establishes the surveillance test to be performed at refueling intervals to verify the operability of the reactor coolant system vents. This qualitative flow test will verify that the vents identified in Specification 3.16.A will be available to exhaust gases from the primary coolant system by demonstrating that no blockage exists in the vent system paths.

The periodic testing required by the ASME Code Section XI for each valve in the vents is conducted as specified in the Indian Point Unit No. 2 Inservice Inspection and Testing Program and is therefore not included in these specifications.