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SUBJECT: Suppls 890417 & 900330 responses to NRC safety evaluation of station blackout.Control room lighting conditions will be improved during 1992 refueling outage to support operations during station blackout.

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10 CFR 50.63

Iowa Electric Light and Power Company

February 10, 1992
NG-92-0283

JOHN F. FRANZ, JR.
VICE PRESIDENT, NUCLEAR

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

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Response to Safety Evaluation by NRC-NRR "Station Blackout Evaluation Iowa Electric Light and Power Company Duane Arnold Energy Center"

Reference: (1) Letter, Mineck (IELP) to Murley (NRC), NG-89-0923, dated April 17, 1989
(2) Letter, Mineck (IELP) to Murley (NRC), NG-90-0757, dated March 30, 1990
(3) Letter, Shiraki (NRC) to Liu (IELP), dated November 22, 1991

File: A-106a, A-107c, R-10

Dear Dr. Murley:

In References (1) and (2), we submitted initial and supplemental information evaluating the Duane Arnold Energy Center (DAEC) against the requirements of the Station Blackout (SBO) Rule, 10 CFR 50.63. Our evaluation was based on the use of NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," except where USNRC Regulatory Guide 1.155 takes precedence. On December 10, 1991, we received the NRC Safety Evaluation (SE) of the DAEC SBO submittals (Reference 3). The staff requested that we submit a revised response to the SBO Rule.

This letter provides that revised response as Attachment 1. This revised response supersedes the previous submittals. The recommendations of the SE have been incorporated except as noted in the second Attachment.

Those exceptions are described as follows:

- the battery capacity calculations do not have a minimum load duration of one minute as recommended in IEEE-485 (reference section 2.2.2 Response item 5);

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- the Division 1, 125 volt battery has only 5% Design Margin instead of 10 to 15% as recommended in IEEE-485 (reference section 2.2.2 Response item 6);

- the assumed initial control room temperature is 85°F and will be administratively controlled (reference section 2.2.4.1 Response);

- the outside air ambient temperature is 91°F based on the design basis of the control room HVAC and an HVAC industrial standard (reference section 2.2.4.1 Response item b);

- the essential switchgear rooms assumed initial temperature is 85°F based on recent data (reference section 2.2.4.4 Response).

Technical justifications for the exceptions are also included in the second Attachment.

This letter and the attachments provide the basis for concluding that the DAEC conforms to the SBO Rule. The detailed evaluations which document the applicability of the baseline assumptions of NUMARC 87-00 to the DAEC are available at the site.

Should you have any questions regarding this matter, please contact this office.

Very truly yours,

John F. Franz, Jr.
Vice President, Nuclear

Attachments:
1) Iowa Electric Light and Power Company, Duane Arnold Energy Center, Response to Station Blackout Rule
2) Resolution of NRC Recommendations for DAEC SBO Rule Compliance

JFF/SCR/pjv

cc: S. Catron
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Iowa Electric Light and Power Company

Duane Arnold Energy Center

Response to Station Blackout Rule

(Revision 2)

Effective July 21, 1988, the Nuclear Regulatory Commission (NRC) amended its regulations by adding a new section 50.63 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. Utilities are expected to have available for NRC review the baseline assumptions, analyses and related information used in their coping evaluation. Section 50.63 requires that the plant be capable of maintaining core cooling and appropriate containment integrity during a SBO of a specified duration and identifies the factors that must be considered in determining that duration. Section 50.63 further requires that each licensee submit the following information:

1. A proposed station blackout duration including a justification for the selection based on the redundancy and reliability of the onsite emergency AC power sources, the expected frequency of loss of offsite power (LOOP), and the probable time needed to restore offsite power;

2. A description of the procedures that will be implemented for station blackout events for the duration (as determined in 1 above) and for recovery therefrom; and

3. A list of modifications to equipment and associated procedures necessary to withstand the specified SBO duration and a proposed schedule for implementing these modifications.

The NRC has issued Regulatory Guide (RG) 1.155, "Station Blackout," which describes a means acceptable to the NRC Staff for meeting the requirements of 10 CFR 50.63. RG 1.155 states that the NRC Staff has concluded that NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout At Light Water Reactors," also provides guidance that is in large part identical to the RG 1.155 guidance and is acceptable to the NRC Staff for meeting these requirements.

Table 1 to RG 1.155 provides a cross-reference between RG 1.155 and NUMARC 87-00 and notes where the RG takes precedence.

Iowa Electric Light and Power Company (IELP) has evaluated the Duane Arnold Energy Center (DAEC) against the requirements of the SBO rule using guidance from NUMARC 87-00 except: (1) where use of RG 1.155 is required; (2) where plant-specific transient analyses were performed to determine the temperature response in the Control Room and all dominant areas of concern during a SBO, as allowed by NUMARC 87-00.

The results of our evaluation are detailed below. (References to NUMARC 87-00 Sections are shown in the parentheses.)

A. <u>Proposed Station Blackout Duration</u>

NUMARC 87-00, Section 3 has been used to determine the proposed SBO duration of four hours. No plant modifications were required to attain this proposed coping duration category.

The following plant factors have been used to determine the proposed station blackout:

1. AC Power Design Characteristic Group is P2 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 2 (Section 3.2.1, Part 1B, p. 3-4);

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

    d. The offsite power system is in the I1/2 Group (Section 3.2.1, Part 1D, p. 3-10).

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

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

    b. One emergency AC power supply is necessary to operate safe shutdown equipment following a loss of offsite power (Section 3.2.2, Part 2B, p. 3-15).

3. The target EDG reliability is .975.

   A target EDG reliability of .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. <u>Procedure Description</u>

An analysis has been performed to determine DAEC's plant-specific response to a SBO. The results of this analysis indicate that concerns regarding operability of equipment inside the primary containment can be alleviated by depressurizing the reactor vessel to between 200 and 400 psi within 30 minutes of the onset of a SBO. This depressurization of the reactor vessel will be directed by plant procedures.

The following plant procedures have been reviewed and are being modified to meet the guidelines in NUMARC 87-00, Section 4:

1. Station Blackout Response per NUMARC 87-00, Section 4.2.1:

   a. DAEC Emergency Operating Procedures (EOPs) Contingency 2 Emergency Depressurization

   b. DAEC Abnormal Operating Procedure (AOP-301) Loss of Essential Electrical Power
      TAB 1 - LOSS OF ONE ESSENTIAL 4160 BUS
      TAB 2 - LOSS OF BOTH ESSENTIAL 4160 BUSES
      TAB 3 - LOSS OF OFFSITE POWER

   c. DAEC Abnormal Operating Procedure (AOP-301.1) Station Blackout
      TAB 1 - STATION BLACKOUT

   d. DAEC Annunciator Response Procedure (ARP-1C08A and ARP-1C08B) Electrical Power Distribution System Alarms

2. AC Power Restoration per NUMARC 87-00, Section 4.2.2:

   a. DAEC Abnormal Operating Procedure (AOP-301) Loss of Essential Electrical Power
      TAB 4 - RESTORATION OF POWER TO ONE ESSENTIAL BUS
      TAB 5 - RESTORATION OF POWER TO BOTH ESSENTIAL BUSES

b. DAEC Abnormal Operating Procedure (AOP-301.1) Station Blackout
   TAB 2 - RESTORATION WITH ONLY STANDBY DIESEL GENERATOR POWER
   TAB 3 - RESTORATION OF OFFSITE POWER

c. DAEC Operating Instruction (OI-304.1) 4160/480 Nonessential Electrical Power
   SECTION 6.0 - REENERGIZING THE 4160/480 NONESSENTIAL BUSES

3. Severe weather per NUMARC 87-00, Section 4.2.3:

a. DAEC Abnormal Operating Procedure (AOP-903) Tornado

C. Modifications

The ability of DAEC to cope with a station blackout for four hours in accordance with NUMARC 87-00, Section 3.2.5 and as determined in Section "A" above was assessed using NUMARC 87-00, Section 7, unless otherwise noted. As a result of this assessment, the following modifications are deemed appropriate.

Insulation has been installed around the Reactor Core Isolation Cooling (RCIC) turbine to assure that the temperature of the RCIC room will remain below 150°F during a SBO.

Control Room lighting conditions will be improved during the 1992 refuel outage to support operations during a SBO.

IELP will ensure that the Commission is advised promptly of any unforeseen plant modifications necessary for coping with a SBO of the proposed four hour duration.

The coping assessment was completed with the following results:

1. Condensate Inventory For Decay Heat Removal (Section 7.2.1 and plant-specific analysis)

An analysis has been performed to determine DAEC's plant-specific response to a SBO. It has been determined from Section 7.2.1 of NUMARC 87-00 and this plant-specific analysis that 63,390 gallons of water are required for decay heat removal for the required coping duration of four hours. By design, the condensate storage tanks maintain an approximate total reserve of 75,000 gallons of water for use under emergency conditions, which exceeds the quantity required to cope with a four-hour station blackout. No plant modifications or procedure changes are needed to utilize this water source.

2. <u>Class 1E Battery Capacity (Section 7.2.2)</u>

Battery capacity calculations have been performed pursuant to NUMARC 87-00, Section 7.2.2, and the conclusion of those calculations is that the Class 1E batteries have sufficient capacity to support station blackout loads for four hours.

3. <u>Compressed Air (Section 7.2.3)</u>

Air-operated valves relied upon to cope with a station blackout for four hours can either be operated manually or have sufficient backup sources independent of the unit's preferred and blacked out Class 1E AC power supply. Valves which require manual operation or backup sources for operation are being identified in plant procedures.

4. <u>Effects of Loss of Ventilation (Plant-specific thermal transient analysis)</u>

The effects of loss of ventilation in the Control Room and in each dominant area of concern were determined using a plant-specific thermal transient analysis in lieu of the steady-state methodology of Section 7.2.4 of NUMARC 87-00.

a. Plant-specific thermal transients have been calculated for the following dominant areas of concern:

Area	Temperature
HPCI Room	150°F (Peak) 139°F (following operator action to open HPCI Room doors after 30-minutes)
RCIC Room	126°F (with added insulation of RCIC turbine)
Steam Tunnel	241°F
Essential Switchgear Rooms	117°F

b. The assumption in NUMARC 87-00, Section 2.7.1 that the control room will not exceed 120°F during a station blackout has been assessed.

The control room at DAEC will not exceed 120°F during a station blackout. Therefore, the control room is not a dominant area of concern.

Operability of station blackout response equipment in the above dominant areas of concern has been verified through an assessment which utilized Appendix F to NUMARC 87-00, the Topical Report, NUREG/CR-4942, and the DAEC Equipment Qualification Program.

5. Containment Isolation (Section 7.2.5)

The list of containment isolation valves in the plant has been reviewed to verify that valves which must be capable of being closed or which must be operated (cycled) under station blackout conditions can be positioned (with indication) independent of the unit's preferred and blacked-out Class 1E AC power supplies. No plant modifications are required but procedure changes are being made to ensure that appropriate containment integrity can be provided under SBO conditions.

6. Reactor Coolant Inventory (Section 2.5)

An analysis has been performed to determine DAEC's plant-specific response to a SBO. The ability to maintain reactor coolant system inventory adequate to ensure that the core is cooled has been assessed for the required four-hour coping duration has been assessed using this analysis. The expected rates of reactor coolant inventory loss under SBO conditions do not result in a core uncovery during a SBO of four hours. Therefore, makeup systems in addition to those currently available under SBO conditions are not required to maintain core cooling under natural circulation conditions.

D. Schedule for Implementation

After receipt of the notification provided by the Director, Office of Nuclear Reactor Regulation, as required by 10 CFR 50.63(c), IELP will advise the NRC of the schedule for implementation of the aforementioned modifications and procedure changes via the Integrated Plan.

Resolution of NRC Recommendations for DAEC SBO Rule Compliance

NRC Safety Evaluation (SE) and its contractor's Technical Evaluation Report (TER) made certain comments and recommendations for the DAEC Response to the SBO Rule. Those comments and recommendations have been carefully considered by IELP. This attachment states each recommendation and discusses the IELP actions taken in response. Necessary revisions in the SBO documentation maintained by IELP have been made.

Each recommendation is identified by the SE section in which it appears and is followed by the IELP response.

2.1 RECOMMENDATION: The licensee needs to change the EDG reliability target from 0.95 to 0.975 in order to remain a 4-hour SBO coping duration plant. The EDG target reliability change should be included in the documentation supporting the SBO submittals that is to be maintained by the licensee. Alternatively, the licensee needs to change the coping duration to 8 hours and reevaluate the plant for an 8-hour coping duration.

RESPONSE: The previous DAEC site-specific Severe Weather Assessment concluded that the DAEC should be categorized in the Severe Weather Group 2 based on data collected at the Cedar Rapids Airport during the period 1950 through 1980. The NRC had several concerns with that Assessment: (1) no justification was provided for the difference between the site-specific weather data and the data contained in NUMARC 87-00; (2) no statistical analysis of the site-specific data set was documented showing a "goodness-of-fit" to the Fisher-Tippet (Type I) distribution; (3) the data set relied upon did not include the last ten years. Because of these concerns and the fact that the calculated frequency of loss of off-site power due to severe weather was 0.0098, which is not significantly different from 0.0100 (the cutoff level between SW-2 and SW-3), the NRC concluded that the DAEC is in the Severe Weather Group 3. With the DAEC in SW Group 3 and all other parameters remaining the same, the coping duration becomes 8 hours. The only parameter which can be varied to retain the 4-hour coping duration is EDG target reliability.

The DAEC Severe Weather Assessment was performed using the data then available from the National Climatic Data Center and the National Severe Storms Forecast Center and following the published guidance in NRC NUREG/CR-4492 and NUREG/CR-2890. Recently, IELP obtained weather data for the period

1980 through 1990. However, preliminary reviews of that data indicate that its use will not change the previous DAEC Severe Weather Assessment appreciably.

Since the DAEC EDG reliability value is currently above 0.975 and the NRC concerns regarding the Severe Weather Assessment cannot be easily resolved, IELP has chosen to reperform the Severe Weather Assessment using the data provided in NUMARC 87-00 and revise the EDG target reliability as recommended. The new DAEC site EDG reliability target is 0.975 and the appropriate procedures will be revised.

2.2 RECOMMENDATION: The licensee needs to conform to the 4-hour coping duration by increasing the EDG reliability target from 0.95 to 0.975. Otherwise, the licensee needs to reevaluate the plant for an 8-hour coping duration and the supporting analyses should be submitted for NRC review.

RESPONSE: IELP has chosen an EDG Reliability Target of 0.975.

2.2.2 RECOMMENDATION: The licensee should reevaluate the battery capacity considering the concerns noted below, perform an analysis in accordance with IEEE 485 or its equivalent to show that there is adequate battery capacity for the required duration, and submit the results of the reanalysis to the NRC staff. The battery capacity analysis and verification, and any resulting modification, should be included in the documentation supporting the SBO submittals that is to be maintained by the licensee.

The staff finds several deviations from IEEE Std. 485 in the cell sizing work sheets. These are:

1. The licensee has used a section sizing of 4.04 (uncorrected) positive plates instead of the maximum section sizing of 5.05 positive plates on the 250V DC battery sizing worksheet.

2. The use of cell correction factor of 0.9662 is not in accordance with IEEE 485 and is non-conservative.

3. The licensee needs to verify that the battery room temperature of 72°F as used in the battery capacity calculations is the lowest electrolyte temperature during normal operation per NUMARC 87-00 Section 7.2.2. In addition, the temperature correction factor for 72°F per IEEE Std. 450 is 1.029 not 1.028 as used by the licensee.

4. The ampere requirement from constant power loads should be calculated at the lowest allowable voltage at the load terminal. This current will be higher than rated current. Rated current is used in the calculation. Also, the licensee needs to ensure that the expected minimum battery terminal voltage (215.2 V and 105 V) exceeds the minimum voltage required for the operation of the equipment (inverters, motors) supported by the batteries.

5. The licensee by selecting periods as low as 0.5 second segments did not follow IEEE 485 recommendation (Section 4.2.3 of IEEE 485).

6. The licensee did not consider any design margin (10% to 15% per IEEE 485) in its battery capacity calculations.

7. The battery sizing calculation does not seem to have been verified.

The licensee also needs to ensure that the battery load profile models the number of HPCI/RCIC operations as used in the plant-specific analyses in support of condensate, containment temperature, and reactor coolant inventory calculations.

RESPONSE: NRC recommended that IELP reperform the calculations in accordance with IEEE-485 and those calculations should include the number of HPCI/RCIC operations as used in the plant-specific analyses. IELP has reperformed the battery capacity calculations and addressed the NRC concerns as discussed below.

The calculations were performed using an IELP-developed computer program. This program utilizes the methodology contained in IEEE-485, which was developed to facilitate repeated reanalysis in evaluating load changes in the future.

A description of the computer program is included in the calculations which are available at the site as part of the documentation supporting DAEC conformance to the SBO Rule.

(1) The concern regarding the choice of 4.04 versus 5.05 was apparently a result of incomplete information available to the reviewer. While 5.05 appears to be the maximum plate requirement, this selection would have resulted in applying the random load (HPCI isolation) to the section containing HPCI initiation. Since this random load could not occur simultaneously with that peak, it was applied to the next most severe peak, resulting in selecting a section size of 4.04 positive plates. Battery margin calculations have been performed using a computer program which contains the same exclusion of simultaneous loads as described above. These calculations confirm the adequacy of the DAEC batteries.

(2) The cell correction factor of 0.9662 represents additional information on the Discharge Characteristic Graph provided by the manufacturer, C&D Batteries. This factor is included by the manufacturer because it allows the manufacturer to use a common discharge graph with a capacity rating factor incorporated for several cell sizes. This correction factor accurately describes the capacity of the cells installed at the DAEC. The use of this correction factor is consistent with the guidance of IEEE-485, Section 6.2, which suggests consideration of factors other than those specified in the standard when those factors will influence cell size.

(3) The battery room temperature is administratively controlled. Corrective action is taken to raise room temperature if battery electrolyte temperature falls to 72°F. Further, the temperature correction factor used in the revised calculation is 1.029 in accordance with IEEE-450, section 6.3, Table 1.

(4) The battery loads are modeled as a mixture of constant power (power supplies and inverters), constant impedance (lights and resistive loads) and constant current (motors) loads. Constant power loads are

modeled such that current demand increases as battery voltage decreases. The model results in an accurate characterization of the current drawn by these loads and does not rely on the equipment current ratings. Constant impedance loads are conservatively modeled as constant current loads.

IELP design specifications for DC system equipment considers the effect of minimum battery voltage. The system is designed for a minimum of 105 VDC or 210 VDC for the 125 VDC and 250 VDC buses, respectively. The equipment is required to be designed and installed (including intervening cabling) with sufficient capability to operate at these minimum voltages.

(5) The original battery capacity analysis did not establish a minimum duration for each load other than the duration which could be reasonably expected. IEEE-485, section 4.2.3 recommends that momentary loads be applied for a minimum of one minute because the voltage drop for an instantaneous, short-duration load is essentially the same as for a one minute-duration load. Information from the battery manufacturer contradicts this assertion in that the instantaneous capacity of the batteries exceeds the one minute capacity. This information was utilized in the previous battery sizing calculations which included load durations which are accurate for the equipment. Similar methodology is used in the new battery capacity analysis. This analysis includes load durations which are representative of the equipment operating characteristics (e.g., in-rush current). This methodology allows a more rigorous approach, is more representative of actual battery loading and capacity, and is in accordance with the battery manufacturer's recommendations.

(6) IEEE-485 describes three types of margin to be used for determining battery size requirements: Aging Margin, Temperature Correction and Design Margin. The battery capacity calculations include 25% margin for aging and 2.9% margin for temperatures as low as 72°F (Temperature correction factor = 1.029, ref. item 3 above). The final margin type, Design Margin, was not incorporated into the new calculations, but is a product of the calculations. Design Margin is intended to account for future load growth and less than ideal conditions at discharge. Since the DAEC batteries are already installed, IELP chose to perform battery calculations described in IEEE-485 without Design

Margin in order to determine the actual margin available. The Design Margins available for the limiting SBO scenario are 5% for 1D1 (Division 1, 125 v battery), >20% for 1D2 (Division 2, 125 v battery), and >80% for 1D4 (250 v battery).

The calculations demonstrate that each of the batteries can support the required loads under SBO conditions. While the available Design Margin for 1D1 is smaller than the 10 to 15% as recommended in IEEE-485, section 6.2.2, IELP is aware of the available margin and has a program which controls load growth such that the batteries will always have adequate capacity. The other factors to be considered for Design Margin (<u>i.e.</u>, poor maintenance, lower temperature than expected and recent discharge) are addressed through procedures governing maintenance, room temperature and returning the batteries to operable status after discharge.

(7) The calculations are complete and verified.

2.2.4.1 RECOMMENDATION: (1) The licensee should reevaluate the temperature rise in the control room and the instrument and relay cabinet room using conservative initial temperatures corresponding to the technical specification temperature limits or the maximum value allowed under administrative procedures, and using conservative parameters described in SAIC's TER for the heat-up calculations. If the licensee's administrative procedures do not specify an operating temperature limit, the licensee should establish an administrative procedure or revise their existing administrative procedures to maintain the control room and instrument and relay cabinet room temperatures at or below 76°F. (2) The licensee should include in their SBO procedure a provision to open the instrument cabinet doors within 30 minutes of the onset of an SBO.

RESPONSE: (1) IELP has reevaluated the room heat-up analyses for the control room and instrument and relay cabinet area. The assumed initial temperature was based on the following references:

- IELP Design Calculation, BECH-VC3-14 states that the design basis operating temperature in the control room is 75°F.

- UFSAR 9.4-6 states that the Control Building HVAC is designed to supply air at 54°F to maintain 75°F in control room.

- NUMARC 87-00 Sec. 2.7.2(3) discusses control room habitability and declares that a conservative case assumes the initial temperature in the control room as 78°F.

These references justify assuming 76°F for the initial temperature in the control room. However, since the DAEC Technical Specifications do not contain temperature limits for the control room, IELP has analyzed the control room to determine the maximum initial temperature which would result in peak temperatures below 120°F. IELP determined that an initial temperature of 85°F will result in peak temperatures of 112.8°F and 120°F in the control and instrument and relay cabinet rooms, respectively. These peak temperatures support the conclusion that the operators will be able to perform the necessary actions and the equipment will remain functional.

The peak temperatures can be maintained within the above limits during the SBO provided that operator actions are taken within 30 minutes of the onset of a SBO to (1) open electrical cabinets which are powered during the SBO and which have sheet metal doors, and (2) provide an exhaust path for control room air via the door and an outside window with temporary gas-powered exhaust fans. These actions are being addressed in appropriate procedures.

In addition to assuming a more conservative initial temperature in the revised calculations for the control room area, IELP has evaluated the other concerns from the TER and made these changes:

(a) Initial temperatures are assumed to be 104°F for the Reactor and Turbine Buildings and 90°F for the Administration Building and Cable Spreading Room. The Administration Building and Cable Spreading Room are mechanically cooled. These values are consistent with the guidance provided in NUMARC 87-00.

(b) IELP did not use the NUREG/CR-1390 value of either 98°F or 112°F for outside ambient temperature. Instead, the outside ambient temperature is assumed to be 91°F. IELP chose this value based on the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Handbook of Fundamentals. This handbook is a standard industry reference for determining outside ambient temperatures for the design of air conditioning systems for various locations. The 1989 issue of this reference indicates the maximum design 1% dry-bulb temperature for Cedar Rapids, Iowa is 91°F. Further justification for this outside ambient temperature is provided in Section 9.4.4.2 of the DAEC UFSAR, which states that the design basis outside ambient temperature is 90°F. The NUREG contains highly conservative probabilistic values for temperature extremes. This degree of conservatism is not necessary for assurance of equipment operability during a SBO, which is considered to be beyond the Design Basis of the DAEC.

(c) The room heat-up transient model for the control room area was refined to consider heat transfer between the instrument and relay cabinet room and the control room and the support area. Further, the temperature in the Cable Spreading Room (i.e., down stream of the floor area) has been revised to the conservative value of 90°F as stated previously.

(d) The concrete thermal properties have been incorporated as recommended in the TER, page 20, item 5.

(e) The control room lighting modification which will be implemented this outage (i.e., by April 1992), has been incorporated into the final heatup calculation.

In addition to incorporating these additional conservatisms, IELP is developing administrative controls for monitoring control room temperature and providing direction to maintain it below 85°F, since that is the assumed initial temperature for the SBO scenario.

(2) NRC recommended including a provision to open instrument cabinet doors during a SBO. IELP has

previously installed steel mesh covers on some of the cabinets relied upon during SBO and the procedures have been revised to direct operators to open the other cabinets as previously stated.

2.2.4.2 RECOMMENDATION: The licensee should include in their SBO procedure a provision to open the HPCI room doors within 30 minutes of the onset of a SBO.

RESPONSE: The DAEC SBO procedure does include a requirement to open the HPCI room doors within 30 minutes of the onset of a SBO. That procedure is available at the site.

2.2.4.4 RECOMMENDATION: The licensee should reevaluate the temperature rise in the essential switchgear room using a conservative initial temperature or establish an administrative control procedure to ensure that the essential switchgear room temperature of 83°F used in the analysis would not be exceeded during normal power operation. In addition, the licensee should assess the equipment operability inside the cabinets.

RESPONSE: IELP reevaluated the assumption that the initial temperature in the essential switchgear rooms would be 83°F. The DAEC HVAC air flow diagrams show that the ventilation flows through the switchgear rooms to the battery rooms. Battery electrolyte temperature is measured every week. In the last year and a half, the electrolyte temperature reached a maximum of 83°F during late June of 1990. (This period is considered to be representative of the temperatures expected because it includes the recent modifications to the duct work and the addition of the Instrument AC Inverters.) Since the batteries are kept on a float-charger, the electrolyte will be slightly warmer than the bulk air temperature in the room. Also, since the ventilation air flow in the battery room first flows through the essential switchgear rooms, the essential switchgear rooms will be the same temperature as, or slightly cooler than the battery room. For these reasons, the originally-assumed initial temperature of 83°F is valid. However, to provide added margin, the assumed initial temperature has been increased to 85°F for a revision of the room heat-up analysis. The result of that reanalysis is that the room reaches a peak of 117°F.

The equipment located in the essential switchgear rooms has been evaluated to assess its operability during a SBO. The SBO equipment in the rooms are the Instrument AC Inverters. The inverter cabinets are equipped with cooling fans which are powered by the inverters. These fans maintain the temperature inside the inverters at or very near the bulk temperature of the room. Additionally, the inverters are designed for operation in room ambient temperatures up to 122°F, so that no operability concern associated with the inverters exists.

2.2.5 RECOMMENDATION: The licensee should provide justification for the criteria used for excluding containment isolation valves from the requirement to be able to be closed or cycled in response to SBO conditions independent of AC power in addition to the criteria listed in NUMARC 87-00. The licensee should verify that valve closure can be confirmed by position indication and that this information is included in the documentation maintained on site to demonstrate compliance with the SBO Rule.

RESPONSE: IELP had used two exclusion criteria in addition to the five listed in NUMARC 87-00 section 7.2.5. Those criteria have been reviewed again. One of the criteria is consistent with NUMARC 87-00, Appendix I, Questions and Answers #101, which states that "since you do not have to assume a single failure in addition to the SBO, providing the capability to close one valve would establish containment integrity." This position was approved by NRC letter (Thadani to Marion (NUMARC)), dated January 3, 1990. IELP determined that the response to the question regarding the need to be able to close both inboard and outboard valves justifies the additional criterion: Isolation valves of a redundant pair, one of which may be positioned independent of any AC power.

The second of the questioned criteria has been discarded. The list of containment isolation valves has been re-reviewed, and the previous conclusion that containment integrity can be maintained under SBO conditions remains valid. Additionally, containment isolation valve position indication is available.

2.4 RECOMMENDATION: (1) The control room heatup calculation should consider the additional heat load due to the modification to the control room lighting condition. (2) The licensee should include a full description of the modifications, including the nature, objectives and schedule of all modifications made in response to the SBO Rule in the documentation maintained on site to support compliance to the SBO Rule.

RESPONSE: (1) The control room heatup calculation has been revised to include the planned modification to control room lighting.

(2) Each of the modifications to be made at the DAEC in order to ensure compliance to the SBO Rule is described in the documentation maintained at the site.

2.5 RECOMMENDATION: The licensee should confirm that an EDG reliability program which meets the guidance of RG 1.155, Section 1.2, will be implemented.

RESPONSE: IELP has developed an EDG Reliability Program which conforms to the guidance provided in NUMARC 87-00, Appendix D, which contains the same elements as RG 1.155, Section 1.2. In addition, IELP is committed to NUMARC Initiative 5a and to maintaining the highest level of EDG reliability which is reasonably achievable. The program includes the EDG target reliability value of 0.975. The administrative procedures which govern this program are available at the site.

2.6 RECOMMENDATION: The Licensee should verify that the SBO equipment is covered by an appropriate QA program consistent with the guidance of RG 1.155, Appendix A. This verification should be included in the documentation maintained on site to support compliance to the SBO Rule.

RESPONSE: The systems and components necessary for coping with a SBO have been reviewed to ensure that appropriate Quality Assurance requirements consistent with RG 1.155, Appendix A are applied.

Those systems and components relied upon during a SBO are either included in IELP's 10 CFR Part 50, Appendix B Quality Assurance Program, or will have the necessary QA requirements applied in accordance with RG 1.155, Appendix A.

In addition to these recommendations, IELP noted that there was an apparent miscommunication in the previously provided information: Section 2.2.1 of the SE refers to a Technical Specification limit on the minimum condensate storage tank (CST) inventory of 75,000 gallons. That limit only applies to refueling operations. However, the construction of the CSTs does ensure that a minimum of 75,000 gallons is available at all times because the suction lines for all systems, except HPCI and RCIC, are connected above the tank level which would correspond to 75,000 gallons. In addition to the physical arrangements, a low level alarm is provided in the control room for each CST which corresponds to 60,450 gallons in each of the two tanks (minimum of 120,900 gallons total). Finally, Operating Instruction (OI-537, "Condensate/Demin Service Water System") directs operators to check CST level once per shift to verify that the level is within the normal operating band of 12-18 feet (120,000 to 180,000 gallons per CST). Based on the physical arrangement of the CSTs, annunciation in the control room and operating procedures, there are sufficient controls in place to ensure that a minimum of 75,000 gallons of condensate is available for decay heat removal during SBO conditions.