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August 6, 1990

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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: Docket No. 50-206
10 CFR 50.63, Station Blackout
San Onofre Nuclear Generating Station
Unit 1

This letter provides additional information regarding our Station Blackout submittals in response to the NRC staff's request during a June 22, 1990 conference call.

In accordance with 10 CFR 50.63, "Loss of all Alternating Current Power," we provided our station blackout (SBO) submittal on April 17, 1989. On May 1, 1990, a supplemental submittal was also provided to the NRC in response to a request from the Nuclear Management and Resources Council (NUMARC). In order to encourage consistent SBO programs throughout the industry, NUMARC developed NUMARC 87-00 to provide standard guidance to utilities for meeting the requirements of the SBO rule. NRC review of our submittals, which compare our SBO program to the NUMARC 87-00 guidance, resulted in the June 22, 1990 conference call wherein the NRC requested the additional information which is provided in the enclosure to this letter.

Our May 1, 1990 letter stated that we were still in the process of completing two analyses required to demonstrate compliance with NUMARC 87-00. The first analysis would investigate the effects of loss of HVAC on the control room temperatures during a station blackout. The second analysis would address the capacity of the station batteries to determine if they are adequate to power required components during a station blackout. The analysis for the control room HVAC has been completed and shows that the loss of HVAC as a result of a station blackout will not cause the control room temperature to exceed the acceptance criteria of 120°F given in NUMARC 87-00. The battery capacity evaluation is still in progress and will be completed by November 30, 1990.

Our May 1, 1990 letter also requested a deviation from NUMARC 87-00 guidance for determining the effects of a station blackout induced loss of ventilation for the DC Switchgear Room, the Charging Pump Room, and the 480V Switchgear Room. The deviation was requested because we credited the heatup calculations performed as part of the Systematic Evaluation Program (SEP) Topic IX.5, "Ventilation Systems" which were not performed to NUMARC 87-00 methodologies.

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Since our May 1, 1990 submittal, we have reevaluated our HVAC calculations for the three rooms for which a deviation from NUMARC 87-00 was requested. We have decided to perform new HVAC calculations for these rooms in accordance with NUMARC 87-00 methodology. At this time, we have completed new HVAC calculations to determine the effects of a loss of ventilation in both the Charging Pump Room and the 480 Volt Switchgear Room using NUMARC 87-00 methodology. Results of these calculations show that these two rooms will survive a four hour station blackout without exceeding their maximum allowable temperatures.

We are in the process of completing a calculation to address loss of ventilation for the DC Switchgear Room using NUMARC 87-00 methodologies. This calculation will be completed by November 30, 1990. Upon completion of this calculation, we will withdraw our request for a deviation from NUMARC 87-00 loss of ventilation methodology, as discussed in our May 1, 1990 letter.

During preparation of this submittal, we have determined that additional effort will be required to respond to your requests regarding the DC Thermal Barrier pump. Because the NRC requested this information as soon as possible, we are submitting a partial response at this time. We have discussed this approach with Mr. James Tatum of the NRC staff who stated that this plan is acceptable.

We will provide an additional submittal which will summarize the results of the DC Battery electrical and the DC Switchgear Room HVAC calculations as well as provide responses to the deferred DC Thermal Barrier pump questions by November 30, 1990.

If you have any questions, please do not hesitate to call me.

Very truly yours,

RM Baerthlan

Enclosure

cc: J. B. Martin, Regional Administrator, NRC Region V
C. Caldwell, NRC Senior Resident Inspector, San Onofre Units 1, 2 and 3
NUMARC (A. Marion)

ENCLOSURE

ADDITIONAL INFORMATION REQUESTED DURING JUNE 22, 1990 CONFERENCE CALL

1. Provide the flow characteristics of the DC Thermal Barrier Pump.

2. Provide a copy of the calculation which shows the DC Thermal Barrier Pump flow is sufficient or provide references that the use of the DC Thermal Barrier Pump has been previously reviewed and approved by the NRC.

3. Provide information on the temperature of the component cooling water system and the RCP seals after 1 hour using the Thermal Barrier Pump.

   Response to Questions 1, 2, and 3:

   Responses to the first three questions concerning the operation of the DC Thermal Barrier pump have been grouped together. We are currently reevaluating some of the assumptions used in the calculations for the DC Thermal Barrier pump to assure that operation throughout the duration of a station blackout is adequately addressed. The pump is powered by the station batteries which will produce a slowly decreasing voltage as they discharge during a station blackout. We have recognized the need to evaluate the performance of the DC Thermal Barrier pump under decreased voltage to assure adequate flow is maintained. We will provide an additional submittal responding to the above questions by November 30, 1990.

4. Provide a listing of the dedicated diesel generator loads and the kW rating.

   Response:

   The Dedicated Diesel Generator is rated at 2000 kW. The loads and their approximate kW ratings are as follows:

1.	Charging Pump Motor	475 kW
2.	Auxiliary Feedwater Pump Motor	336 kW
3.	Pressurizer Heaters	120 kW
4.	Charging Pump - Lube Oil Cooler Fan	1 kW
5.	Lighting Distribution Panel	25 kW
6.	DG Space Heaters, Air Temp and Lights	27 kW
7.	UP Lighting Loads and Receptacle	2 kW
8.	Pressurizer Heater Transfer Switch Heater	1 kW
9.	MCC Space Heater	2 kW
10.	Charging Pump - Transfer Switch Heater	1 kW
11.	DSD Panel Heaters and Lights	1 kW
12.	120V UPS Panel	1 kW
13.	Battery Charger Loads	13 kW
14.	4 kV Switchgear Heater	2 kW
15.	Diesel Auxiliary Loads	50 kW
	Total	1,057 kW

Note: The kW ratings for the charging pump motor and the auxiliary feedwater pump motor are nameplate ratings. These ratings are significantly greater than the loads expected during a station blackout. During an SBO the charging pump only needs to provide enough flow to replace leakage and volumetric losses due to shrinkage which will require approximately 380 kW. Demands placed on the AFW pump are those required to achieve safe shutdown and will require approximately 290 kW. These power requirements are significantly less than the nameplate power ratings which are provided in the table above in order to be conservative.

5. Provide a summary of the DC Battery calculation.

Response:

The battery calculation is not yet complete. An additional submittal providing a summary of the battery calculation results will be provided by November 30, 1990.

6. Provide the location of the pressure indication for the backup nitrogen systems.

Response:

The pressure indication for the safety related backup nitrogen systems is local at the nitrogen bottle clusters. There is no pressure indication in either the control room or the remote shutdown panel. Because the design of the nitrogen system allows for operation of required components for up to 16 hours before replacing any bottles, local indication for nitrogen pressure is acceptable for a 4 hour station blackout.

7. Identify the procedure which administratively controls the "normally" closed containment isolation valves and revise the Station Blackout analysis to identify those procedures.

Response:

Procedure SO1-4-39 verifies that valves MOV 850A, MOV 850B, MOV 850C, HV 851A and HV 851B are closed. Procedure SO1-4-41 verifies that CRS 021, CRS 382, CRS 426, MOV 866A, MOV 866B, and MOV 880 are closed. The containment isolation section in the SONGS 1 Station Blackout analysis is being revised to identify these procedures.

8. Provide a list of the containment isolation valves which were concluded to partially meet GDC 56, and were accepted by the NRC on some other defined basis as part of the SEP review. Include a copy of the IPSAR pages which reference the valves.

   Response:

   The following valves on the refueling water system (containment spray) return line were concluded to partially meet GDC 56 and were accepted on some other defined basis: CRS 306, CRS 307, CV 82, CV 92, and CV 114. Similarly, the valves on the refueling water supply line, MOV 1100B and 1100D, were also concluded to partially meet GDC 56 and were accepted on some other defined basis. All of these valves were accepted as part of the resolution of SEP Topic VI-4, Containment Isolation System. These valves were evaluated and found acceptable in section 4.23.7 of NUREG-0829, Integrated Plant Safety Assessment, Systematic Evaluation Program (IPSAR). The appropriate pages of the IPSAR are provided as Attachment 1.

9. Verify that the SEP loss of ventilation system calculations are bounding with respect to the NUMARC 87-00 methodology.

   Response:

   Our May 1, 1990 submittal identified three rooms which credit the loss of ventilation room heatup calculations performed as part of SEP Topic IX.5, "Ventilation Systems." For these rooms (DC Switchgear Room, Charging Pump Room, and 480V Switchgear Room) a deviation was requested because the SEP methodology was used instead of the NUMARC 87-00 methodology. The methodology used in the SEP calculations results in higher room temperatures than would be obtained using NUMARC 87-00 methodologies because the equipment remains energized. Because NUMARC 87-00 methodologies assume that AC equipment is not energized (except for those powered by the inverters) and thus does not produce heat, the SEP calculations are bounding of SBO conditions. However, since our June 22, 1990 telephone conversation, we have reevaluated our HVAC calculations for the three rooms for which a deviation from NUMARC 87-00 was requested. We have decided to perform new HVAC calculations for these rooms in order to fully comply with NUMARC 87-00 methodology. We have completed loss of ventilation calculations in accordance with the NUMARC 87-00 methodologies for both the charging pump room and the 480V switchgear room. These calculations show that these rooms will be able to survive a station blackout without excessive room heatup. A third calculation is being performed for the DC Switchgear Room using NUMARC 87-00 methodology. This calculation will be done in conjunction with the DC battery calculation and will be completed by November 30, 1990. As a result, we will no longer credit the heatup calculations performed as part of SEP Topic IX-5 for these three rooms following completion of the DC switchgear room calculation.

10. Provide a summary of the control room heatup calculations including the assumptions and the time frame for opening doors in the control room.

Response:

The control room heatup calculations were performed using methodologies consistent with NUMARC 87-00 guidance. The temperature response calculation for the control room was prepared for the purpose of determining the ambient room temperature rise during a four hour station blackout. The ambient temperature provides a reference point for reasonably assuring the operability of equipment necessary to achieve and maintain safe shutdown during station blackout.

The acceptance criteria for assuring the equipment operability, as established by NUMARC 87-00, is that the ambient temperature after a four hour station blackout is to be less than 120°F. The calculation utilized the "finite difference" method of transient heat transfer analysis to evaluate the wall temperature within the concrete slabs and the resultant ambient room temperature. Convection, conduction, and heat storage (in the concrete slabs) were considered in the analysis. In accordance with NUMARC 87-00 guidance, only the concrete walls and ceilings were considered as heat sinks in the analysis.

The primary assumptions and design input used in the temperature response calculation are as follows:

1. All plant equipment is in its normal operating condition prior to station blackout.

2. Heat transfer is due to convection and conduction through walls and ceiling in one direction, for simplification.

3. Air temperature in the surrounding rooms is not changed during the blackout period.

4. The air volume above the suspended ceiling in the control room is not credited in the heat transfer analysis, per NUMARC 87-00.

5. There is no heat transfer through the 4 kV switchgear room ceiling slab to the control room area, as the heat load in the 4 kV room during blackout is negligible.

6. The station blackout coping duration is four hours.

7. The electrical heat load for the control room is 26.9 kW.

8. The ambient room temperature in the control room before blackout is 75°F.

9. Heat loads due to people and lighting must be included for the control room.

The results of the calculation determined that the control room ambient temperature after a four hour station blackout event would be approximately 117°F, which is less than the acceptance criteria of 120°F. These results consider that the doors to the control room remain closed during the entire event. Also, consistent with the guidance given in NUMARC 87-00, the doors to cabinets containing instrumentation necessary for safe shutdown will be opened within 30 minutes of the initiation of the station blackout event.

ATTACHMENT 1

SECTIONS OF NUREG-0829 INTEGRATED PLANT SAFETY ASSESSMENT
SYSTEMATIC EVALUATION PROGRAM

4.22 Topic VI-1, Organic Materials and Postaccident Chemistry

10 CFR 50 (GDC 1, 4, 14, 31, 35, and 41 and Appendix B), as implemented by SRP Sections 6.1.1 and 6.1.2 and Regulatory Guide 1.54, requires, in part, that structures, systems, and components important to safety be designed to accommodate the effects of and be compatible with the environmental conditions associated with normal operating and postulated accident conditions. In particular, paints and organic materials used inside containment should not adversely affect the functions of the engineered safety features.

The safety objective of this topic is to ensure that protective coatings inside the containment do not consist of material (such as cellulose, hydrocarbons, or chlorides) that could decompose in radiation environments, create a hazardous hydrogen-rich environment, or cause material failures. The staff in its topic evaluation, therefore, recommended that the licensee commit to a periodic inspection and repair program.

By letter dated March 30, 1984, the licensee submitted the results of the inspection of the containment coatings that was performed during a plant outage as well as plans for future inspections and repair. On the basis of the inspection, the licensee performed the following paint repairs:

(1) Touch up of reactor coolant pumps, containment hatch door, and heating, ventilation, and air conditioning (HVAC) recirculation fans.

(2) Repair to coatings on some piping with salt and pepper rusting and on piping where coating was applied over mill varnish.

(3) Repair to coating on exterior surface of HVAC equipment where delamination may have occurred.

The licensee also agreed to develop a program to perform future periodic inspections of the containment coatings at intervals to coincide with containment type A testing. This will result in a frequency comparable to the staff recommendation of once every 3 years. Therefore, the staff finds this commitment acceptable.

4.23 Topic VI-4, Containment Isolation System

10 CFR 50 (GDC 54, 55, 56, and 57), as implemented by SRP Section 6.2.4 and Regulatory Guides 1.11 and 1.141, requires isolation provisions for the lines penetrating the primary containment to maintain an essentially leaktight barrier against the uncontrolled release of radioactivity to the environment. Under Topic VI-4, the containment isolation system is reviewed. This includes a reexamination of the penetrations for compliance with GDC 54 through 57 as well as a review of the electrical, instrumentation, and control design. The results of this review, including identified differences from criteria, are discussed below.

The results of the limited PRA for this topic showed that differences in the existing isolation provisions are of low importance to risk because the absolute failure probability of the penetrations of concern were small in comparison with the overall containment failure probability.

4.23.1 Electrical Aspects

The scope of the review and evaluation performed under Multiplant Generic Activity B-24 and Office of Inspection and Enforcement (IE) Bulletin 80-06, "Engineered Safety Feature (ESF) Reset Controls," encompasses the electrical aspects of this topic. Staff evaluations on the electrical issues associated with containment isolation were issued on February 17 and December 6, 1982. Specific issues raised in those evaluations are discussed below.

4.23.1.1 Purge Lines

As part of the review of Generic Issue B-24, the staff concluded that maintaining the 24-in.-diameter purge line isolation valves closed during modes 1 through 4 would preclude release of radioactivity through these lines should a loss-of-coolant accident occur.

The licensee submitted a proposed Technical Specification change on September 9, 1983, that would require a valve in each purge line to be locked closed during modes 1 through 4. The staff issued License Amendment No. 71 on February 17, 1984, to implement this requirement. This issue is therefore resolved.

4.23.1.2 Key Control and Control Panel Access Procedures for Sequencer Doors

In the December 6, 1982, topic evaluation, the staff found that the sequencer test switches were not the spring-loaded type that automatically return to the non-test position. Therefore, it was possible that both sequencers could be placed in the test mode at the same time. A common annunciator for "Sequencer in Test" is provided for both sequencers and thus would not show that both sequencers were in the test mode. Although administrative controls have been established to prevent this, no physical features have been provided to augment these controls as recommended by staff guidelines. As discussed in the licensee's November 22, 1982, submittal, each of the sequencer test panels has a lockable door with an indicator light. The licensee proposed to revise the test procedures to require that only one door light be on when the "Sequencer in Test" annunciator is lit.

The control panel access procedures in conjunction with the "door open" control panel lights for the sequencer doors will provide added assurance that both sequencers are not in the test mode at the same time.

As discussed in the licensee's July 28, 1986, letter, the necessary procedures have been implemented. The staff finds this acceptable and considers this issue to be resolved.

4.23.1.3 Redesign of BLOCK SIAS Annunciator Window

In the December 6, 1982, safety evaluation, the staff concluded that the annunciator for blocking the safety injection actuation signal (SIAS) should be modified to clarify the effects of blocking the signal. This modification entails redesigning the BLOCK SIAS annunciator window to indicate that when the SIAS is blocked, the containment spray signal and the SIAS inputs to the containment isolation signal are also blocked. Implementation of this modification does not entail physical changes to the present operating configurations, and, therefore, the degree of safety will not be significantly enhanced. Furthermore, during normal plant cooldown, the automatic SIAS is manually blocked to prevent inadvertent actuation of safety injection. An RCS pressure bistable element generates an alarm (Alert to BLOCK SIAS) at 1,750 psig to advise the operator that the SIAS should be manually blocked before pressure is reduced as part of the cooldown. Should safety injection be required after blocking, manual actuation of both injection flow trains is possible by deliberate sequencer actuation via manual initiate pushbuttons located on each sequencer remote surveillance panel in the main control room. Automatic reset of the safety injection block circuits will occur at a pressure of 1,900 psig in the pressurizer as the system is being brought to operating conditions. At that time, the safety injection block permissive indication will extinguish, indicating that the permissives have been reestablished.

In regard to the impacted containment spray, actuation can be initiated as required by manually starting the refueling water pump and opening the appropriate valves.

The containment spray system is actuated on a two-out-of-three high containment pressure signal and initiation of the SIAS. In the event the sequencer is reset before the receipt of the two-out-of-three signal (reset BLOCK SIAS) initiation of containment spray could be defeated. The containment spray actuation circuitry has been modified to include a seal-in relay contact to seal in the SIAS. Therefore, reset of the sequencer will not defeat the actuation of the containment spray system. The sealing of the SIAS is released on reset of the containment spray actuation signal.

On the basis of the information provided above, the blocking of the automatic initiation of more than one engineered safety feature (ESF) occurs only when operating modes are changed, at which time this configuration is desirable. The benefit gained by implementation of the annunciator modification is limited to additional information annunciated on the permissive display panel. Since operation of the SIAS block switch is an integral part of normal plant cooldown and part of routine operating procedures, reactor operators receive training to ensure familiarity with system operation. This familiarity includes operator awareness of the additional impacted ESFs and the procedures necessary to initiate those systems, should actuation be required. The current operator training program provides adequate information on the system interaction, and implementation of the proposed modification will not significantly enhance operator awareness. Therefore, implementation of the proposed annunciator modification will not significantly enhance safety. Furthermore, this modification does not entail changes in system operation. For these reasons, this modification is not warranted and the staff considers this issue to be resolved.

4.23.1.4 Automatic Loading of Diesel Generator Radiator Fans

The staff in the topic evaluation concluded that the fans that provide cooling for the diesel generators should be automatically loaded on a safety bus when the diesel generators start. The staff concluded that the diesel generator could be running without adequate cooling capability and thus might overheat.

In a letter dated January 19, 1984, the licensee stated that the diesel generators will start coincident with a safety injection actuation signal (SIAS), loss of offsite power (LOP), or SIAS/LOP. In the event of an SIAS, the diesel generators will start and the diesel generator radiator fans will be loaded automatically on the safety bus, which is powered by offsite power. In the event of an LOP, the diesel generators will start but will initially run with zero load. In this situation, the initial operator action is to attempt to regain power from the switchyard. If power cannot be regained from the switchyard, the buses will be manually loaded on the running diesel generators, at which time, operation of the radiator fans will be initiated. In the event of an SIAS/LOP, the diesel generators will start and be automatically loaded. Once the diesel generators have reached full speed and voltage (approximately 10 sec after the event), the sequencer will cause the diesel generator circuit breaker to close, thereby energizing the buses that supply power to the radiator fans. Therefore, the fans will start 10 sec after the diesel generators for the SIAS/LOP event.

Thus, initiation of the diesel generator radiator fans by loading the bus requires operator action only in the event of an LOP. Approximately 30 min are available to initiate fan cooling for the diesel generators running at no load before the diesel generators start to overheat. The staff concluded that the licensee should review plant operating procedures to ensure that precautions are included regarding the time limits for diesel generator operation unloaded.

On the basis of the above discussion, the staff concludes that, with appropriate procedures, adequate time is available for operator action when it is needed. These procedural checks were completed before restart from the Cycle 9 outage. The staff finds this acceptable.

4.23.1.5 Override Capability for Reactor Coolant Sample Line Isolation Valves

This issue is discussed in Section 4.23.2.

4.23.2 Valve Actuation

The following penetrations were identified during the topic review as having remote manual valves inside containment as isolation valves instead of automatic isolation valves as required by GDC 55 and 56:

Line	Penetration	Valve numbers
Pressurizer sample	46	CV951, 953 (inside); CV992 (outside)
Reactor coolant loop samples	47	CV955, 956 (inside); SV3302 (outside)
Residual heat exchanger sample	48	CV962 (inside); CV957 (outside)
Pressurizer relief tank gas sample	49	CV948 (inside); CV949 (outside)

The isolation configuration for these 3/8-in. sample lines consists of a normally closed remote manual valve (inside) in series with an automatic valve (outside). All of the valves are normally closed except when samples are being taken. The automatic valves have a common override switch so that samples can be taken even if a containment isolation signal is present. The override does not result in automatic reopening of any valve.

In regard to the manual override of the automatic isolation valves outside containment, Section II-E.4.2 of NUREG-0737 states that reopening of containment isolation valves shall require deliberate action. This requirement is satisfied by the fact that two actions are required to open each line: one action to override the containment isolation signal and one action to open the valve.

Providing modifications to these penetration lines to meet the explicit provisions of GDC 55 and 56 would not significantly improve the capability to isolate these lines.

On the basis of the above considerations, the staff concluded that these lines have adequate isolation provisions and no modifications are warranted. Accordingly, this issue is considered to be resolved.

4.23.3 Valve Type

The staff in the topic evaluation noted that the following penetrations have check valves outside containment as isolation valves instead of automatic isolation valves as required by GDC 56 or 57:

Line	Penetration
Instrument air header	13
Steam generator feedwater supply	7
Steam generator feedwater supply	8
Steam generator feedwater supply	9

Penetration 13 has check valves both inside and outside containment as well as a pressure-regulated valve outside containment. The pressure-regulated valve closes automatically when supply pressure drops below 60 psig. This is higher than the peak accident design pressure. The valve will be automatically closed whenever the air supply pressure will not ensure positive inflow to containment. The check valve also provides isolation for this 1½-in. line. The staff concludes that this valving arrangement provides adequate isolation capability and, therefore, no modifications are warranted.

The configuration of the feedwater lines was identified as a difference from current criteria because the boundary classification change (safety-related/non-safety-related) occurred at the check valve. However, the check valve is backed up by both a flow control valve and an MOV on the main feedwater lines and by a flow control valve on the bypass line. These valves are automatically closed on receipt of a safety injection actuation signal. Therefore, the staff concludes that this valving configuration provides adequate isolation for these lines.

The ½-in. chemical feed lines connect to the main feedwater lines on the containment side of the check valve. Therefore, these lines are part of the isolation boundary. A check valve serves as the isolation valve. The staff has concluded in previous risk assessments for other SEP plants that replacing the check valve with an automatic isolation valve would not significantly improve isolation reliability. Also, the potential leakage through such a small line, even if the valve were to catastrophically fail, is a negligible contributor to containment release. Therefore, the staff finds this valving arrangement acceptable and considers this issue to be resolved.

4.23.4 Valve Location

The following penetrations have both isolation valves outside containment instead of one inside and one outside, as required by GDC 56:

Line	Penetration
Containment sphere purge air	15
Containment sphere exhaust air	16

One valve in each line is maintained locked closed whenever the plant is in operation. The relative benefits of one valve inside and one valve outside rather than two valves outside containment have been evaluated in other SEP integrated assessments, and the conclusion was that little improvement could be shown in moving a valve inside containment. This is because the probability of failure of both valves was greater than the probability of failure of the pipe between the containment and first isolation valve. These lines are also included within the scope of systems being evaluated under Topic III-6 for their seismic integrity (see Section 4.11). Because of the minimum improvement in containment isolation capability and low importance of containment leakage to overall risk, corrective modifications are not recommended. The staff considers this issue to be resolved.

4.23.5 Isolation of Closed Systems

The following penetrations are lines that either enter or leave the containment sphere but are not open to the sphere free volume or the outside atmosphere. They are not provided with either automatic, remote manual, or locked-closed isolation valves as required by GDC 57.

Line	Penetration
Component cooling water supply and return	29 through 41

These lines are equipped with local manual valves outside containment and, in some cases, check valves inside containment.

The component cooling water (CCW) system is normally always in operation and provides postaccident functions. Thus, these lines will be pressurized when isolation is required. The CCW system is leak tested every 40 months and is hydrotested in accordance with ASME Code, Section XI requirement to check for leakage. The CCW system is within the scope of systems for which seismic reevaluation and upgrading is continuing (see Section 4.11). The CCW lines inside containment are evaluated as potential targets for pipe break effects (see Section 4.9). On the basis of system use, the seismic reevaluation, and pipe break considerations, the staff concludes that adding remote manual or automatic isolation valves to these lines is not warranted. However, it is the staff position that the licensee develop procedures that would identify when these valves need to be closed to ensure containment integrity (e.g., when the system is depressurized or there is a break in the CCW system). The licensee has proposed to evaluate the provisions for isolating CCW system lines and to implement any needed procedural changes by November 14, 1986.

4.23.6 Isolation of Air Handling Unit Cooling Lines

The following penetrations are lines that enter or leave the containment sphere but are not open to the sphere free volume or the outside atmosphere. GDC 57 requires at least one isolation valve that is either automatic, locked closed, or capable of remote manual operation.

Line	Penetration
Cooling water to air handling units	4, 5, 6

The licensee has indicated that lines 4, 5, and 6 are part of an essential closed system inside containment. Isolation provisions for each of these penetrations consist of a single remote manual isolation valve located outside containment.

This arrangement satisfies the requirements of GDC 57. However, for GDC 57 to apply, the closed system inside containment should be of safety-grade design. These lines are designated seismic Category A and are being evaluated under Topic III-6. Protection from pipe break effects is being considered under Topic III-5.A. Therefore, subject to resolution of these topics, this issue is considered to be complete.

4.23.7 Isolation of Branch Lines

The following penetrations have branch lines outside containment between the isolation valve and the containment, with open manual valves as containment ioslation valves:

Line	Penetration
Refueling water	1, 2
Main steam	54, 55

4.23.7.1 Refueling Water Lines

Line 1 (refueling water supply) branches into four parallel lines inside containment; one parallel line is provided with a normally closed manual valve, and the other three are each provided with a remote manual valve. Since line 1 has a postaccident safety function, namely, containment spray, automatic isolation of this line is not appropriate, and the use of remote manual valves inside containment is acceptable.

Outside containment, line 1 branches into main parallel lines, which have check valves, and into several smaller branch lines. With respect to the isolation valves outside containment, GDC 56 specifies that simple check valves are not suitable automatic isolation valves. However, the staff has determined that the use of a simple check valve outside containment is acceptable for the reasons stated in Section 4.23.3.

A further consideration with respect to line 1 is that several instrument, test connection, and branch lines connect to this line, downstream (containment side) of the specified containment isolation valves outside containment. Valves on these connections are normally closed.

The staff has reviewed the isolation provisions for this penetration and its associated branch lines and has determined that there is reasonable assurance that isolation will be provided if needed. Therefore, the staff finds these valving arrangements acceptable if appropriate administrative controls and/or physical locking devices are provided to ensure these connections are locked closed during operation.

In a letter dated October 4, 1985, the licensee noted that a program has been implemented to verify that normally closed valves are indeed closed. Procedures S01-12.3-43, "Containment Integrity," and S01-12.3-34 "Containment Sphere Safety-Related Alignment," provide assurance that valves are closed and provide for a monthly surveillance of valve alignments.

Line 2 (refueling water return line) branches into four lines inside containment, namely, two recirculation lines from the containment sphere sump, a bypass line from the containment sphere spray header, and the reactor refueling cavity drain line. The latter two lines are isolated from the refueling water return line during reactor operating modes 1 through 4, with single, or two series, closed local manual valves. Under accident conditions, the safety function of the refueling water return line is to recirculate the sump water for the recirculation mode of emergency core cooling and containment spray. Since there is only a single line penetrating containment, and because of its safety function, containment isolation valves, per se, are not provided outside containment. If necessary, however, there are manual valves that can be closed to isolate the containment. A further consideration is that the associated systems are engineered safety features and become extensions of the containment boundary; consequently, they constitute an appropriate isolation barrier. The amount of leakage from the piping and components outside containment is limited by the Technical Specifications; the system piping is periodically pressurized to check for leakage. Therefore, the staff finds this design meets GDC 56 on some other defined basis and considers this issue to be resolved.

4.23.7.2 Main Steamlines

Lines 54 and 55 are the main steamlines; each line is provided with a main steam isolation valve that is manually operated. These valves do not satisfy the requirements of GDC 57; however, the turbine stop valves and turbine control valves are available to automatically or remote manually isolate the main steamlines. However, upstream of the turbine stop valves and turbine control valves are numerous branch lines that also would have to satisfy the requirements of GDC 57. The staff has reviewed the isolation provisions for these branch lines and found their isolation arrangements meet the requirements of GDC 57, with the exception of (1) 1-in. lines to the flash evaporator/air ejector and (2) several 3/4-in. lines to the drain traps. The staff's concern with respect to these lines was the use of normally open local manual valves as isolation valves. As discussed in a July 28, 1986, submittal, the licensee will develop procedures to isolate main steam branch lines and drain lines by November 14, 1986. The staff finds this commitment acceptable.

The main concern in a PWR is for a steamline break that induces a hydraulic transient rupturing steam generator tubes resulting in a radiological release and uncontrolled LOCA outside containment. This scenario would only happen if the pipe were to fail between the steam isolation valve and the stop valve. The failure probability of the steamline is this particular section is low. The evaluation of the radiological consequences of this scenario (see Topic XV-17) has been performed assuming that the steam generator has not been isolated, and the staff found that the consequences were within acceptance criteria. The staff concludes that no modification to the steamlines is warranted; however, the staff recommends that appropriate procedures be developed to isolate these lines when required.

4.23.8 Spare Penetrations

During the topic review adequate information regarding the isolation and leakage testing of the following spare penetrations was not available.

Line	Penetration
Spare penetration	64 through 72

As noted in the June 28, 1983, letter from the licensee, these penetrations are sealed with blind flanges and the penetration design includes provisions for leakage testing. The staff considers this issue resolved.

4.23.9 Air Locks and Hatches

During the topic review adequate detailed information was not available regarding the appropriateness of isolation provisions for piping or instrument lines that may penetrate either the personnel air lock, emergency escape lock, or equipment access hatch.

The licensee has since indicated that the only penetrations are in the external wall of the air locks. These penetrations are for test purposes. Each has at least one closed manual isolation valve under administrative control. On the basis of this information, the staff finds the provisions for isolation acceptable and considers this issue resolved.

4.24 Topic VI-7.B, Engineered Safety Feature Switchover From Injection to Recirculation Mode (Automatic Emergency Core Cooling System Realignment)

10 CFR 50 (GDC 35), as implemented by Item 19 of SRP Section 6.3 requires, in part, that the complete sequence of emergency core cooling system (ECCS)