ATTACHMENT 2

PROPOSED TECHNICAL SPECIFICATIONS

APPENDIX A

TECHNICAL SPECIFICATIONS

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SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 1
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3.3 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.3.1 ECCS SUBSYSTEMS - RCS PRESSURE ≥ 600 PSIG

APPLICABILITY: MODES 1, 2, and MODE 3 when RCS pressure is ≥ 600 psig

OBJECTIVE: To define those conditions necessary to ensure the availability of the Safety Injection and Recirculation Systems.

SPECIFICATION: The following ECCS subsystems shall be OPERABLE:

A. Safety Injection System

(1) Two Safety Injection System (SIS) pump trains, with each train comprised of:

a. One safety injection (SI) pump

b. One feedwater (FW) pump

(2) Two SI flow paths capable of taking suction from the RWST, delivering flow to the SI header; and three flow paths from the SI header to the RCS cold legs, including all trains of valves and instruments required for SI.

B. Recirculation System

(1) Two Recirculation System pump trains with each train comprised of:

a. One recirculation pump

b. One charging pump

c. One refueling water pump

(2) The recirculation heat exchanger

(3) A cold leg recirculation (CLR) flow path capable of taking suction from the containment sump through both trains of recirculation and charging pumps, delivering flow to the three RCS cold legs, including all trains of valves and instruments required for CLR.

(4) Two hot leg recirculation (HLR) flow paths comprised of:

a. The normal HLR flow path taking suction from the containment sump, via the recirculation and charging pumps to the RCS loop B hot leg via the pressurizer, including all trains of valves and instruments required for normal HLR.

b. The alternate HLR flow path from the containment sump, via the recirculation and refueling water pumps through an RHR heat exchanger, bypassing RHR Pump G-14A, to the loop C hot leg, including all trains of valves and instruments required for alternate HLR.

(5) A secondary recirculation flow path capable of taking suction from the containment sump through the recirculation pump(s), the recirculation heat exchanger, and refueling water pump(s) to the RWST; supplying the steam generator(s) via the feedwater and safety injection pump(s) and feedwater bypass valve(s), including all valves and instruments required for secondary recirculation.

ACTION:

A. With one SIS pump train inoperable, restore the inoperable train to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours, and reduce RCS pressure to less than 600 psig within the following 6 hours.

B. With one SI flow path, one train of valves, or one train of instruments inoperable, restore the inoperable flow path or components to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and reduce RCS pressure to less than 600 psig within the following 6 hours.

C. With one Recirculation System pump train inoperable, restore the inoperable train to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and reduce RCS pressure to less than 600 psig within the following 6 hours.

D. With a common portion of the CLR flow path or secondary recirculation flow path inoperable, or with the recirculation heat exchanger inoperable, restore the flow path and heat exchanger to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and reduce RCS pressure to less than 600 psig within the following 6 hours.

E. With a redundant portion of the CLR flow path or the secondary recirculation flow path inoperable, or with one train of required valves or instruments inoperable, return the inoperable flow path and component(s) to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and reduce RCS pressure to less than 600 psig within the following 6 hours.

F. With one HLR flow path or one train of required valves and instruments inoperable, return the inoperable flow path or component(s) to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and reduce RCS pressure to less than 600 psig within the following 6 hours.

<u>BASIS</u>: Implementation of the Specifications

These specifications and the other specifications in Section 3.3 are designed to be implemented according to train alignment and flow path requirements. Required valves and instruments, flow paths, train alignment, and operability requirements are defined in design controlled documentation.

"Common" as used throughout section 3.3 refers to valves, instruments, and flow paths which do not have a redundant backup. As used in specification 3.3, "or" refers to any one, all, or any combination of listed items.

The intent of the specifications is to allow multiple components to be out-of-service at the same time without incurring a loss of safety function. For example, it is permissible to have the Train A safety injection pump out-of-service coincident with the Train B cold leg injection valve for a period not to exceed 72 hours. This is allowed because during the 72-hour period it is not required to assume a single failure. The 72-hour clock must be started from the time the first component is removed from service. It is not acceptable to disable the ECCS for a period longer than 72 hours by entering multiple action statements. It is also not acceptable to defeat safety functions such as removing Train A feedwater pump and Train B safety injection pump at the same time since this would defeat the SI safety function.

The action statement requirements are based on train alignment and flow path operability. Action A was provided for inoperable pump trains. Action B was provided to cover components in the flow paths, or common flow paths which are not associated with a pump train. For example, the discharge valves associated with the safety injection pump are considered part of the flow path. It would not be necessary to apply Action A since the affected component already is covered under Action B. Should a component on the pump, such as the motor then become inoperable, Action A would then be applied, with the 72 hour clock remaining as started under Action B.

Safety Injection System:

There are two independent safety injection flow paths from the RWST through redundant safety injection and feedwater pumps to the common safety injection discharge header. During normal operation, the feedwater pumps are isolated from the SI flow path, delivering water to the steam generators. Upon a safety injection signal the feedwater pump suction and discharge valves realign, such that the feedwater pump takes suction from the safety injection pump discharge. The feedwater pumps are isolated by redundant valve trains from the Feedwater/Condensate System during safety injection.

Three safety injection flow paths from the common safety injection discharge header supply borated water to the RCS cold legs. Each of the three cold leg safety injection flow paths has a separate isolation valve. Each of these valves is powered by a separate electrical train (A or B), or Uninterruptable Power Supply.

The safety analysis for Main Steam Line Break (MSLB) and Loss of Coolant Accident (LOCA) (UFSAR Sections 15.2 and 15.16) is based on flow from one of the three cold leg safety injection paths. The flow from a second path is assumed blocked by failure of the injection valve to open. The third path is assumed to be blocked during a MSLB due to a common-cause power supply failure, or spilling directly to the break during a LOCA.

Safety Injection continues until it is automatically terminated by the RWST low-low level instrumentation. Upon depletion of the RWST inventory, the RWST low-low level instrumentation automatically trips the safety injection and feedwater pumps and closes the three RCS loop safety injection isolation valves. The RWST low-low level trip setpoint is limited by the minimum RWST inventory required to support charging and containment spray during the manual realignment.

Recirculation System:

The Recirculation System provides long term post-LOCA cooling and prevents boron precipitation. The SIS is manually-realigned to provide recirculation flow from the containment sump to the RCS, after automatic termination of the safety injection phase.

The Recirculation System consists of three main flow paths: the cold leg recirculation, hot leg recirculation, and alternate hot leg recirculation flow paths. The alternate hot leg recirculation path serves as a back-up to the normal hot leg recirculation flow path in the event of a failure of a non-redundant component in the normal HLR path. Manual bypass valve RHR-004 allows flow around the RHR pump discharge check valves, and through the RHR isolation valves, MOV-813 and MOV-814, to the Loop C hot leg.

Secondary recirculation is a means of providing cooling after a Main Steam Line Break (MSLB) which disables the RHR system inside the containment. The flow path takes water from the sump and returns it to the RWST using recirculation and refueling water pumps. The feedwater and safety injection pumps are aligned to supply the secondary side of the steam generators using the feedwater bypass valves.

3.3.2 <u>ECCS SUBSYSTEMS - RCS PRESSURE < 600 PSIG</u>

APPLICABILITY: MODE 3 < 600 psig, and MODE 4

OBJECTIVE: To define those conditions necessary to ensure the availability of the Safety Injection and Recirculation Systems.

SPECIFICATION: The following shall be OPERABLE:

A. One of the Recirculation System pump trains with each train comprised of:

(1) One recirculation pump

(2) One charging pump

(3) One refueling water pump

B. A cold leg recirculation (CLR) flow path capable of taking suction from the containment sump through the recirculation and charging pumps, capable of delivering flow to a minimum of two of the three RCS cold legs, including valves and instruments required for CLR.

C. One of the two hot leg recirculation (HLR) flow paths comprised of:

(1) The normal HLR flow path taking suction from the containment sump, via the recirculation and charging pumps to the RCS loop B hot leg via the pressurizer, including all trains of valves and instruments required for normal HLR.

(2) The alternate HLR flow path from the containment sump, via the recirculation and refueling water pumps through an RHR heat exchanger, bypassing RHR Pump G-14A, to the loop C hot leg, including all trains of valves and instruments required for alternate HLR.

D. The recirculation heat exchanger.

ACTION:

A. With no Recirculation System pump train OPERABLE, restore at least one train to OPERABLE status within 1 hour or be in COLD SHUTDOWN within the next 20 hours.

B. With the common portion of the CLR flow path, or two or more trains of redundant CLR valves, instruments, or flow paths inoperable, return the flow path or train to OPERABLE status within 1 hour or be in COLD SHUTDOWN within the next 20 hours.

C. With both HLR flow paths or trains of required valves and instruments inoperable, return an inoperable flow path or component train to OPERABLE status within 1 hour or be in COLD SHUTDOWN within the next 20 hours.

D. With the recirculation heat exchanger inoperable, restore it to operable status within 1 hour or be in COLD SHUTDOWN within the next 20 hours.

<u>BASIS</u>: The basis for Specification 3.3.1, describes the train alignment, flow paths and application of action statements.

In the lower modes of operation single failure consideration is not a concern due to the stable reactivity condition of the reactor and the limited core cooling requirements. Therefore, only one train of ECCS is required. This is consistent with the Standard Technical Specifications Basis for the ECCS components in MODE 4.

The isolation of the primary safety injection flow path below an RCS pressure of 500 psig is a design feature of SONGS 1 to preclude potential overpressurization, or boron dilution of the RCS. To allow sufficient time to isolate the flow path, in accordance with Specification 3.3.3, this specification allows the process to begin after the RCS pressure is below 600 psig.

When the RCS pressure is less than 600 psig, a manual cold leg injection path is available via the charging pump to the cold legs through a minimum of two of the three cold leg loop recirculation valves. At an RCS temperature of 350°F, RHR is placed in operation and overpressure protection is provided by operation of the RHR relief valve. Due to single failure concerns and to maintain the boundary of the overpressure analysis, administrative restrictions have been placed on the operation of the charging system and cold leg recirculation valves. The high flow cold leg recirculation valves (FCV-1115D, E, and F) may be isolated in Mode 4 to comply with the limits of the overpressurization analysis. If these valves are closed, then a minimum of two of the low flow valves (FCV-1115A, B, and C) are required to be operable. Adequate cold leg recirculation flow is available via two of the low flow cold leg recirculation valves without crediting additional charging flow through the normal charging valve (FCV-1112).

An analysis for normal core decay heat removal requirements within five hours of full power (102%) operation has shown that adequate heat removal capacity is available with a minimum flow rate of 95 gpm from the RWST. This flow is well within the available capabilities of the valve alignment required for overpressure protection. This flow requirement is satisfied by providing flow to 2 out of 3 cold legs through either the high or low flow valves.

There are no specific requirements for secondary recirculation at an RCS pressure less than 600 psig, because of the limited amount of time the plant is operated in this condition prior to entering MODE 4, and because of the limited potential for an MSLB during this time.

References:

1) UFSAR Section 6.3.

2) Design Calculation DC-3273

3.3.3 ISOLATION OF THE RCS FROM THE FEEDWATER/CONDENSATE AND SAFETY INJECTION SYSTEMS

APPLICABILITY: MODE 3 below 500 psig, Modes 4, 5 and 6

OBJECTIVE: To preclude injection of unborated feedwater/condensate into the RCS when the reactor is shut down and to preclude the potential for overpressurization.

SPECIFICATION: When reactor fuel assemblies are in the vessel and the RCS pressure is less than 500 psig, two "positive barriers" shall be provided between the Feedwater/Condensate System and the piping connections to the Reactor Coolant System.

Additionally, when the RCS is less than 500 psig and the head is on the reactor vessel, two positive barriers shall be provided between the safety injection system and piping connections to the RCS.

A "positive barrier" is defined as follows:

A. Motor Operated Valves

When closed and tagged with supply breakers open, except that power may be restored and the valves may be opened during surveillance testing required by Specification 4.4.F.1.

B. Pneumatic/Hydraulic Operated Valves

When closed and condition tagged, with the respective hydraulic actuated block valves closed, or otherwise blocked closed, except that power may be restored and the valves may be opened during surveillance testing required by Specification 4.4.F.1.

C. Manually Operated Valves

When closed and condition tagged.

D. Feedwater Pump (Overpressurization Protection Only)

When the pump is shutdown with the breaker in the racked out, or test position.

E. A blind flange, installed and condition tagged.

ACTION: With only one positive barrier between the RCS and the Feedwater/Condensate System or between the RCS and Safety Injection System, within 1 hour initiate action to verify the remaining barrier, and restore the second positive barrier within 4 hours.

BASIS: Under normal Mode 1, 2 and 3 conditions, SI system operational interlocks preclude injection of feedwater/condensate into the reactor by the SI System[1]. These interlocks include:

A. Actuation of the Safety Injection System which de-energizes the condensate and heater drain pumps and closes the flow path for condensate, thereby preventing injection of feedwater into the RCS.

B. Interlocks between the condensate isolation valves at the feedwater pump suction and the safety injection header isolation valves at the pump discharge which prevent the opening of the header isolation valve unless the pump condensate suction valve is closed.

Below 600 psig the safety injection and feedwater pumps may be removed from service in accordance with Specification 3.3.2. A band of 100 psi is provided to allow the operators time to isolate the pumps prior to reaching the specified 500 psig limit. With the RCS in a low pressure shutdown condition, the interlocks may be overridden for maintenance and/or tests of components of these systems. However, it is still necessary to prevent intrusion of feedwater, condensate, or safety injection water into the RCS. Injection of feedwater/condensate has the potential to dilute the boron concentration of the RCS and create a potential for a reactivity excursion. Injection of either safety injection water or feedwater at low RCS temperatures, creates the potential for pressurizing above limits established by 10 CFR 50 Appendix G and as reflected in Technical Specification 3.1.

The "two positive barriers" required by this specification provide protection of the RCS against boron dilution and overpressurization when in the low pressure and low temperature conditions. Two positive barriers are provided in each potential path between the Feedwater/Condensate System, Safety Injection System, and the RCS. If there are no fuel assemblies in the reactor vessel, it is not necessary to isolate the Feedwater/Condensate Systems from the RCS since boron dilution is not a concern.

During surveillance testing of motor operated and pneumatic-hydraulic operated valves, an exception is made to allow one of two positive barriers to be out-of-service while the other barriers remain in effect. For overpressurization protection, the barrier function is provided by closing the manual valves and placing the feedwater pump breaker in the test or racked-out position, or by isolation from the RWST and Condensate System. As an alternative, a blind flange, properly tagged, may also serve as a positive barrier.

Tagged, as used above, means tagged in accordance with current Southern California Edison Company procedures for tagging of equipment which must not be operated.

Reference: (1) Updated Final Engineering Report and Safety Analysis, Section 6.3.2.8.

3.3.4 REFUELING WATER STORAGE TANK (RWST) AND SAFETY INJECTION (SI) LINES

APPLICABILITY: MODES 1, 2, 3 and 4; or as described in Specification 3.2.

OBJECTIVE: To ensure immediate availability of borated water from the RWST for safety injection, containment spray, or emergency boration.

SPECIFICATION:

A. The RWST shall be OPERABLE with a level of at least plant elevation 50 feet of water having a boron concentration of not less than 3750 ppm and not greater than 4300 ppm.

B.* The SI lines from the RWST to MOV-850 A, B and C, with the exception of lines common to the feedwater system, shall be OPERABLE with a boron concentration of not less than 1500 ppm and not greater than 4300 ppm.

ACTION:

A. With the RWST inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

B.* With one or more SI lines inoperable due to boron concentration of less than 1500 or greater than 4300 ppm, restore the SI lines to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

BASIS: The RWST serves three purposes, namely:

A. As a reservoir of borated water for accident mitigation purposes,

B. As a reservoir of borated water for flooding the refueling cavity during refueling, and

C. As a deluge for fires in containment.

Approximately 220,000 gallons of borated water are required to provide adequate post-accident core cooling and containment spray to maintain calculated post-accident doses below the limits of 10 CFR 100[1]. The RWST filled to elevation 50 feet represents in excess of 240,000 gallons.

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* This is not required when the SI lines are isolated from the RCS under specification 3.3.3.

A boron concentration of 3750 ppm in the RWST and 1500 ppm in the SI lines is required to meet the requirements of a postulated steam line break[2][4]. A maximum boron concentration of 4300 ppm ensures that the post-accident containment sump water is maintained at a pH between 7.0 and 7.5[3].

The refueling tank capacity of 240,000 gallons is based on refueling volume requirements and includes an allowance for water not useable because of tank discharge line location.

Sustained temperatures below 32°F do not occur at San Onofre. At 32°F, boric acid is soluble up to approximately 4650 ppm boron. Therefore, no special provisions for temperature control to avoid either freezing or boron precipitation are necessary.

The boron concentration in the SI lines is not required to be maintained when the SI lines are isolated from the RCS and two "positive barriers" are established in accordance with Section 3.3.3.

<u>References</u>:

(1) Enclosure 1 "Post-Accident Pressure Reanalysis, San Onofre Unit 1" to letter dated January 19, 1977 in Docket No. 50-206.

(2) "Steam Line Break Accident Reanalysis, San Onofre Nuclear Generating Station, Unit 1, October 1976" submitted by letter dated December 30, 1976 in Docket No. 50-206.

(3) Additional information, San Onofre, Unit 1 submitted by letter dated March 24, 1977 in Docket No. 50-206.

(4) Reload Safety Evaluation, San Onofre Nuclear Generating Station, Unit 1, Cycle 10, edited by J. Skaritka, Revision 1, Westinghouse, March 1989.

3.3.5 CONTAINMENT SPRAY SYSTEM

APPLICABILITY: MODES 1, 2, 3, and 4.

OBJECTIVE: To ensure availability of the Containment Spray System (CSS) for containment energy removal, pH control and iodine removal in accident conditions.

SPECIFICATION: The following shall be OPERABLE:

A. Two CSS pump trains, with each train comprised of:

(1) One refueling water pump,

(2) One hydrazine additive pump.

B. A containment spray flow path from the RWST, through the refueling water pumps, to the containment spray nozzles, being isolated from the fire water spray header inside the secondary shield, including valves and instruments required for containment spray.

C. The containment spray flow limiter valves shall be maintained in the open position and capable of remote-manual closure.

D. A hydrazine addition flow path from the hydrazine tank, through the hydrazine additive pumps to the containment spray header, including all trains of valves and instruments required to inject hydrazine into the refueling water pump discharge header.

E. The hydrazine tank shall contain not less than 150 gallons of aqueous solution having a concentration of not less than 21 weight% N_2H_4.

F. An pH control system containing a minimum of 5400 pounds of anhydrous trisodium phosphate stored in the racks located in the containment shall be OPERABLE.

ACTION:

A. With one CSS pump train inoperable, restore the inoperable train to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

B. With one train of redundant valves or instruments from the containment spray or hydrazine addition flowpaths inoperable, restore the train to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

C. With one containment spray flow limiter valve inoperable, maintain the valve in the closed position or maintain both recirculation pumps operable. Restore the inoperable valve to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

NOTE: The valve may be operated/stroked during the 72 hour period for maintenance/testing.

D. With any common portion of the containment spray or hydrazine addition flow path inoperable or the fire water spray header inside the secondary shield not isolated, restore the inoperable flow path to OPERABLE status or isolate the fire water spray header within 1 hour or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours, except as provided for in Action B above.

E. With the hydrazine additive tank inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

F. With the pH control system inoperable, restore the racks to a full condition within 72 hours or be in COLD SHUTDOWN within the next 36 hours.

BASIS:

The Containment Spray System is required to maintain the containment peak pressure below the design containment pressure in the limiting design basis accidents and limit offsite dose per 10CFR100. The design basis MSLB inside the containment is the limiting accident for containment integrity.

A minimum of one of the two hydrazine additive pumps and the associated discharge valve is sufficient to inject the required amount of hydrazine into the containment spray water. This provides for absorption of airborne fission products and reduction of the thyroid doses associated with the maximum hypothetical accident to within 10 CFR 100 limits.

The hydrazine tank is a reservoir of aqueous hydrazine solution for post-accident iodine removal. A hydrazine tank capacity of 100 gallons of 15% N_2H_4 solution satisfies the current analysis assumptions of hydrazine for 2 hours to reduce airborne iodine concentration in the event of a loss of coolant accident. A total of at least 150 gallons 21 wt%, or greater, N_2H_4 is maintained, i.e., 50% margin, to ensure that NPSH is maintained to the spray addition pumps and proper concentration exists at all times. Therefore, this amount fulfills requirements for safety injection operations.

The containment spray system consists of two redundant trains, which satisfy the single failure criterion. At least one containment spray flow limiter valve must be open during the initial containment spray mode to pass the design flow rate of the Containment Spray System. Since the flow limiting valves require non-safety related instrument air to open, the flow limiting valves are maintained in the open position to assure the valves will be in the correct position for containment spray. For operation during the recirculation phase both valves are closed. Instrument air is not required to close the valves. One of the two valves is permitted to be inoperable in the closed position, for 72 hours, providing both recirculating water pumps are operable. Both pumps are needed in this alignment to assure adequate flow to the charging pumps.

MOV-883 is the isolation valve for the common flow path from the refueling water storage tank to the containment spray system. It must remain open during injection mode and be capable of closure for recirculation mode. Single failure susceptibility of MOV-883 due to spurious closure which would result in loss of refueling water supply to the Containment Spray System is precluded by redundant lockout of both the control and motive power. Therefore, operation with one of the redundant trains of power supply out-of-service is limited to 72 hours; however operation with the valve inoperable requires action to shut down the unit within 1 hour. Similarly, single failure susceptibility of CV-92 which would divert containment spray flow to the fire spray header in the containment, is precluded by redundant lockout of power.

Reference: (1) Amendment 52 to Final Safety Analysis, San Onofre Nuclear Generating Station, Unit 1, December 1975.

3.3.6 RCS PRESSURE ISOLATION VALVES

APPLICABILITY: MODES 1, 2, and Mode 3

OBJECTIVE: To assure the leak-tightness of the RCS pressure isolation valves and thereby reduce the potential of an inter-system loss of coolant accident.

SPECIFICATION: The integrity of all pressure isolation valves listed in Table 3.3.6-1 shall be demonstrated OPERABLE by Specification 4.2.2. The leakage of the RCS pressure isolation valves shall not exceed the limits specified in Table 3.3.6-1.

ACTION: With the leakage of any RCS pressure isolation valve in excess of its limits, restore the leakage to within the specified limit within 1 hour, or be in COLD SHUTDOWN in the following 24 hours.

<u>TABLE 3.3.6-1</u>

<u>REACTOR COOLANT SYSTEM PRESSURE ISOLATION VALVES</u>

System	Valve No.	Maximum[a] Allowable Leakage
Safety Injection		
Loop A, cold leg	SIS-003	≤5.0 GPM
Loop B, cold leg	SIS-010	≤5.0 GPM
Loop C, cold leg	SIS-004	≤5.0 GPM

<u>Footnote</u>:

[a] 1. Leakage rates less than or equal to 1.0 gpm are considered acceptable.

2. Leakage rates greater than 1.0 gpm but less than or equal to 5.0 gpm are considered acceptable if the latest measured rate has not exceeded the rate determined by the previous test by an amount that reduces the margin between measured leakage rate and the maximum permissible rate of 5.0 gpm by 50% or greater.

3. Leakage rates greater than 1.0 gpm but less than or equal to 5.0 gpm are considered unacceptable if the latest measured rate exceeded the rate determined by the previous test by an amount that reduces the margin between measured leakage rate and the maximum permissible rate of 5.0 gpm by 50% or greater.

4. Leakage rates greater than 5.0 gpm are considered unacceptable.

3.3.7 COMPONENT COOLING WATER (CCW) SYSTEM

APPLICABILITY: MODES 1, 2, 3, and 4.

OBJECTIVE: To ensure availability of the Component Cooling Water System to act as a heat sink for the ECCS.

SPECIFICATION: The following shall be OPERABLE:

A. Two trains of the CCW System components with each train comprised of:

(1) One CCW pump.

(2) One CCW heat exchanger

(3) One saltwater cooling (SWC) pump.

B. A CCW flow path from the CCW pumps capable of providing flow through both CCW heat exchangers to the required safety related heat exchanger/coolers, and returning flow to the suction of the CCW pumps, including required valves and instruments.

C. An SWC flow path from the intake structure through the SWC pumps capable of providing flow through the CCW heat exchangers to the discharge structure, including required valves and instruments.

ACTION:

A. With one CCW System train or any required CCW or SWC flow path component inoperable, except as provided by Action B below, restore the inoperable train or component to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

B. One CCW heat exchanger is permitted to be removed from service for seven days providing:

(1) The OPERABLE CCW heat exchanger shell side outlet valve is open with the supply breaker open, and

(2) The out-of-service CCW heat exchanger is isolated on both the tube and shell side with the isolation valve breaker open, and

(3) CCW heat exchanger SWC inlet cross-tie valve is placed in the open position.

BASIS: The OPERABILITY of the CCW system ensures that sufficient cooling capacity is available for continued operation of the safety related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the accident analyses.

To extend the time the CCW heat exchangers may be out-of-service, a valve alignment may be made to provide cooling using a single heat exchanger. The CCW heat exchanger being removed from service is fully isolated, and the CCW heat exchanger SWC inlet cross-tie header valve, SWC-300, is opened. With SWC-300 open, both trains of saltwater pumps are available to supply the operable CCW heat exchanger. The CCW discharge valve on the operable CCW heat exchanger is failed open to assure that it cannot be closed.

3.3.8 RECIRCULATION LOOP OUTSIDE CONTAINMENT EFFECTIVE LEAKAGE

APPLICABILITY: MODES 1, 2, 3 and 4.

OBJECTIVE: To ensure that offsite dose limits will not exceed 10 CFR Part 100.

SPECIFICATION: Effective leakage from the recirculation loop outside the containment shall be less than 625 cc/hr as calculated from the following formula:

Effective Leakage= $(a_1 \times L_1) + (a_2 \times L_2) + (a_3 \times L_3)$

where,

L_1 = pump and valve leakage which drains directly to auxiliary building sump.

L_2 = valve leakage in auxiliary building or containment penetration room which does not drain directly to the auxiliary building sump.

L_3 = valve leakage outside the auxiliary building, or containment penetration room which does not drain directly to auxiliary building sump.

a_1 = iodine release factor for leakage directly to auxiliary building sump (0.05).

a_2 = iodine release factor for leakage inside the auxiliary building or containment penetration room (0.5).

a_3 = iodine release factor for leakage outside the auxiliary building or containment penetration room (1.0).

ACTION: With the effective leakage from the recirculation loop outside containment beyond its limit, restore the integrity of the loop to within its limit within 72 hours or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

BASIS: The limit of 625 cc/hr for the recirculation loop leakage ensures that the combined 0-2 hour EAB thyroid dose due to recirculation loop leakage and containment leakage will not exceed the limits of 10 CFR 100. The formula for determining the leakage incorporates consideration of the significance of leakage in different plant areas. The iodine release factor adjusts actual pump or valve leakage to account for the fraction of the iodine in the leakage which would actually be released to the atmosphere. The iodine release factors in the auxiliary building sump, the auxiliary building or containment penetration room, and outside are 0.05, 0.5, and 1.0 respectively.

TABLE 3.5.5-1 (Continued)

TABLE NOTATION

ACTION STATEMENTS

* The provisions of Specification 3.0.4 are not applicable.

ACTION 8 - With the number of operable subchannels for one sequencer less than the Minimum Channels Operable, restore the inoperable sequencer subchannel(s) to OPERABLE status within 72 hours, or be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; however, one channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.1.4.

ACTION 9 - With the number of OPERABLE channels one less than the Total Number of Channels, operation may proceed until performance of the next required CHANNEL FUNCTIONAL TEST provided the inoperable channel is placed in the tripped condition within 8 hours.

ACTION 10 - With less than the Minimum Channels OPERABLE, operation may continue provided the containment purge and exhaust valves (POV-9 & POV-10) are maintained closed.

ACTION 11 - With the number of OPERABLE Channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

TABLE 4.1.2 (continued)

			Check	Frequency
2.	Safety Injection Line and RWST Water Samples	a.	Boron Concentration	Monthly, when in Modes 1, 2, 3, and 4
3.	Control Rod Drop	a.	Verify that all rods move from full out to full in, in less than 2.44 seconds	At each refueling shutdown
4.	(Deleted)			
5.	Pressurizer Safety Valves	a.	Pressure Setpoint	At each refueling shutdown
6.	Main Steam Safety Valves	a.	Pressure Setpoint	At each refueling shutdown
7.	Main Steam Power Operated Relief Valves	a.	Test for OPERABILITY	At each refueling shutdown
8.	Trisodium Phosphate Additive	a.	Check for system availability as delineated in Technical Specification 4.2	At each refueling shutdown
9.	Hydrazine Tank Water Samples	a.	Hydrazine concentration	Once every six months, when in Modes 1, 2, 3, and 4
10.	Not used.			

TABLE 4.1.2 (continued)

	Check		Frequency
11. (Deleted)			
12. Emergency Siren Transfer Switch	a.	Verify that the fuse block for either breaker 8-1145 to MCC 1 or breaker 8-1293A to MCC 2 is removed.	Monthly, when in Modes 1, 2, 3, and 4
13. Communication Power Panel Transfer Switch	a.	Verify that the fuse block for either breaker 8-1195 to MCC 1 or breaker 8-1293B to MCC 2 is removed.	Monthly, when in Modes 1, 2, 3, and 4
14a. Spent Fuel Pool Water Level		Verify water level per Technical Specification 3.8.	a. Once every seven days when spent fuel is being store in the pool.
b. Refueling Pool Water Level			b. Within two hours prior to start of and at least once per 24 hours thereafter during movement of fuel assemblies or RCC's.
15. Reactor Coolant Loops/Residual Heat Removal Loops	a.	per Technical Specifications 3.1.2.C and 3.1.2.D, in MODE 1 and MODE 2 and in MODE 3 with reactor trip breakers closed, verify that all required reactor coolant loops are in operation and circulating reactor coolant.	a. once per 12 hours.
	b.	Per Technical Specification 3.1.2.E, in MODE 3 with the reactor trip breakers open, verify.	

TABLE 4.1.2 (continued)

	Check	Frequency
	1. At least one RHR TRAIN is in operation and circulating reactor coolant.	1. Once per 12 hours
	2. When required, one additional RHR TRAIN is operable with correct pump breaker alignments and indicated power availability.	2. Once per 7 days
	3. When required, the secondary side water level of at least two steam generators is $\geq$ 256 inches (wide range).	3. Once per 12 hours
	e. Per Technical Specification 3.8.A.3, in MODE 6, with water level in refueling pool greater than elevation 40 feet 3 inches, verify that at least one method of decay heat removal is in operation and circulating reactor coolant at a flow rate of at least 400 gpm.	e. Once per 12 hours
	f. Per Technical Specification 3.8.A.4, in MODE 6, with water level in refueling pool less than elevation 40 feet 3 inches, verify	
	1. At least one decay heat removal method is in operation and circulating reactor coolant.	1. Once per 12 hours
	2. One additional decay heat removal method is operable with correct pump breaker alignments and indicated power availability.	2. Once per 7 days
16. RWST Contained Water Volume	a. Verify volume $\geq$ 50 ft. plant elevation	a Monthly, when in Modes 1, 2, 3, and 4

TABLE 4.1.2 (continued)

		Check		Frequency
17. Hydrazine Tank Volume	a.	Verify volume ≥ 150 gallons of aqueous solution	a.	Monthly, when in Modes 1, 2, 3, and 4

4.2 EMERGENCY CORE COOLING SYSTEM (ECCS)

4.2.1 EMERGENCY CORE COOLING SYSTEM PERIODIC TESTING

APPLICABILITY: Applies to testing of the ECCS.

OBJECTIVE: To verify that the ECCS will respond promptly and properly if required.

SPECIFICATION: I. System Tests

A. Hot Safety Injection System Test

(1) When the plant is planned to be shutdown from MODE 1 operation and is planned to enter MODE 5 operation, a Hot SIS Test shall be performed in MODE 3 while RCS pressure is above 1500 psi but not more often than once every 9 months. The test shall include a determination of the force required to open valves HV-851 A and B and the margin of available actuation force.

(2) The test will be considered satisfactory if:

(a) control board indication and visual observations indicate all components have operated and sequenced properly. That is, the appropriate pumps have started and/or stopped and started, and all valves have completed their travel.

(b) the measured actuator force for both the HV-851 A and B valves is equal to or less than 10,000 lb_f.*

(3) If the measured actuator force of either HV-851 A or B is between 10,000 and 22,000 lb_f, the HV-851 A and B valves shall be considered OPERABLE but the future testing interval shall be accelerated as determined by the following equation:

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*Upon receipt of satisfactory data from continuing testing and analysis, the NRC staff will consider a request from Southern California Edison Company to change this number to more accurately reflect existing conditions.

$$T = T_L \frac{(22,000 - F)}{12,000}$$

where: T = maximum time in days of operation allowed before next surveillance test is required

T_L = time in days of operation since the last surveillance test

F = measured actuator force

(4) If the measured actuator force of either HV-851 A or B is greater than 22,000 lb_f, test results shall be reported to the NRC pursuant to Specification 6.9.2 along with proposed corrective actions. NRC approval shall be obtained prior to returning the unit to service.

B. Trisodium Phosphate Test

(1) A test of the trisodium phosphate additive shall be conducted once every refueling to demonstrate the availability of the system. The test shall be performed in accordance with the following procedure:

(a) The three storage racks are visually observed to have maintained their integrity.

(b) The three racks, each with a storage capacity of 1800 pounds of anhydrous trisodium phosphate additive, are visually observed to be full.

(c) Trisodium phosphate from one of the sample storage racks inside containment shall be submerged without agitation, in 25±0.5 gallons of 150°F to 175°F distilled water borated to 3900±100 ppm boron.

(2) The test shall be considered satisfactory if the racks have maintained their integrity, the racks are visually observed to be full, and the trisodium phosphate dissolves to the extent that a minimum pH of 7.0 is reached within 4 hours of the start of the test.

C. Containment Spray System Test

(1) During reactor shutdown at intervals not longer than the normal plant refueling intervals, a "no-flow" system test shall be conducted to demonstrate proper availability of the system. The test shall be performed either by closing a manual valve in the system or electrically disabling the refueling water pumps and initiating the system by tripping the normal actuation instrumentation.

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

(3) At least once every second refueling outage an air flow test shall be performed to demonstrate the absence of blockage at each containment spray nozzle.

D. Inspection of Containment

Perform a visual inspection verifying that no loose debris (rags, trash, clothing, etc.) is present in the containment which could be transported to the containment sump and cause restriction of the recirculation pump suction inlet or sump during LOCA conditions. This visual inspection shall be performed:

(1) For all accessible areas of the containment prior to establishing CONTAINMENT INTEGRITY, and

(2) Of the areas affected within containment at the completion of each containment entry when CONTAINMENT INTEGRITY is in effect.

At refueling intervals:

Perform a visual inspection of the containment and recirculation sumps and verify that the suction inlets are not restricted by debris. Additionally verify that the sump components (screens, etc.) show no evidence of structural distress or abnormal corrosion.

II. <u>Component Tests</u>

A. Pump Tests

(1) In addition to the above test, the safety injection, recirculation, hydrazine additive, and refueling water pumps shall be started at intervals not to exceed one month to verify that they are in satisfactory running order.

(2) Acceptable levels of performance shall be as follows:

(a) The safety injection pumps shall reach and be capable of maintaining 95% of their rated shutoff head within 10 seconds after starting.

(b) The refueling water pumps shall be capable of maintaining 90% of their rated shutoff head.

(c) The recirculation pumps shall be run dry. Proper starting of the pump is confirmed by observation of the running current on the ammeter.

(d) The hydrazine additive pumps shall be capable of maintaining their rated flow at a discharge pressure not less than 90% of their rated discharge pressure.

B. Instrument Tests

(1) RWST Low Level Trips

Monthly, perform a CHANNEL TEST and every refueling interval perform a CHANNEL CALIBRATION of the SI/Feedwater Pump trip and the MOV 850A, 850B, and 850C automatic closure on low-low Refueling Water Storage Tank level.

(2) Recirculation System Instruments

At every refueling interval perform a CHANNEL CALIBRATION for the following instrument loops:

(a) Recirculation pump discharge flow

(b) RCS cold leg recirculation flow

C. Valve Tests

(1) At least once every 31 days, verify that each accessible valve in the flow path (manual, power operated or automatic) which is not locked, sealed, or otherwise secured in position, is in the correct position.

(2) At least once every 31 days, verify that the power supply breaker for either MOV-822A or MOV-822B is open when in MODES 1, 2 or 3 with the RCS pressure greater than or equal to 600 psig.

(3) At each refueling interval verify operation of the backup nitrogen supply for the high flow cold leg recirculation valves (FCV-1115 D, E, F) and charging valves (CV-305, FCV-1112) by transferring motive power from the normal air supply to the nitrogen supply and operating the valves through a complete cycle of full travel.

D. Leakage Tests

(1) The recirculation loop outside containment (including the Containment Spray System) shall be pressurized at a pressure equal to or greater than the operating pressure under accident conditions at intervals not to exceed the normal plant refueling interval. Visual inspections for leakage shall be made and if leakage can be detected, measurements of such leakage shall be made. In addition, pumps and valves of the recirculation loop outside containment which are used during normal operation, shall be visually inspected for leakage at intervals not to exceed once every six months. If leakage can be detected, measurements of such leakage shall be made.

(2) The non-redundant Containment Spray System piping shall be visually inspected at intervals not to exceed the normal plant refueling interval. Observations made as part of compliance with Paragraph C, above, or Paragraph I.C(2) of Technical Specification 4.2 will be acceptable as visual inspection of portions of non-redundant Containment Spray System piping.

E. Piping Venting

At least once every 31 days, verify the SI system piping is full of water by venting the pump discharge piping high points.

<u>BASIS</u>: The Safety Injection System is a principal plant safeguard. It provides means to insert negative reactivity and limits core damage in the event of a loss of coolant or steam break accident.[(1)(2)(3)] The inspections and tests are to assure the availability of the components and the equipment for safety injection, cold leg recirculation, hot leg recirculation, alternate hot leg recirculation and containment spray.

Preoperational performance tests of the components are performed in the manufacturer's shop. An initial system flow test demonstrates proper dynamic functioning of the system. Thereafter, periodic tests demonstrate that all components are functioning properly. For these tests, flow through the system is generally not required. However, in the case of the "Hot SIS Test," actual conditions of an SI event are simulated. Specification 4.4, is a SISLOP test which is performed at cold shutdown and verifies the ECCS components function under loss of offsite power. Together, these two tests, and the other surveillances, satisfy the standard specification requirement to ensure automatic ECCS valves actuate to the correct postion.

The "Hot SIS Test," is performed to assure that long-term set of the valve seat faces on HV-851 A and B has not caused the valves to become inoperable. The test is required to be performed as the plant is shutting down from MODE 1 in order to assure that the valves have not been disturbed (i.e., the long-term set is still in effect) and that full dynamic conditions that would occur during an actual SI event are simulated. When possible the test should be performed prior to stopping the feedwater pumps (this is not a requirement). This will further assure that the valves will be in the same condition as when required for an actual Safety Injection event since the discharge pressure of the feedwater pumps acting on the valves will keep them seated even considering any back pressure built up in the downstream SI header. The equation used to determine future intervals if actuator force is between 10,000 lb_f and 22,000 lb_f is developed by shortening the interval in direct proportion to the degree to which the force exceeds 10,000 lb_f. During the test, all components are verified to have operated and sequenced properly.

The tests required in this specification will demonstrate that all components which do not normally and routinely operate will operate properly and in sequence if required. The monthly verification assures that one of the RHR heat exchanger valves (MOV-822A or MOV-822B) is de-energized. Because the valves are located in the containment, and are not environmentally qualified, one valve is required to be open with the power removed. It is not required to physically verify the valve position, since access to the containment is limited. The In-Service Test Program is used to verify required ECCS valves are operable. The portion of the Recirculation system outside the containment sphere is effectively an extension of the boundary of the containment. The measurement of the recirculation loop leakage ensures that the calculated EAB 0-2 hr. thyroid dose does not exceed 10 CFR 100 limits.

The trisodium phosphate stored in storage racks located in the containment is provided to minimize the possibility of stress corrosion cracking of metal components during operation of the ECCS following a LOCA. The trisodium phosphate provides this protection by dissolving in the sump water and causing its final pH to be raised to 7.0 - 7.5. The requirement to dissolve trisodium phosphate from one of the sample storage racks in distilled water heated and borated, to the extent recirculating post LOCA sump water is projected to be heated and borated, provides assurance that the stored trisodium phosphate will dissolve as required following a LOCA. The sample storage racks are sized to contain 0.5 pounds of trisodium phosphate. Trisodium phosphate stored in the sample storage racks has a surface area to volume ratio of 1.33 whereas the trisodium phosphate stored in the main racks has a surface area to volume ratio of 1.15.

Visual inspection of the non-redundant piping in the Containment Spray System provides additional assurance of the integrity of that system.

Surveillance testing of the RWST low-low level main feedwater/safety injection pump trips and automatic closure of MOV 850A, 850B and 850C valves will ensure that these components will be available to complete their safety functions if required.

REFERENCES:

(1) Final Engineering Report and Safety Analysis, Section 6.3

(2) "San Onofre Nuclear Generating Station", report forwarded by letter dated December 29, 1971 from Jack B. Moore to Director, Division of Reactor Licensing, USAEC, subject: Emergency Core Cooling System Performance, San Onofre Nuclear Generating Station, Unit 1.

(3) USAEC Safety Evaluation of ECCS Performance Analysis for San Onofre Unit 1, forwarded by letter dated March 6, 1974 from Mr. Donald J. Skovholt to Mr. Jack B. Moore.

(4) Letter, K. P. Baskin, SCE, to D. M. Crutchfield, NRC, dated October 16, 1981.

1. Simulating SISLOP*, and:

   a. Verifying operation of circuitry which locks out non-critical equipment,

   b. Verifying the diesel performs a DG FAST START from standby condition on the auto-start signal, energizes the emergency buses with permanently connected loads and the auto connected emergency loads** through the load sequencer (with the exception of the feedwater, safety injection, charging and refueling water pumps whose respective breakers may be racked-out to the test position) and operates for $\geq$ 5 minutes while its generator is loaded with the emergency loads,

   c. Verifying that on the safety injection actuation signal, all diesel generator trips, except engine overspeed and generator differential, are automatically bypassed.

   d. Verifying by control board indication and visual observation that all components have operated and sequenced properly. That is, the appropriate pump control circuitry has actuated, and that all automatic valves have completed their travel.

2. Verifying the generator capability to reject a load of 4,000 kW without tripping. The generator voltage shall not exceed 4,800 volts and the generator speed shall not exceed 500 rpm (nominal speed plus 75% of the difference between nominal speed and the overspeed trip setpoint) during and following the load rejection.

G. Manual Transfer Switches

1. Verify once every 31 days that the fuse block for breaker 8-1181 in MCC-1 for MTS-7 is removed.

2. Verify once every 31 days that MTS-8 is energized from breaker 8-1480B from MCC-4 and the cabinet door is locked, and that breaker 8-1122 from MCC-1 is locked open.

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* SISLOP is the signal generated by a sequencer on coincident loss of voltage on its associated 4160 volt bus (Bus 1C or 2C) and demand for safety injection.

** The sum of all loads on the engine shall not exceed 6,000 kW.