Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

June 22, 1990

Dr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

Subject: LaSalle County Station Units 1 and 2
Revised Response to Station Blackout Rule
NRC Docket Nos. 50-373 and 50-374

References: (a) 10 CFR Part 50.63, Loss of all Alternating Current Power.

(b) M. Richter (CECo) letter to T.E. Murley (NRC), dated April 17, 1989.

(c) B. Lee (NUMARC) letter to NUMARC Board of Directors, dated January 4, 1990.

(d) M. Richter (CECo) letter to T.E. Murley (NRC), dated March 30, 1990.

Dr. Murley:

Reference (a) requires that each light-water-cooled nuclear power plant be able to withstand and recover from a station blackout (SBO) of a specified duration. A response to the SBO rule was required from each licensee by April 17, 1989. Reference (b) provided Commonwealth Edison Company's (CECo) initial response to the SBO rule for LaSalle County Station. Subsequent to the initial response, Reference (c) provided additional guidance/clarifications to the NUMARC 87-00 guidelines. As a result of these NUMARC clarifications and CECo/NRC staff discussions on the SBO rule, CECo has re-evaluated the original response for LaSalle County Station and determined that a revised response was necessary.

A050
1/1

Attachment 'A' to this letter provides CECo's revised response to the SBO rule for LaSalle County Station. CECo is proposing to meet the SBO rule for LaSalle County Station by demonstrating that the station can cope for the four-hour blackout duration. During a blackout event, LaSalle County Station can utilize the Reactor Core Isolation Cooling (RCIC) System or the High Pressure Core Spray (HPCS) System to provide the required reactor vessel inventory makeup. An Alternate AC power source exists for each unit which meets the criteria specified in Appendix B of NUMARC 87-00, and provides the necessary power for HPCS System availability.

Please address any questions that you may have concerning this response to this office.

Respectfully,

Milton H. Richter

M.H. Richter
Generic Issues Administrator

Attachment 'A': Response to Station Blackout Rule for LaSalle County Station.

cc: A.B. Davis, Regional Administrator - RIII
Senior Resident Inspector - LaSalle Station
R. Pulsifer - NRR Project Manager
P. Gill - NRR Electrical Systems Branch

TLM/ZNLD/ID15

ATTACHMENT A

RESPONSE TO STATION BLACKOUT RULE

FOR LASALLE COUNTY STATION

RESPONSE TO STATION BLACKOUT RULE FOR LASALLE COUNTY STATION

On July 21, 1988, the Nuclear Regulatory Commission (NRC) amended its regulations in 10 CFR, Part 50. A new section, 50.63, was added which requires that each light-water-cooled nuclear power plant be able to withstand and recover from a station blackout (SBO) of a specified duration. Licensees were required to submit station blackout responses by April 17, 1989. In accordance with the rule, Commonwealth Edison Company (CECo) submitted a response for LaSalle County Station on that date.

Following the NRC review of several licensee responses, it was determined that additional guidance/clarifications were necessary for the industry. The NRC and NUMARC subsequently agreed upon a set of clarifications to the NUMARC guidance consisting of a set of questions and answers. This supplement to NUMARC 87-00 was issued to the industry by NUMARC on January 4, 1990.

Prior to the issuance of the NUMARC letter (January 4, 1990), CECo had been involved in discussions with the NRC staff on the SBO responses for Dresden and Quad Cities Stations. As a result of the NUMARC clarifications and the CECo/NRC staff discussions, CECo re-evaluated the original LaSalle Station response and coping calculations, and determined that a revised response was necessary.

For this response, CECo has evaluated LaSalle Station against the requirements of the SBO rule using the recent clarifications of NUMARC 87-00 except where Regulatory Guide 1.155 takes precedence. In some instances, alternative technical methodologies were used. These alternate approaches are highlighted in this response where appropriate.

This response details the plant factors considered in the determination of the proposed station blackout coping duration. In addition, the ability of LaSalle Station to cope with a station blackout of this proposed duration is addressed. Finally, procedure revisions and modifications required to conform to the guidance are described. The results of this evaluation are detailed in this response. (Applicable NUMARC 87-00 sections are shown in parentheses.)

A. Proposed Station Blackout Duration

NUMARC 87-00, Section 3, combined with the recently issued guidance, was used to determine a proposed SBO duration of four hours. The plant factors considered in determining the proposed SBO duration are discussed in this section. Additionally, the available Alternate AC power source option is discussed. A simplified one-line diagram of LaSalle Station's AC electrical distribution is presented on Figure 1.

1. The AC Power Design Characteristic Group is P1 based on:

   a. Expected frequency of grid-related LOOPs does not exceed once per 20 years (Section 3.2.1, Part 1A, p. 3-3);

   b. Estimated frequency of LOOPs due to extremely severe weather places the plant in ESW Group 1 (Section 3.2.1, Part 1B, p. 3-4);

   c. Estimated frequency of LOOPs due to severe weather places the plant in SW Group 2 (Section 3.2.1, Part 1C, p. 3-7);

   d. The off-site power system is in the I 1/2 Group (Section 3.2.1, Part 1D, p. 3-10).

2. The Emergency AC power configuration group is D (Section 3.2.2, Part 2C, p. 3-13) based on:

   a. There are three emergency AC power supplies not credited as Alternate AC power sources (Section 3.2.2, Part 2A, p. 3-15);

   b. Two emergency AC power supplies are necessary to operate safe shutdown equipment for an extended period following a loss of off-site power (Section 3.2.2, Part 2B, p. 3-15).

3. The target EDG reliability to be maintained by the site is 0.975.

   a. A target EDG reliability of 0.975 was selected based on having a nuclear unit average EDG reliability for the last 100 demands greater than 0.95, consistent with NUMARC 87-00, Section 3.2.4.

   b. A diesel generator reliability program incorporating the five elements discussed in Regulatory Guide 1.155 will be established to ensure this target is maintained. In addition, CECo is monitoring the resolution of Generic Issue B-56: Diesel Generator Reliability. When the final guidance on the resolution of this issue is published, CECo will review, and if necessary, revise the program.

4. An Alternate AC (AAC) power source option exists at LaSalle Station which meets the criteria specified in Appendix B to NUMARC 87-00.

An AAC power source exists for each unit, and is available within ten minutes of the onset of the station blackout event. The AAC power source has sufficient capacity to operate systems capable of coping with a station blackout for the required SBO duration of four hours.

The AAC power source for each unit is the Division 3 emergency diesel generator (D/G 1B for Unit 1 and D/G 2B for Unit 2) which supplies power to the HPCS System and its auxiliaries. The AAC division (Division 3) includes its own safe shutdown equipment which is physically and electrically isolated from the unit's normal safe shutdown busses (busses 141-Y and 142-Y for Unit 1, and busses 241-Y and 242-Y for Unit 2). The HPCS System is designed to provide coolant injection at all reactor pressure conditions, and is capable of maintaining the plant in hot shutdown for the expected four-hour duration of the station blackout.

This AAC power source is not susceptible to a single point vulnerability whereby a likely weather-related event or single active failure could disable any portion of the emergency ac power sources or the preferred power supply, and simultaneously fail the AAC source. Since this AAC power system is designed to power safe shutdown loads during a loss of offsite power event, a transient loading analysis was not necessary.

B. Proposed Coping Assessment

The ability of LaSalle Station to cope with a four-hour station blackout in accordance with NUMARC 87-00, Section 3.2.5 is assessed in this section using NUMARC 87-00, Section 7. This coping assessment considers (1) the adequacy of the condensate inventory, (2) the capacity of the Class 1E batteries, (3) the station blackout compressed air requirements, (4) the effects of loss of ventilation on station blackout response equipment, and (5) the ability to maintain containment integrity. The coping assessment calculations referenced in this section are available for review.

1. Condensate Inventory For Decay Heat Removal (Section 7.2.1)/Reactor Coolant Inventory (Section 2.5)

It has been conservatively determined from Section 7.2.1 of NUMARC 87-00 that 167,000 gallons of water are adequate for decay heat removal for four hours. The station blackout coping approach uses the Reactor Core Isolation Cooling (RCIC) System or the HPCS System to provide makeup water for core cooling. The HPCS system normally takes suction from the suppression pool which contains approximately 950,000 gallons of water. The RCIC System normally takes suction from the condensate storage tank (CST) and automatically transfers to the suppression pool on low CST level. Since decay heat is removed by the discharge of steam through the main steamline safety/relief valves (SRVs) into the suppression pool, this source will not be significantly depleted by RCIC/HPCS operation. A plant-specific analysis was performed to ensure that the RCIC System or HPCS System can supply sufficient condensate to maintain the core covered for the entire four-hour duration of the station blackout.

As a result of SRV discharge, gradual heatup of the suppression pool will occur. A calculation was performed to ensure that the suppression pool temperature would not exceed the temperature/pressure limits within four hours. A leakage rate of 18 gpm from each reactor recirculation pump was assumed in this analysis. In addition, the Technical Specification leakage rate of 25 gpm (20 gpm identified plus 5 gpm unidentified) was included.

No plant modifications or procedure changes are needed to utilize the water sources (CST and suppression pool).

2. Class 1E Battery Capacity (Section 7.2.2)

The 125 Vdc (Divisions 1 and 2) and 250 Vdc Class 1E batteries are being replaced with larger capacity batteries. At this time, the 125 Vdc Division 1 batteries for both units, and the 250 Vdc battery for Unit 2, have been replaced. A calculation was performed to ensure that these new batteries have sufficient capacity to meet the station blackout loads for four hours assuming that loads not needed to cope with a station blackout are shed. The required loads include power restoration from either the emergency ac power supplies or the preferred power source. The loads that need to be shed are listed in the battery capacity calculation performed for the SBO analysis. The shedding of these loads will be proceduralized as noted in Section C of this response.

3. Compressed Air (Section 7.2.3)

The AAC power source does not power station compressors, however, instrument nitrogen is required for the relief mode operation of the main steamline SRVs. The Automatic Depressurization System (ADS) valves (7 of the SRV's) have existing backup nitrogen bottle banks that have been analyzed to ensure they are sufficient to support SRV actuations for the four-hour coping duration. Manual opening and closing of individual ADS valves, to depressurize the reactor in a controlled manner, requires sending an operator to the Auxiliary Electric Equipment Room (AEER). Emergency lighting and communications already exist to gain access to the AEER and to utilize the required controls. Control of the ADS valves from the AEER can be established within 20 minutes. During this time, the Low Low Set function of five of the ADS valves will automatically control reactor pressure in the normal operating range. The ADS valves (all 7 at once) can be manually initiated by either of two divisions of DC logic from the Control Room. As a backup, the mechanical safety mode of SRV operation is available independent of nitrogen bottles to control pressure.

4. Effects of Loss of Ventilation (Section 7.2.4)

The AAC power source does not power cooling loads to some plant areas that contain station blackout response equipment. These areas must therefore be evaluated to establish reasonable assurance of operability for station blackout equipment. This section documents that reasonable assurance of operability is provided for the containment and all dominant areas of concern.

In addition, the Residual Heat Removal (RHR) System is not energized during a station blackout. Therefore, a calculation has been performed to ensure that the suppression pool temperature/pressure limit will not be violated under station blackout conditions.

a. Dominant Areas of Concern

The dominant areas of concern (DACs) at LaSalle Station were chosen from rooms that, based on documented engineering judgment, (1) contained station blackout response equipment, (2) have substantial heat generation terms, and (3) lack normal heat removal systems due to the blackout. These areas are listed in the following table along with their associated station blackout temperature, type of heatup analysis performed, and justification for Reasonable Assurance of Operability (RAO).

AREA	FOUR HR. TEMP.	ANALYSIS	RAO JUSTIFICATION
Aux Elect Equip Rooms	117°F	transient (non-NUMARC)	less than 120°F
Control Room	98.1°F	transient (non-NUMARC)	less than 120°F
RCIC Room	153°F	transient (non-NUMARC)	NUMARC 87-00 App. F Report

Reasonable assurance of equipment operability is established without further analysis if temperatures in the DAC are calculated to be equal to or less than 120°F (NUMARC 87-00 Supplemental Questions/Answer #2.2). Procedure revisions are required for opening access and panel doors in the Auxiliary Electrical Equipment Rooms. No modifications are required to provide reasonable assurance of equipment operability in the above rooms.

b. Containment

The AAC power supply does not energize containment cooling systems. Therefore, a loss of ventilation analysis was performed for the containment under station blackout conditions. This analysis verifies the NUMARC 87-00 assumption (Section 2.7.1) that containment temperatures resulting from a station blackout are enveloped by those of the loss of coolant accident.

c. Suppression Pool

The AAC power supply does not energize the RHR System. Therefore, the suppression pool temperature will increase due to the discharge of steam from the safety/relief valves. A calculation was performed which ensured that the suppression pool temperature would not exceed the temperature/pressure limits within four hours. A leakage rate of 18 gpm from each reactor recirculation pump was assumed in this analysis. In addition, the Technical Specification leakage rate of 25 gpm (20 gpm identified plus 5 gpm unidentified) was included.

5. Containment Isolation (Section 7.2.5)

The station list of containment isolation valves has been reviewed to verify that valves which must be capable of being closed, or that must be operated (cycled) under station blackout conditions, can be positioned (with indication) independent of the preferred or Class 1E power supplies. This analysis used the exclusion criteria listed in NUMARC 87-00, Section 7.2.5. When multiple valves are provided in a line penetrating containment, only one valve is required to be closed.

The valves that may require manual actuation to ensure appropriate containment integrity under station blackout conditions will be incorporated into the appropriate station procedures. The associated procedure revisions are documented in Section C of this response.

6. Quality Assurance

A QA program meeting the requirements of Regulatory Guide 1.155 Appendices A and B will be applied to cover non-safety related equipment needed for coping with a station blackout that are not already covered by existing QA requirements in Appendices B or R of 10 CFR 50.

C. Proposed Procedures and Modifications

This section documents the proposed procedure revisions and modifications for LaSalle Station to conform to the station blackout rule.

1. Procedure Revisions

The following potential procedure revisions have been identified to meet the station blackout rule.

TOPIC	PROCEDURE #	NATURE OF REVISION
Battery Capacity	LOA-AP-08	shed appropriate battery loads
Loss of Ventilation	LOA-AP-08	open AEER access and panel doors
Containment Isolation	LOA-AP-08	valves requiring manual actuation
Containment Isolation	LOA-PC-01	valves requiring manual actuation
Containment Isolation	LOA-MS-02	valves requiring manual actuation
Containment Isolation	LOA-RH-04	valves requiring manual actuation
Containment Isolation	LOA-RI-03	valves requiring manual actuation
Containment Isolation	LOA-RT-02	valves requiring manual actuation
Containment Isolation	LOS-HG-SA1	valves requiring manual actuation
Restoration of AC power	SPSO-I-1	system load dispatcher guidance

The LSCS housekeeping program includes periodic inspections of the site with the intent of minimizing the accumulation of excessive debris. This satisfies the intent of the severe weather actions per NUMARC 87-00 Section 4.2.3.

These procedure revisions will be completed one year after the notification provided by the Director, Office of Nuclear Reactor Regulation in accordance with 10 CFR 50.63 (c)(3).

2. Modifications

The 125 Vdc (Divisions 1 and 2) and 250 Vdc Class 1E batteries are being replaced with larger capacity batteries. These modifications are scheduled to be completed by the end of the fourth refueling outage for each unit (Unit 1 - scheduled for April 1991, Unit 2 - scheduled for January 1992).

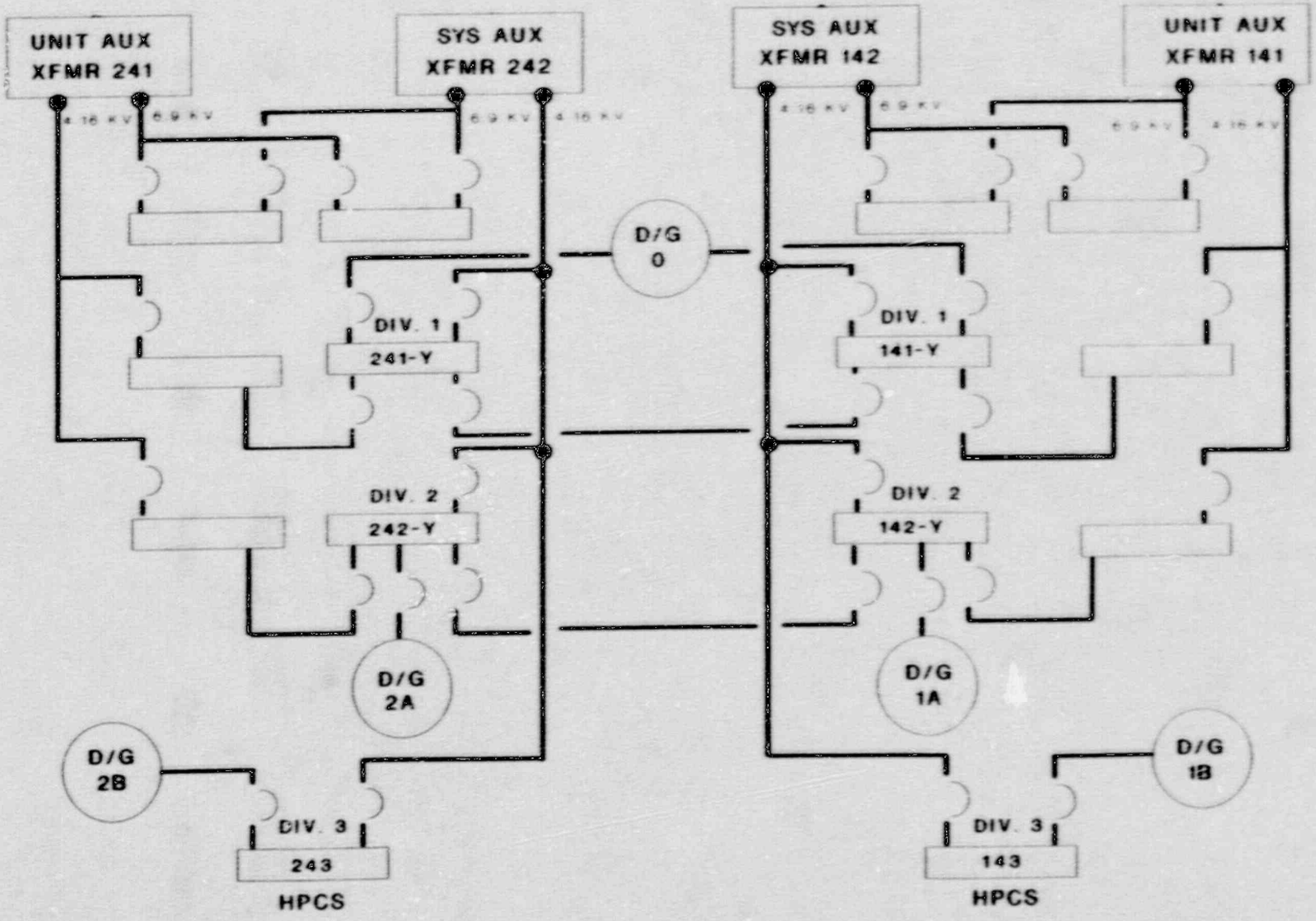

Figure 1 One Line Diagram of LaSalle Station's AC Electrical Distribution