The cable tunnel is equipped with two temperature-controlled ventilation fans. Each fan has a capacity of 21,000 cfm and is connected to a 480v bus. One fan will start automatically when the temperature in the tunnel reaches 100°F. Under the worst conditions, i.e., loss of outside power and all the Engineered Safety Features in operation, one ventilation fan is capable of maintaining the tunnel temperature below 104°F. Under the same worst conditions, if no ventilation fans were operating, the natural air circulation through the tunnel would be sufficient to limit the gross tunnel temperature to below the tolerable value of 140°F. However, in order to provide for ample tunnel ventilation capacity, the two ventilation fans are required to be operable when the reactor is made critical. If one ventilation fan is found inoperable, the other fan will ensure that cable tunnel ventilation is available.

Valves 856A, C, D and E are maintained in the open position during plant operation to assure a flow path for high-head safety injection during the injection phase of a loss-of-coolant accident. Valves 856B and F are maintained in the closed position during plant operation to prevent hot-leg injection during the injection phase of a loss-of-coolant accident. As an additional assurance of preventing hot-leg injection, the valve motor operators are de-energized to prevent spurious opening of these valves. Power will be restored to these valves at an appropriate time in accordance with plant operating procedures after a loss-of-coolant accident in order to establish hot-leg recirculation.

Valves 842 and 843 in the mini-flow return line from the discharge of the safety injection pumps to the refueling water storage tank are de-energized in the open position to prevent an extremely unlikely spurious closure which would cause the safety injection pumps to overheat if the reactor coolant system pressure is above the shutoff head of the pumps.

The specified minimum water quantity for the RWST (345,000 gallons) includes the minimum quantity required for the injection phase (246,000)[(2)] for accident mitigation, the minimum quantity of water required during the recirculation phase (60,000 gallons) for accident mitigation, and a sufficient quantity of water (39,000 gallons) to allow for instrument inaccuracies, additional margin, and for water that is unavailable from the bottom of the tank. The minimum RWST boron concentration ensures that the reactor core will remain subcritical during long term recirculation with all control rods fully withdrawn following a postulated large break LOCA.

The seven-day out-of-service period for the Weld Channel and Penetration Pressurization System and the Isolation Valve Seal Water System is allowed because no credit has been taken for operation of these systems in the calculation of offsite accident doses should an accident occur. No other safeguards systems are dependent on operation of these systems[11]. The minimum pressure settings for the IVSWS and WC & PPS during operation assures effective performance of these systems. Portions of the Weld Channel Pressurization System are in areas that are not accessible, such as below the concrete floor of containment or in high radiation areas. If it is determined that it is not practicable to repair an inoperable portion of the system, then that portion may be disconnected.

The IVSWS seal water tank pressure is maintained by a nitrogen supply piped to the tank via piping that expands to three flow paths. Two flow paths contain a pressure control valve and the third path is a manual bypass around one of the control valves. Based on original plant design, two flow paths to the tank are required to consider IVSWS operable. If only one flow path to the tank is available, the appropriate LCO would be entered.

References

(1) UFSAR Section 9
(2) UFSAR Section 6.2
(3) DELETED
(4) UFSAR Section 6.4
(5) Reference Deleted
(6) UFSAR Section 9.3
(7) UFSAR Section 9.3
(8) UFSAR Section 9.6.1
(9) UFSAR Section 14.3
(10) DELETED
(11) UFSAR Sections 6.5 and 6.6
(12) WCAP-12312, "Safety Evaluation for An Ultimate Heat Sink Temperature to 95°F at Indian Point Unit 2", July, 1989.

The Functional Units having risk informed AOTs are identified with either (1) or (2) in column 6 of Tables 3.5-2 through 3.5-4. Risk informed AOTs for analog channels (72 hours) and logic channels (24 hours) are based on the analysis provided in Reference 5. Specification 3.5.3 allows the minimum degree of redundancy to be reduced by one for on-line testing (and corrective maintenance for inoperable instrumentation discovered during the surveillance testing) of instruments with installed bypass capability. For analog channels, this test bypass allowance is limited to 12 hours consistent with Reference 5. For logic channels, this test bypass allowance is limited to eight hours as provided in Note # of Tables 3.5-2 and 3.5-3 and consistent with Reference 5. At the end of this test bypass allowance, the requirements of Tables 3.5-2 through 3.5-4 and associated notes must be complied with. The test bypass allowance does not apply to the performance of preventative maintenance or performance of maintenance for inoperable instrumentation discovered by other means than the performance of a surveillance test.

Corrective (and not preventative) maintenance is permitted on a logic channel provided that the redundant channel is operable. For the RPS, 24 hours of such maintenance is permitted for the logic channel. This same 24 hour corrective maintenance period is permitted for the trip breaker if the logic channel requires maintenance at the same time.

References

(1) UFSAR Section 7.2

(2) UFSAR Section 14.3

(3) UFSAR Section 14.2.5

(4) Safety Evaluation accompanying the Indian Point Unit No. 2 "Application for Amendment to Operating License," sworn to on May 29, 1979 by Mr. William J. Cahill, Jr. of Consolidated Edison.

(5) WCAP-14333, "Probabilistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times"

The requirement for the fuel storage building charcoal filtration system to be operating when spent fuel movement is being made provides added assurance that the offsite doses will be within acceptable limits in the event of a fuel-handling accident. The additional month of spent fuel decay time will provide the same assurance that the offsite doses are within acceptable limits and therefore the charcoal filtration system would not be required to be operating.

The spent fuel storage pit water level requirement in Specification 3.8.C.2 provides approximately 24 feet of water above fuel assemblies stored in the spent fuel storage racks.

The fuel enrichment and burnup limits in Specification 3.8.D.1 and the boron requirements in Specification 3.8.D.2 assure the limits assumed in the spent fuel storage safety analysis will not be exceeded.

The requirement that at least one RHR pump and heat exchanger be in operation ensures that sufficient cooling capacity is available to maintain reactor coolant temperature below 140°F, and sufficient coolant circulation is maintained through the reactor core to minimize the effect of a boron dilution incident and prevent boron stratification.

The requirement to have two RHR pumps and heat exchangers operable when there is less than 23 feet of water above the vessel flange ensures that a single failure will not result in a complete loss of residual heat removal capability. With the head removed and at least 23 feet of water above the flange, a large heat sink is available for core cooling, thus allowing adequate time to initiate actions to cool the core in the event of a single failure.

References

(1) FSAR Section 9.5.2

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. Test switches are also provided down stream of the master relay output contacts. The purpose of these test switches is to prevent actuation of engineered safety features equipment during testing. Verification that the logic is accomplished is indicated by the matrix test light and/or master relay operation.

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 function following a loss-of-coolant accident to control the hydrogen evolved in the containment. The passive autocatalytic recombiners(PARs) contain no control or support equipment which would require surveillance. No specific degradation mechanism has yet been identified for the catalysts plates in standby service. Periodic visual examination and cleaning if necessary is done to prevent significant gas blockage by dust or debris. Representative plates are periodically removed and their response to an approximately 1.5% hydrogen gas mixture is evaluated for evidence of unexpected degradation.

The biannual testing of the containment atmosphere sampling system will demonstrate the availability of this system.

The recirculation fluid pH control system is a passive safeguard with the baskets of trisodium phosphate located in the containment sump area. Periodic visual inspections are required (Refueling#) to verify the storage baskets are in place, have maintained their integrity, and filled with trisodium phosphate.

The control room air filtration system is designed to filter the control room atmosphere for intake air 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. HEPA filters and charcoal adsorbers are installed to reduce potential releases of radioactive material to the atmosphere. 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 50.67 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 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 is tested periodically in accordance with ASTM D3803-1989 to verify that the charcoal meets the iodine removal efficiency requirements of Regulatory Guide 1.52, Revision 2 March 1978. 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, March 1978 and ASTM D3803-1989.

NRC Generic Letter 99-02 ("Laboratory Testing of Nuclear-Grade Activated Charcoal," dated June 3, 1999) requires testing in accordance with ASTM D3803-1989 and requires that the testing be done at 30°C [86°F] and a relative humidity of 95%. Also, the Generic Letter requires that the testing be done at a minimum face velocity of 0.203 m/sec [40 ft/min] or, if higher, the design face velocity. As stated in the Generic Letter, these conditions give test results that represent a more realistic assessment of the capability of the charcoal in systems without heater-based humidity control. The methyl iodide penetration is based on the following formula (the Generic Letter requires a minimum Safety Factor of 2), which is provided in Generic Letter 99-02, Attachment 2:

$$\text{Allowable Penetration} = \frac{[100\% - \text{Methyl Iodide Efficiency for Charcoal Credited in Licensee's Accident Analysis}]}{\text{Safety Factor}}$$

Thus, the allowable methyl iodide penetration, by system, is as follows:

TS Sec.	System Name	Filter Efficiency	UFSAR Reference	Allowable Methyl Iodide Penetration
4.5.E	Control Room Air Filtration System	90%	Sec. 14.3.6.5	5.0%
4.5.F	Fuel Storage Building Air Filtration System	85%	Table 14.2-2	7.5%
4.5.G	Post-Accident Containment Venting System	70%	Sec. 14.3.6.1.3	15.0%

While UFSAR Sections 14.3.6.1.3 and 14.3.6.5 provide filter efficiencies for methyl iodide, UFSAR Table 14.2-2 just provides a combined iodide (methyl iodide and elemental iodide) efficiency. Since the methyl iodide efficiency is lower than the combined iodide efficiency, the use of the combined iodide efficiency provides a more conservative limit for testing purposes.

References

(1) UFSAR Section 6.2
(2) UFSAR Section 6.4
(3) NRC Generic Letter 99-02, dated June 3, 1999
(4) UFSAR Table 14.2-2
(5) UFSAR Section 14.3.6.1.3
(6) UFSAR Section 14.3.6.5

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