Attachment 1

SAIC-91/1268

TECHNICAL EVALUATION REPORT
LASALLE COUNTY STATION UNITS 1 AND 2
STATION BLACKOUT EVALUATION

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1.0 BACKGROUND

On July 21, 1988, the Nuclear Regulatory Commission (NRC) amended its regulations in 10 CFR Part 50 by adding a new section, 50.63, "Loss of All Alternating Current Power" (1). The objective of this requirement is to assure that all nuclear power plants are capable of withstanding a station blackout (SBO) and maintaining adequate reactor core cooling and appropriate containment integrity for a required duration. This requirement is based on information developed under the commission study of Unresolved Safety Issue A-44, "Station Blackout" (2-6).

The staff issued Regulatory Guide (RG) 1.155, "Station Blackout," to provide guidance for meeting the requirements of 10 CFR 50.63 (7). Concurrent with the development of this regulatory guide, the Nuclear Utility Management and Resource Council (NUMARC) developed a document entitled, "Guidelines and Technical Basis for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," NUMARC 87-00 (8). This document provides detailed guidelines and procedures on how to assess each plant's capabilities to comply with the SBO rule. The NRC staff reviewed the guidelines and analysis methodology in NUMARC 87-00 and concluded that the NUMARC document provides an acceptable guidance for addressing the 10 CFR 50.63 requirements. The application of this method results in selecting a minimum acceptable SBO duration capability from two to sixteen hours depending on the plant's characteristics and vulnerabilities to the risk from station blackout. The plant's characteristics affecting the required coping capability are: the redundancy of the onsite emergency AC power sources, the reliability of onsite emergency power sources, the frequency of loss of offsite power (LOOP), and the probable time to restore offsite power.

In order to achieve a consistent systematic response from licensees to the SBO rule and to expedite the staff review process, NUMARC developed two generic response documents. These documents were reviewed and endorsed (9) by the NRC staff for the purposes of plant specific submittals. The documents are titled:

1. "Generic Response to Station Blackout Rule for Plants Using Alternate AC Power," and

2. "Generic Response to Station Blackout Rule for Plants Using AC Independent Station Blackout Response Power."

A plant-specific submittal, using one of the above generic formats, provides only a summary of results of the analysis of the plant's station blackout coping capability. Licensees are expected to ensure that the baseline assumptions used in NUMARC 87-00 are applicable to their plants and to verify the accuracy of the stated results. Compliance with the SBO rule requirements is verified by review and evaluation of the licensee's submittal and audit review of the supporting documents as necessary. Follow up NRC inspections assure that the licensee has implemented the necessary changes as required to meet the SBO rule.

In 1989, a joint NRC/SAIC team headed by an NRC staff member performed audit reviews of the methodology and documentation that support the licensees' submittals for several plants. These audits revealed several deficiencies which were not apparent from the review of the licensees' submittals using the agreed upon generic response format. These deficiencies raised a generic question regarding the degree of the licensees' conformance to the requirements of the SBO rule. To resolve this question, on January 4, 1990, NUMARC issued additional guidance as NUMARC 87-00 Supplemental Questions and Answers (10) addressing the NRC's concerns regarding the deficiencies. NUMARC requested that the licensees send their supplemental responses to the NRC addressing these concerns by March 30, 1990.

2.0 REVIEW PROCESS

The review of the licensee's submittal is focused on the following areas consistent with the positions of RG 1.155:

A. Minimum acceptable SBO duration (Section 3.1),

B. Alternate AC (AAC) Power Source (Section 3.2),

C. SBO coping capability (Section 3.3),

D. Procedures and training for SBO (Section 3.4),

E. Proposed modifications (Section 3.5), and

F. Quality assurance and technical specifications for SBO equipment (Section 3.6).

For the determination of the proposed minimum acceptable SBO duration, the following factors in the licensee's submittal are reviewed: a) offsite power design characteristics, b) emergency ac power system configuration, c) determination of the emergency diesel generator (EDG) reliability consistent with NSAC-108 criteria (11), and d) determination of the accepted EDG target reliability. Once these factors are known, Table 3-8 of NUMARC 87-00 or Table 2 of Regulatory Guide 1.155 provides a matrix for determining the required coping duration.

For the SBO coping capability, the licensee's submittal is reviewed to assess the availability, adequacy and capability of the plant systems and components needed to achieve and maintain a safe shutdown condition and recover from an SBO of acceptable duration which is determined above. The review process follows the guidelines given in RG 1.155, Section 3.2, to assure:

a. availability of sufficient condensate inventory for decay heat removal,

b. adequacy of the class-1E battery capacity to support safe shutdown,

c. availability of adequate compressed air for air-operated valves necessary for safe shutdown,

d. adequacy of the ventilation systems in the vital and/or dominant areas that include equipment necessary for safe shutdown of the plant,

e. ability to provide appropriate containment integrity, and

f. ability of the plant to maintain adequate reactor coolant system inventory to ensure core cooling for the required coping duration.

The licensee's submittal is reviewed to verify that required procedures (i.e., revised, existing, and new) for coping with SBO are identified and that appropriate operator training will be provided.

The licensee's submittal for any proposed modifications to emergency AC sources, battery capacity, condensate capacity, compressed air capacity, ventilation system for equipment operability, containment isolation integrity and primary coolant make-up capability is reviewed. Technical specifications and quality assurance requirements set forth by the licensee to ensure high reliability of the equipment, specifically added or assigned to meet the requirements of the SBO rule, are assessed for their adequacy.

The licensee's proposed use of an alternate AC power source is reviewed to determine whether it meets the criteria and guidelines of Section 3.3.5 of RG 1.155 and Appendix B of NUMARC 87-00.

This SBO evaluation is based on a review of the licensee's submittals dated April 17, 1989 (12), March 30, 1990 (13), June 22,1991 (14) and September 23, 1991 (15), the information available in the plant Updated Final Safety Analysis Report (UFSAR) (16); it does not include a concurrent site audit review of the supporting documentation. Such an audit may be warranted as an additional confirmatory action. This determination will be made and the audit may be scheduled and performed by the NRC staff at some later date.

3.0 EVALUATION

3.1 Proposed Station Blackout Duration

Licensee's Submittal

The licensee, Commonwealth Edison, calculated (12 and 14) a minimum acceptable SBO duration of four hours for the LaSalle County Station, Units 1 and 2. The licensee stated (12) that no modifications are necessary to attain this proposed coping duration.

The plant factors used to estimate the proposed SBO duration are as follows:

1. Offsite Power Design Characteristics

   The plant AC power design characteristic group is "P1" based on:

   a. Independence of offsite power group of "I1/2,"

   b. Estimated frequency of LOOPs due to severe weather (SW) which places the plant in SW group "2,"

   c. Estimated frequency of LOOPs due to extremely severe weather (ESW) which places the plant in ESW Group "1," and

   d. Expected frequency of grid-related LOOPs of less than once per 20 years.

2. Emergency AC (EAC) Power Configuration Group

   The EAC power configuration of the plant is "D." The LaSalle site is equipped with three emergency diesel generators two of which are necessary to operate safe shutdown equipment during a station blackout for both units at the site.

3. Target Emergency Diesel Generator (EDG) Reliability

The licensee has selected a target EDG reliability of 0.975 based on having a nuclear unit average EDG reliability of greater than 0.95, 0.90, and 0.94, for the last 100, 20, and 50 demands respectively.

Review of Licensee's Submittal

Factors which affect the estimation of the SBO coping duration are: the independence of offsite power system grouping, the estimated frequency of LOOPs caused by severe weather (SW) and extremely severe weather (ESW) conditions, the estimated frequency of LOOPs caused by grid-related failures, the classification of EAC, and the selection of an EDG target reliability.

According to the UFSAR (16), two 4.16 kV Engineered Safeguards Features (ESF) buses (141-Y and 142-Y for Unit 1 and 241-Y and 242-Y for Unit 2) are normally supplied with power from System Auxiliary Transformers (SATs) 142 and 242. A third ESF bus is dedicated to the High Pressure Core Spray system (HPCS), and, although it is powered from an SAT, this is not a factor in determining the independence of offsite power system ("I") grouping. The SATs receive power directly from the switchyard. Upon failure of an SAT, the ESF buses can receive power from the opposite units SAT. According to UFSAR Figure 8.1-2, the SAT windings feeding the ESF buses are rated at 29 MVA. According to UFSAR Table 8.3.1, the maximum ESF bus loading, excluding HPCS, is 2364 kW. The HPCS bus load is 2597 kW, and the HPCS buses cannot be cross-connected. Thus, the maximum SAT load (4 x 2364 kW + 1 x 2597 kW) is 12053 kW, which corresponds to 15.1 MVA using a 0.8 power factor. Therefore, one SAT has adequate capacity to power all site ESF loads. The unit-to-unit ESF bus cross connection lines have a capacity of 1200 A at 4160 V, which corresponds to 3994 kW. Therefore, the cross-connection lines have adequate capacity to power an ESF bus from the opposite unit. The automatic and manual transfers of power are explained in Section

8.3.1.1.2 of the UFSAR. Therefore, we agree with the licensee's conclusion that LaSalle is in group "I2," based on item 2.b. of Table 5 of RG 1.155:

> "The safe-shutdown busses are normally aligned to the same preferred power source with either an automatic or manual transfer to the remaining preferred or alternate ac power source."

We agree with the licensee's estimated frequency of LOOPs caused by severe weather (SW) and extremely severe weather (ESW) conditions, placing the plant in groups "2," and "1," respectively. The weather-related parameters were taken directly from NUMARC 87-00 and the licensee is correct in its assessment of two rights-of-way for offsite power transmission lines.

With regard to the expected frequency of grid-related LOOPs at the site, we can not confirm the stated results. The available information in NUREG/CR-3992 (3), which gives a compendium of information on the loss of offsite power at nuclear power plants in the U.S., covers only the events prior to the calendar year 1984. No grid-related LOOPS for LaSalle were reported.

Establishment of the proper Emergency AC (EAC) Configuration Group is based on the number of available EAC sources and the number of EAC sources required to operate the safe shutdown equipment following a LOOP. The LaSalle site has three countable EAC power sources with two required after a LOOP. RG 1.155, Table 3, Note a. states that special purpose EDGs, such as LaSalle's HPCS EDGs should not be counted in the determination of EAC group. Therefore, we agree with the licensee that the plant is in EAC Group "D" (RG 1.155, Table 3).

The final characteristic needed to establish the duration of LaSalle's required coping capability is the target EDG reliability. The licensee stated (12 and 14) that the assignment of the EDG target reliability of 0.975 is based on having a nuclear unit average EDG reliability of

greater than 0.95, 0.90, and 0.94, for the last 100, 20, and 50 demands respectively. A review of the information in NSAC-108 indicates that the EDGs at LaSalle had an average of 38 valid demands per year, and a site average EDG reliability level of 0.998 per year for the calendar years of 1983 through 1985. Therefore, based on the licensee's statement and the NSAC-108 data, we agree that the licensee can choose a reliability goal of 0.975.

In response to the requirement for an EDG reliability program the licensee stated (14) that a reliability program incorporating the five elements discussed in RG 1.155, Regulatory Position 1.2, will be established to ensure that the target reliability (0.975) is maintained. In addition, the licensee stated that it is monitoring the resolution of Generic Issue B-56. When the final guidance on the resolution of this issue is published, the licensee will review and if necessary revise this program.

Based on an independence of offsite power group "I1/2," an SW group "2," and an ESW group "1," the AC power design characteristics of LaSalle is "P1." With this determination, in conjunction with EAC group "D" and an EDG reliability target of 0.975, the required SBO coping duration for LaSalle is four hours.

3.2 Alternate AC (AAC) Power Source

Licensee's Submittal:

The licensee's original submittal (12) did not identify an AAC power source. However, in a later submittal (14) the licensee stated that an AAC power source option exists at the LaSalle Station and is available within ten minutes of the onset of an SBO event. The AAC power source identified is the Division 3 EDG, DG 1B for Unit 1, and DG 2B for Unit 2, which supply power to the HPCS system and its auxiliaries. The licensee stated that the Division 3 equipment is physically and electrically isolated from the normal safe shutdown equipment and that

it is not susceptible to any single point vulnerability. The licensee added that this AAC power source has sufficient capacity to operate systems capable of coping with an SBO for the required duration of four hours. Additionally, the licensee stated that the HPCS system is capable of maintaining the plant in hot shutdown for the expected four hour duration of the SBO event.

Review of Licensee's Submittal:

The HPCS system provides a function that is redundant to the AC-independent Reactor Core Isolation Cooling (RCIC) system. The RCIC system is the procedurally preferred system. Therefore, the HPCS system provides added redundancy, but has no effect on the SBO coping capability. In addition, the licensee did not propose any plant modifications to use the excess capacity of these EDGs to augment its ability to cope with an SBO event. Therefore, we conclude that the division 3 EDG is not an AAC power source, as defined in RG 1.155.

3.3 Station Blackout Coping Capability

The plant coping capability with an SBO event for the required duration of four hours is assessed with the following results:

1. **Condensate inventory for decay heat removal**

   Licensee's submittal:

   The licensee stated (14) that based on an analysis performed in accordance with NUMARC 87-00, Section 7.2.1, 167,000 gallons of water are required for decay heat removal for the required coping duration of four hours. The licensee stated (15) that RCIC or HPCS could be used to provide makeup water. The HPCS system normally takes suction from the suppression pool, while the preferred RCIC system takes suction from the condensate storage tank (CST), and upon depletion of the CST transfers the suction to

the suppression pool, however, no credit was taken for water in the CST in the analysis. The licensee's calculation (17) states that the suppression pool inventory is adequate to cope with an SBO with a duration of four hours, since the suppression pool initially contains over 955,000 gallons.

Review of Licensee's Submittal

The licensee's suppression pool inventory calculation for RCIC assumes that all water mass from decay heat removal (73,505 gallons), SRV operations (78,310 gallons), RCS leakage (14,640 gallons @ 61 gpm) and RCIC turbine leakage (481 gallons) is lost from the suppression pool. This loss, totaling 166,936 gallons would lower the suppression pool level by 4.7 feet. The licensee's estimate is conservative since the RCIC pump can only deliver 144,000 gallons of water (@ 600 gpm) during a four hour period. A similar calculation was performed for HPCS with the nearly the same resultant loss (166,500 gallons) from the suppression pool. The licensee's analyses are also conservative because no credit is taken for water in the CST or for water returned to the suppression pool. We agree with the licensee that the water volume in the suppression pool is adequate to cope with an SBO with a duration of four hours.

2. Class-1E Battery Capacity

Licensee's Submittal

The licensee stated (12 and 14) that the 125 V (divisions 1 and 2) and the 250 V class-1E batteries are being replaced with larger capacity batteries, and that the replacement of the batteries is scheduled to be completed during the first quarter of 1992 (15). A battery capacity calculation (19) was performed in accordance with NUMARC 87-00, Section 7.2.2 to verify that the class-1E batteries have sufficient capacity to meet SBO loads for four

hours. The licensee stated (14) that with proper load shedding the new batteries will meet the SBO loads, including those needed for power restoration.

The licensee provided (19 and 20) calculations of battery capacity with and without load shedding. The Sargent & Lundy Electrical Load Monitoring System for DC Loads (ELMS-DC) computer program was used for the calculation. The licensee assumed that during the SBO event, the station will use SRVs and the RCIC system (which places a larger burden on site batteries than the HPCS system). The licensee's analysis included verification that the battery capacity is sufficient to feed the safety relief valve operations and to support the restoration of AC power following a four-hour SBO event.

The analyses (15) used the minimum Technical Specification-allowed electrolyte temperature of 60°F and a design margin of 1.0. An aging factor of 1.25 was used for all batteries except for division 3, which used a 1.11 aging factor.

The licensee stated (19 and 20) that the replacement class-1E division 1 and 2 batteries and the class-1E division 3 batteries have adequate capacity to support SBO loads for a duration of four hours and to restore AC power at the conclusion of the SBO (the original class-1E batteries do not have adequate capacity for a four-hour SBO event).

Review of Licensee's Submittal

The LaSalle DC power supply system consists of four separate, class-1E divisions for each unit. The 125 V division 1 and 2 systems supply the control power for various ESF loads and switchgear. The 125 V division 3 system supplies the HPCS and HPCS diesel control power. The 250 V division 1 battery is

essentially dedicated to the RCIC system. Each subsystem has a dedicated battery charger.

The licensee provided a list (19) of loads that it plans to shed from the station batteries. The loads shed include lighting and controls, and oil pumps for non-essential equipment. We agree with the licensee that the shedding of non-essential controls and oil pumps does not affect its ability to cope with an SBO, and accept the licensee approach to shed unnecessary lighting, subject to on-site NRC review.

The licensee provided no reason or justification for using an aging factor of 1.11 for the analysis of the HPCS battery. Although the battery is not specifically required to cope with an SBO, the licensee needs to explain why it choose to use an aging factor lower that the IEEE Std-485 recommended value of 1.25.

The licensee used a design margin of 1.0 to calculate the class-1E battery capacity and determined that the minimum excess capacity remaining after a four-hour SBO event was 8.3% (Ref. 19, Table 5A), after recovery, circuit breaker colsure, and connection of the emergency buses to the available offsite power source, the excess capacity was 6.3%. IEEE Std-485 recommends that a design margin of 10% to 15% be used in calculating battery capacity "to provide a capacity margin to allow for unforeseen additions to the DC system and less-than-optimum operating conditions of the battery due to improper maintenance, recent discharge, or ambient temperatures lower than anticipated." Since the calculated minimum excess battery capacity, using a design margin of 1.0, is less than the capacity that results from using the minimum design margin recommended by IEEE Std-485 (10%), the licensee needs to verify compliance to the recommendations of IEEE Std-485, in order to show that the class-1E batteries have adequate capacity to support SBO loads for the four-hour coping duration.

The licensee provided a schedule (14 and 15) for battery replacements, all of which will be completed by the fourth refueling of Unit 2 (first quarter of 1992). We cannot verify that this schedule meets SBO guidance.

3. Compressed Air

Licensee's Submittal

The licensee stated (12 and 14) that instrument nitrogen is required for the relief mode operation of the mainsteam safety/relief valves (SRVs). The Automatic Depressurization System (ADS) valves (7 of the SRVs) have backup nitrogen bottle banks that have been analyzed to ensure they are sufficient to support SRV actuations for the four-hour coping duration. The licensee added that manual opening and closing of individual ADS valve requires sending an operator to the Auxiliary Electric Equipment Rooms (AEER). Control of the ADS valves can be established from the AEER within 20 minutes. The ADS valves (all 7 at once) can be manually initiated from the control room.

Review of Licensee's Submittal

Our review of the UFSAR (16) indicates that all key RCIC valves are DC operated, and included in the battery capacity analysis. The licensee did not indicate what operator actions are needed in the AEER to support manual operation of the ADS valves. Although we did not review the licensee's analysis of the instrument nitrogen system used by the SRVs, the temperature in the AEER rooms remains below 120°F during the event, thus the valves can be operated manually.

4. Effects of Loss of Ventilation

Licensee's Submittal

The licensee stated (14) that the dominant areas of concern (DACs) at LaSalle were chosen from rooms that, based on engineering judgement,

- contained station blackout response equipment,
- have substantial heat generation loads, and
- lack normal heat removal systems due to the blackout.

The licensee identified three potential dominant areas of concern; the Auxiliary Electric Equipment Rooms (AEER), the Control Room and the RCIC Room, and performed plant specific transient thermal analyses of these rooms and the Drywell. The bases for Reasonable Assurance of Operability (RAO) are listed.

AREA	INITIAL TEMPERATURE	FINAL TEMPERATURE	RAO JUSTIFICATION
AEER	75°F	117°F	less than 120°F with the doors open
Control Room	73°F	98.1°F	less than 120°F
RCIC Room	104°F	153°F	NUMARC 87-00, App. F
Drywell	135°F	293°F	less than the 340°F design limit

The licensee stated (14) that a loss of ventilation analysis was performed for the containment under SBO conditions. This analysis

verifies the NUMARC 87-00 assumption that containment temperatures are enveloped by those following a LOCA. Additionally, the licensee stated that the suppression pool will not exceed any pressure or temperature limits during an SBO and that the main steam tunnel was considered for the temperature heat-up analysis but a review revealed that it did not contain shutdown equipment credited for an SBO, or RCIC isolation temperature instrumentation.

The licensee stated (15) that initial wall temperatures were based on normal operating temperatures.

The licensee submitted (15) the results of a random selection of electrical equipment for the Control Room, RCIC pump rooms and the AEER rooms determine if the maximum ambient temperatures expected during SBO would exceed the temperature rating of the equipment. The licensee stated that a consideration in selecting the equipment was to choose reasonably sensitive equipment. All of the equipment chosen from the AEER and control rooms was designed to operated above the maximum expected room temperatures. The licensee added that all RCIC room equipment was designed to operate in harsh environments which exceed the temperature expected during an SBO.

Review of Licensee's Submittal

We have two concerns with the licensee's analysis of the effects of the loss of ventilation. First, the initial room temperatures chosen for the AEER and control rooms are non-conservative. They appear to be based on perfect operation of the HVAC systems. The room HVAC systems could be in a degraded condition prior to the event, unless plant controls (e.g., Technical Specifications, administrative controls) ensure otherwise. The licensee can choose these temperatures only if it provides appropriate controls to ensure that this temperature will not be exceeded under any

circumstances during normal plant operation. Second, the licensee stated (24) that the maximum design drywell temperature is 340°F. It is not clear what this temperature is based on. Our concern is that the limit is based on a shorter time frame than the four hour duration of the SBO event, and therefore not valid for an SBO.

5. Containment Isolation

Licensee's Submittal

The licensee (12 and 14) stated that they reviewed the plant list of containment isolation valves to verify that valves which must be capable of being closed or that must be operated under SBO conditions can be positioned (with indication) independent of the unit's preferred and blacked-out class-1E power supplies. In addition to the NUMARC exclusion criteria, the licensee also excluded valves from consideration that met the following conditions:

- o Valves in line with excluded valves
- o Valves which continue to be powered
- o Valves in line with a penetration with one valve closed

The licensee stated that valves that require manual actuation to ensure appropriate containment integrity will be incorporated into the appropriate station procedures. The licensee provided (15) the list of containment isolation valves analyzed for the SBO event.

Review of Licensee's Submittal

The list of containment isolation valves in the UFSAR (Table 6.2-21) and that provided by the licensee's response to questions (15) were reviewed to determine the capability of the plant to establish containment isolation under SBO conditions. The

exclusion allowed by RG 1.155 (paragraph 3.2.7) were applied. Our review concurs with the licensee that adequate containment isolation integrity is assured during an SBO event. All penetrations are either excluded using the criteria in RG 1.155, or excluded on the basis that they meet the intent of the guidance.

6. Reactor Coolant Inventory

Licensee's Submittal

The licensee stated (14) that since decay heat is removed by the discharge of steam through the main steam line safety/relief valves into the suppression pool, this source will not be significantly depleted by RCIC/HPCS operation. The suppression pool contains over 955,000 gallons of water. The licensee stated (14) that the RCS and condensate inventory calculation is based on an assumed 18 gpm per recirculation pump seal leak, and a 25 gpm maximum Technical Specification-allowed leakage. Reference 15 describes calculation 3C7-0390-001 (17) that performs an RCS inventory analysis and demonstrates that the suppression pool heat capacity temperature limit (HCTL) is not exceeded during an SBO event with a duration of four hours. The licensee (15) assumed that SRVs cycle at their setpoints. The ANSI standard decay heat curve was used. Manual depressurization cooldown at 100°F/hr. is used until the reactor pressure is controlled between 167 and 172 psia. The initial suppression pool temperature was assumed to be 105°F. The licensee analysis show that adequate reactor water level is maintained throughout the 4-hour SBO event.

Review of Licensee's Submittal

The licensee analyzed reactor coolant inventory during an SBO with a four hour duration. The licensee apparently took the RCS fluid and structure sensible heat, decay heat, maximum technical

specification allowed leakage, reactor coolant pump seal leakage, inventory lost from safety-relief valve operations and steam used for RCIC pump operation into account.

If RCIC is used, the final suppression pool temperature is 214.6°F (18), at four hours, and the lowest reactor vessel water level is approximately -130" at about 50 minutes after the onset of the SBO event (Ref. 18, Figure 5). Using HPCS, the lowest reactor vessel water level reached is approximately -75" (Ref. 18, Figure 11)at about one minute into the event. Level rapidly recovers, within ten minutes, and from 20 minutes to four hours remains at approximately +50", with a final suppression pool temperature, after four hours, of 232.1°F(18). Insufficient information was provided to determine if the lowest reactor vessel water level reached (-130" using RCIC) results in a brief core uncovery. The licensee's analysis needs to show that the core remains covered, or if the core is briefly uncovered, the duration of core uncovery. We accept the licensee conclusion that there is adequate water available to maintain reactor inventory during an SBO with a four hour duration. However, the licensee needs to verify that the suppression pool temperatures are within acceptable ranges for the operation of RCIC and HPCS equipment and that Technical Specification or design limits are not exceeded. Specifically, this is important for RCIC operation because RCIC turbine lube oil and gland seal is cooled by the water from the RCIC pump discharge. No degradation of the operating SBO equipment is accepted by the staff. In addition, the licensee needs to verify that, following restoration of AC power, recovery from these elevated suppression pool temperatures is possible. Our main concern is the ability to run the reactor heat removal system in the suppression pool cooling mode without cavitating or damaging the pumps.

NOTE:

"The 18 gpm RCP seal leak rate was agreed to between NUMARC and the staff pending resolution of Generic Issue (GI) 23. If the final resolution of GI-23 defines higher seal leak rates than assumed for the RCS inventory evaluation, the licensee needs to be aware of the potential impact of this resolution on its analyses and actions addressing conformance to the SBO rule."

3.4 Proposed Procedures and Training

Licensee's Submittal

The licensee stated that plant procedures have been reviewed and revisions necessary to meet the intent of the guidelines in NUMARC 87-00, Section 4 are listed in its submittal (14).

Review of Licensee's Submittal

We neither received nor reviewed the affected procedures or training. These procedures are plant specific actions concerning the required activities to cope with a SBO. It is the licensee's responsibility to revise and implement these procedures, as needed, to mitigate an SBO event and to assure that these procedures are complete and correct in their contents and that the associated training needs are carried out accordingly.

3.5 Proposed Modifications

Licensee's Submittal

The licensee stated (15) that, with the exception of the Unit 2, division 2, 125 VDC battery, all the class-1E batteries at the LaSalle

County Station have been replaced. Replacement of the division 2 battery is scheduled for the first quarter of 1992.

Review of Licensee's Submittal

The licensee provided a schedule (14 and 15) for battery replacemenis, all of which will be completed by the fourth refueling of Unit 2 (first quarter of 1992). We cannot verify that this schedule meets SBO guidance.

3.6 Quality Assurance And Technical Specifications

Quality Assurance

The licensee provided a list (15) of equipment required during an SBO which are not classified as either safety-related or regulatory-related. The licensee stated that a QA program meeting the guidance of RG 1.155 Appendix A will be provided. We accept the licensee's statement that a QA program will be implemented.

Technical Specifications

The licensee did not provide any information on whether any Technical Specification will be needed in order for the plant to comply with the guidance of RG 1.155, Appendix A.

4.0 CONCLUSIONS

Based on our review of the licensee's submittals, telephone conversations between NRC/SAIC and the licensee, and the information available in the UFSAR for the LaSalle Plant, we find the submittal conforms with the requirements of the SBO rule and the guidance of RG 1.155 with the following exceptions:

1. **Alternate AC (AAC) Power Source**

   The licensee proposes to use the division 3 HPCS EDGs excess capacity to power other necessary shutdown equipment, but does not identify the equipment to be powered or plant modifications that may be necessary for the EDG to qualify as an AAC in accordance with the guidance provided in RG 1.155. As a result, we conclude that the division 3 EDGs cannot be considered an AAC power source.

2. **Class-1E Battery Capacity**

   Our reiew indicates that the calculated minimum excess battery capacity, using a design margin of 1.0, is less than the capacity that results from using the minimum design margin recommended by IEEE Std-485 (10%), the licensee needs to verify compliance to the recommendations of IEEE Std-485, in order to show that the class-1E batteries have adequate capacity to support SBO loads for the four-hour coping duration. In addition, the licensee needs to explain why it chooses to use an aging factor lower that the IEEE Std-485 recommended value of 1.25 in the analysis of the HPCS battery.

3. **Effects of Loss of Ventilation**

   The initial room temperatures chosen for the Auxiliary Electric Equipment Rooms and the Control Rooms are non-conservative. The licensee can choose these temperatures only if it provides

appropriate controls to ensure that this temperature will not be exceeded under any circumstances during normal plant operation. In addition, the licensee needs to provide the basis for the maximum design drywell temperature of 340°F. Our concern is that the limit may be based on a shorter time frame than the four hour duration of the SBO event, and therefore not valid for SBO.

4. Reactor Coolant Inventory

Insufficient information was provided to determine if the lowest reactor vessel water level reached (-130" using RCIC) results in a brief core uncovery. The licensee needs to provide analysis that show that the core remains covered, or if the core is briefly uncovered, the duration of core uncovery. The licensee also needs to verify that the suppression pool temperatures are within acceptable ranges for the operation of RCIC and HPCS equipment and that Technical Specification or design limits are not exceeded (see Section 3.3). In addition, the licensee needs to verify that, following restoration of AC power, recovery from these elevated suppression pool temperatures is possible and does not impact the ability to run the reactor heat removal system in the suppression pool cooling mode without cavitating or damaging the pumps. The licensee needs to take the above mentioned heat load issues into account in its analysis and operating procedures.

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