ATTACHMENT 1

SAIC-90/1070

TECHNICAL EVALUATION REPORT

JOSEPH M. FARLEY NUCLEAR PLANT 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 by the NRC staff (12) 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 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/Answers (13) 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. SBO coping capability (Section 3.2),

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

D. Proposed modifications (Section 3.3), and

E. Quality assurance and technical specifications for SBO equipment (Section 3.5).

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 (9), 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 RG 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, appropriate containment integrity and primary coolant make-up capability is reviewed. Technical specifications and quality assurance 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 the review of the licensee's submittals dated April 17, 1989 (10) and March 8, 1990 (14), and the information available in the plant Final Safety Analysis Report (FSAR) (11); 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 would be made and the audit would 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, Alabama Power Company (AP), calculated (10 and 14) a minimum acceptable SBO duration of four hours for the Joseph M. Farley Nuclear Plant (JMFNP) site. The licensee stated that no modifications are required to attain this proposed coping duration.

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

1. **Offsite Power Design Characteristics**

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

   a. Independence of the plant offsite power system characteristics of "I1/2,"

   b. Estimated frequency of LOOPs due to extremely severe weather (ESW) which places the plant in ESW group "3,"

   c. Expected frequency of grid-related LOOPs of less than one per 20 years, and

   d. Estimated frequency of LOOPs due to severe weather (SW) which places the plant in SW group "1."

2. **Emergency AC (EAC) Power Configuration Group**

   The EAC power configuration for Farley Nuclear Plant, Units 1 and 2, is group "C" since each unit requires either Train A or Train B emergency power to operate safe shutdown equipment following a loss of offsite power.

3. Target Emergency Diesel Generator (EDG) Reliability

The target emergency diesel generator (EDG) reliability for Farley Nuclear Plant, Units 1 and 2, is 0.95 based on EDG reliability for the last 100 demands on each EDG model. The Farley Nuclear Plant Technical Specifications requires the EDG surveillance frequency to be based on reliability calculated in accordance with RG 1.108, Revision 1, August 1977. This methodology for calculating EDG reliability is conservative when compared to the methodology of NSAC-108 referenced in RG 1.155 and NUMARC 87-00.

Review of Licensee's Submittal

Factors which affect the estimation of the SBO coping duration are: the independence of the offsite power system grouping, the estimated frequency of LOOPs due to ESW and SW conditions, the expected frequency of grid-related LOOPs, the classification of EAC, and the selection of EDG target reliability. The expected frequency of LOOPs due to ESW is consistent with that provided in NUMARC 87-00, Table 3-2. Using Table 3-3 of NUMARC 87-00, the expected frequency of LOOPs at JMFNP due to SW condition is in group "2" or "1," dependent on having offsite power transmission lines on one or multiple rights-of-way, respectively. A review of the JMFNP FSAR indicates that the site could be considered as having power transmission lines on multiple rights-of-way. Therefore, JMFNP has an SW grouping of "1."

The licensee stated that the independence of the plant offsite power system grouping is "I1/2." A review of JMFNP FSAR indicates that (Figure 1) (11):

1. All offsite power sources are connected to the unit through two electrically connected switchyards;

2. During normal power operation, the essential buses are powered from each unit's two start-up transformers;

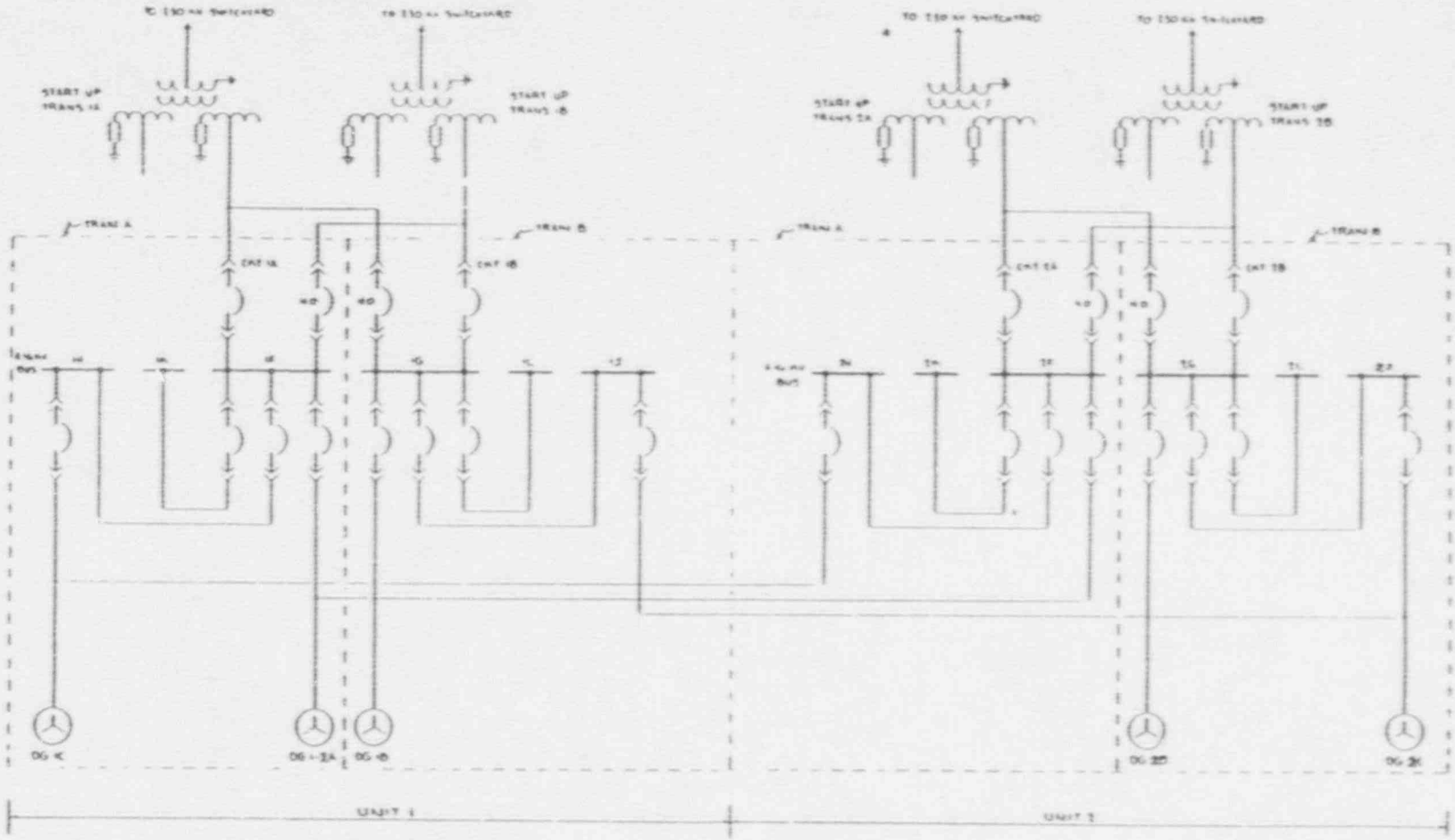

Figure 1. EAC and AAC Power Source Arrangement

3. Both start-up transformers are sized and designed to supply the required load of both essential buses; and

4. Upon loss of power to one start-up transformer both 4.16 Kv essential buses will be powered from the other start-up transformer via a manual transfer.

Based on these and the guidance provided in Table 5 of RG 1.155 the plant independence of offsite power system group can be considered to be an "I2."

The Farley station is a two unit site with one-dedicated EDG per unit, (EDG 1B and 2B), and three shared EDGs, (EDG 1C, 2C, and 1-2A). These EDGs have two different ratings: EDGs 1C and 2C have a continuous and a 2000 hour rating of 2850 kW and 3100 kW, respectively, while EDGs 1B, 2B, and 1-2A have a continuous and a 2000 hour rating of 4075 kW and 4353 kW, respectively. The configuration and connectability of each EDGs are as follows (see Figure 1):

EDG 1-2A supports Train A in Unit 1 and Unit 2,
EDG 1C supports Train A in Unit 1 and Unit 2,
EDG 2C supports Train B in Unit 1 and Unit 2,
EDG 1B supports Unit 1 Train B, and
EDG 2B supports Unit 2 Train B.

The dedicated EDGs, are connected to the Train B ESF buses in each unit. The Train A ESF buses in each unit are powered from EDG 1-2A and EDG 1C. For JMFNP to have excess EDG redundancy to be used as a 10-minute AAC power source and be classified as EAC group "C," EDG 1C should have the capacity and connectability to support the required safe shutdown loads following a LOOP and, therefore, be qualified as a redundant EDG to EDG 1B or 2B. Otherwise, the licensee needs to use the definition of "excess" EDG capacity (15 and 16) as an available AAC power source for the blacked-out unit.

For the determination of EAC power source capacity, we reviewed the FSAR tabulated shutdown loads powered after a LOOP by following the guidance provided in NUMARC 87-00 Supplemental Questions and Answers, under Question 3.4, which states that the shutdown loads powered must be capable of maintaining the plant in a safe shutdown condition for an extended period. Our review indicates that the sum of the major loads required to conform with the above guidance would be 2940 kW. This load includes; a charging pump, a component cooling water (CCW) pump, an auxiliary feedwater (AFW) pump, a battery charger, emergency lighting, two service water pumps, a screen wash pump, a pressurizer heaters bank, a containment cooler, an instrument air compressor, and a residual heat removal (RHR) pump. Therefore, smaller EDGs (EDG 1C or 2C) would be left with an additional 160 kW capacity (within its 2000 hour rating) to support needed miscellaneous 600 V loads and the heating, ventilation, and air conditioning (HVAC) loads required to ensure equipment operability for an extended period. Based on the above, and contingent upon the licensee confirming that the sum of the required HVAC and miscellaneous loads would not exceed 160 kW, we agree with the licensee's classification of EAC power source.

However, should each unit need more than 160 kW for the HVAC and miscellaneous loads the EAC classification will still be "C," but only excess EDG capacity would be available for crediting as an AAC power source. This determination is based on the definition of the AAC power source as stated in the SBO rule:

> "At multi-unit site, where the combination of emergency ac power sources exceeds the minimum redundancy requirements for safe shutdown (non-DBA) of all units, the remaining emergency ac power sources may be used as alternate ac power sources provided they meet the applicable requirements."

Even though five EDGs are available at JMFNP, they can only be considered as four; two small EDGs are considered as one, representing a redundant EDG to one of the large EDGs. Since one-out-of-two large

EDGs is required for safe shutdown loads per unit, each unit can be classified as EAC group "C." Therefore, after meeting the minimum EDG redundancy requirement no excess EDG will be available to be used as an AAC power source.

The licensee stated that the EDG target reliability was selected based on the demonstrated reliability of the last 100 demands on each EDG. The licensee stated this was determined using RG 1.108, which the licensee claimed to be conservative when compared to the NSAC-108 method. No EDG failure statistics were included in its SBO submittal (10) to support this statement. Without the reliability statistics, it is difficult to judge how well the EDGs have performed in the past and if there should be any concern. Based on the available information in the NSAC-108, which gives the EDG reliability data at U.S. nuclear reactors for calendar years 1983 to 1985, the EDGs at JMFNP experience an average reliability of 0.993 per diesel per year. Using this data, it appears that the target EDG reliability (0.95) selected by the licensee (10) to be appropriate. Nevertheless, the licensee needs to have an analysis showing the EDG reliability statistics for the last 20, 50, and 100 demands in its SBO submittal supporting documents.

The licensee's submittal does not document the conformance of the plant's EDG reliability program with the guidance of RG 1.155, Section 1.2, and NUMARC, 87-00 Appendix D. However, the licensee stated that the goal is to maintain the average EDG reliability for each EDG model equal or greater than the target EDG reliability of 0.95. The licensee added that a reliability program will be addressed following the resolution of generic safety issue B-56 (Diesel Generator Reliability). Since the information on EDG reliability statistics and the associated EDG models are only available onsite for review, an audit may be required to confirm compliance.

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. indicates that JMFNP did not have any symptomatic grid-related LOOP prior to the calendar year 1984. In the absence of any contradicting information, we agree with the licensee's statement that the expected grid-related LOOP at the JMFNP site is less than one per 20 years.

Based on the above, the offsite power design characteristic of the JMFNP site is "P1" with a minimum required SBO coping duration of four hours.

3.2 Alternate AC (AAC) Power Source

Licensee's Submittal

The AAC power source is an existing class 1E EDG. The AAC power source will meet the criteria specified in Appendix B to NUMARC 87-00. The AAC power source will be available within 10 minutes of the onset of an SBO event. This power source will have sufficient capacity and capability to operate systems necessary for coping with an SBO for the required duration of four hours.

Review of Licensee's Submittal

As stated earlier, see Section 3.1, the plant can only be considered to have an excess EDG to be used as an AAC power source if the EDG 1C can be qualified as a redundant EDG to EDG 1B or 2B. For this to be true, the licensee needs to confirm that the sum of the needed miscellaneous 600 V loads in addition to the list of loads considered earlier in Section 3.1, and the required HVAC loads are less than 160 kW per unit.

Should each unit need more than 160 kW for the HVAC and miscellaneous 600 V loads, only excess EDG capacity would be available for crediting as an AAC power source. Even though five EDGs are available at the site, they can only be considered as four; two small EDGs are considered as one redundant EDG. After considering that two redundant EDGs are failed in the blacked-out (BO) unit and the third one failed in the non-

blacked-out (NBO) unit, the site would be left with one additional redundant EDG to support the loads in both the BO and NBO units. If the remaining redundant EDG happens to be one of the dedicated EDGs (i.e. EDG 1B or 2B), with the present electrical distribution (see Figure 1) the blacked-out unit needs to cope with an SBO independent of an AC power source. In other cases, the plant will have sufficient excess EDG capacity to support both BO and NBO units. However, if the remaining EDG is EDG 1-2A, the licensee needs to perform a modification that enables him to connect EDG 1-2A to both units at the same time; only EDG 2C can presently be connected to both units at the same time. Considering the worst case scenario, the licensee needs to revise its submittal to show plant's capability to cope with an SBO of four hours duration independent of AC power, or perform the following modifications in order to have connectibility to use available EDG excess capacity for powering the required shutdown loads in the BO unit from the operating EDG in the NBO unit:

1. Install a cross-tie between the Train B buses of Unit 1 and Unit 2.

2. Change the EDG 1-2A output circuit breaker logic to enable EDG 1-2A to be connected to both units at the same.

However, if the licensee were to confirm that EDG 1C can be qualified as a redundant EDG to the larger EDGs by considering the safe shutdown loads required after a LOOP for an extended period, consistent with the NUMARC 87-00 Supplemental Questions and Answers, Question 3.5, then the proposed AAC power source, which is one of the shared class 1E diesels, meets or exceeds the criteria of Appendix B to NUMARC 87-00. The remainder of our review of the licensee's submittals will be based on the above confirmation. In this review, we will consider that the AAC power source will be available within 10 minutes and support the needed functions as indicated by the licensee.

3.3 Station Blackout Coping Capability

The licensee stated that since the AAC power source will be available within 10 minutes, the coping evaluations for class 1E battery capacity, compressed air, and containment isolation need not to be addressed in accordance with 10 CFR 50.63(c)(2). We consider the licensee's statement to mean that the functions needed to cope with an SBO are available, and they are adequately powered from the AAC power source for the required duration. Our review of the plant coping capability is based on the assumption that a viable AAC power source is available, i.e. the licensee has confirmed that there is excess EDG redundancy on site. Based on the above assumption, the assessment of the plant coping capability with an SBO event for the required duration of four hours is given below:

1. **Condensate Inventory for Decay Heat Removal**

   Licensee's Submittal

   The licensee stated that each unit requires 58,662 gallons of water to remove decay heat during a 4-hour SBO event. The minimum permissible condensate storage tank (CST) level per technical specifications provides 150,000 gallons of water for each unit. This exceeds the required quantity of condensate for coping with a 4-hour SBO event.

   Review of Licensee's Submittal

   Using the information available in the plant FSAR, the guidance provided in NUMARC 87-00, Section 7.2.1, and assuming no cooldown of the primary system, we have estimated that the water required for removing decay heat would be ~63,000 gallons per unit. This estimate is based on a maximum licensed core thermal rating of 2830 MWt, or 102% of 2774 MWt (Table 14.3-2a of the plant FSAR).

Based on the licensee's statement that the plant Technical Specifications requires a minimum CST volume of 150,000 gallons per unit be available, we agree that each unit has sufficient condensate inventory to cope with an SBO event.

2. Class 1E Battery Capacity

Licensee's Submittal

Since the AAC power source will be available within 10 minutes of the onset of an SBO event, no analysis of class 1E battery capacity calculation is provided.

Review of Licensee's Submittal

According to the plant FSAR each unit contains two class 1E batteries that will continue to supply the required DC and vital AC equipment upon a LOOP. The batteries are sized to supply the anticipated vital loads following a plant trip and loss of all AC power for two hours without being charged. There is a separate class 1E DC system for the service water area that consists of two independent and redundant subsystems. Each service water battery has adequate storage and capacity to carry its loads without charger support for a period of at least two hours. The AAC power source will be available to power the required battery chargers within 10 minutes. Therefore, the operating batteries will have sufficient capacity to support the required loads during a 4-hour SBO event.

3. Compressed Air

Licensee's Submittal

Since the AAC power source will be available within 10 minutes, no analysis of the compressed air system is provided.

Review of Licensee's Submittal

A review of the EDG load tables (FSAR Table 8.3-1) and the 600 V load center single line drawings (FSAR Figures 8.3-1 and 8.3-2) indicates that a station air compressor, which serves both instrument and service air, can be manually loaded onto the operating EDG on each train. It is expected, therefore, that one station air compressor to be operating during an SBO event.

4. Effects of Loss of Ventilation

Licensee's Submittal

The licensee stated that the AAC power source provides power to HVAC systems serving the emergency safeguards feature room coolers and the control room which are the dominant areas of concern. Therefore, [consistent with the NUMARC 87-00, Sections 7.1.2 and 7.2.4], the effects of loss of ventilation were not assessed.

Review of Licensee's Submittal

In our evaluation of the required EDG loads the licensee has 160 kW to be used for the miscellaneous 600 V loads in addition to those identified in Section 3.1, and for the required HVAC loads. The licensee stated that the control room and the emergency safeguards feature room HVAC systems will be operating during an SBO event. The licensee needs to ensure that other areas which have heat generation sources, i.e., operating equipment, are provided with appropriate area cooling, or perform and document analyses showing that the equipment operability in these areas will not be degraded during an SBO event.

5. Containment Isolation

Licensee's Submittal

Since the AAC power source will be available within 10 minutes, no analysis of containment isolation is provided.

Review of Licensee's Submittal

Since the AAC power source is available to one division of safety buses within 10 minutes appropriate containment integrity is assured during an SBO event.

6. Reactor Coolant Inventory

Licensee's Submittal

The licensee stated that the AAC source powers the necessary make-up systems which maintain adequate reactor coolant system inventory and ensures that the core is cooled for the required coping duration of four hours.

Review of Licensee's Submittal

Reactor coolant make-up is necessary to replenish the reactor coolant system (RCS) inventory losses due to the reactor coolant pump (RCP) seal leakage (25 gpm per pump per NUMARC 87-00 guideline), and to the technical specifications maximum allowable leakage (estimated to be 25 gpm). The make-up, or the charging, system at JMFNP has three positive displacement pumps. Each pump has a design flow capacity of 150 gpm, which exceeds the assumed RCS leak rate of 100 gpm during an SBO event. Therefore, we agree with the licensee that the core will not be uncovered during a 4-hour SBO event.

Note:

"The 25 gpm RCP seal leak rate was agreed to between NUMARC and NRC staff pending resolution of Generic Issue (GI) 23. If the final resolution of GI-23 defines higher RCP 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 the following plant procedures have been reviewed per guidelines in NUMARC 87-00, Section 4:

1. AC power restoration, and
2. Severe weather.

The licensee has identified that additional procedure changes will be made as required to indicate proper operator actions in order to ensure that the AAC power source is properly loaded during an SBO event.

Review of Licensee's Submittal

We neither received nor reviewed the affected SBO procedures. These procedures are plant-specific actions concerning the required activities to cope with an 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, and that the associated training needs are carried out accordingly.

3.5 Proposed Modifications

Licensee's Submittal

The licensee has proposed modifications to ensure that service water is available to the AAC power source using the worst case assumptions for SBO. In addition, modifications will be required to automatically shed unnecessary loads to ensure sufficient capacity is available for manual loading of the required station blackout loads.

Review of Licensee's Submittal

The licensee did not provide any information on the proposed modifications. Therefore, no review can be performed. However the licensee's action is consistent with the requirement of the SBO rule and the guidance provided in RG 1.155 and NUMARC 87-00.

The licensee may also need to perform additional modifications if it can not confirm that EDG 1C is a redundant EDG to EDG 1B or 2B when considering the shutdown loads required to maintain the plant in a safe condition for an extended period (see Section 3.2)

3.6 Quality Assurance and Technical Specifications

The licensee did not provide any information on how the plant complies with the requirements of RG 1.155, Appendices A and B.

4.0 CONCLUSIONS

Based on our review of the licensee's submittals and the information available in the FSAR for Joseph M. Farley Nuclear Plant, we find that the submittal conforms with the requirements of SBO rules and the guidance of RG 1.155 with the following exceptions:

1. **Emergency AC Power Configuration Group/ Alternate AC power source**

   The licensee classified the EAC power configuration of the plant as "C." Our review indicates that, for the plant to be classified as an EAC group "C" and have a viable 10-minutes AAC power source, EDG 1C should be qualified as a redundant EDG to EDG 1B or 2B. The licensee needs to confirm that EDG 1C can be qualified as a redundant EDG to the larger EDGs considering the safe shutdown loads required after a LOOP for an extended period, consistent with the NUMARC 87-00 Supplemental Questions and Answers, Question 3.5. Otherwise, the licensee needs to revise its submittal showing the plant's capability to cope independent of AC for four hours, (see Section 3.2), or perform the following modifications in order to have connectibility for using the available EDG excess capacity to power the required shutdown loads in the BO unit from the operating EDG in the NBO unit:

   1. Install a cross-tie between the Train B buses of Unit 1 and Unit 2.

   2. Change the EDG 1-2A output circuit breaker logic to enable EDG 1-2A to be connected to both units at the same.

2. **Emergency Diesel Generator Reliability Program**

   The licensee's submittal does not document the conformance of the plant's EDG reliability program with the guidance of RG 1.155, Section 1.2, and NUMARC, 87-00 Appendix D. However, the licensee

stated that the goal is to maintain the average EDG reliability for each EDG model equal or greater than the target EDG reliability of 0.95. The licensee added that a reliability program will be addressed following the resolution of generic safety issue B-56 (Diesel Generator Reliability).

2. Effects of Loss of Ventilation

The licensee stated that the AAC power source provides power to heating, ventilation and air conditioning (HVAC) systems serving the emergency safeguards feature room coolers and the control room which are the dominant areas of concern. The licensee needs to ensure that other areas which have heat generation sources, i.e., operating equipment, are provided with appropriate area cooling, or provide an analysis showing that the equipment operability in these areas will not be degraded.

3. Proposed Modifications

The licensee identified a need for a modification to providing service water to the AAC power source during an SBO event. The licensee needs to provide a brief summary of the proposed modifications for the NRC's review. The licensee may also need to perform additional modifications if it can not confirm that EDG 1C is a redundant EDG to EDG 1B or 2B when considering the shutdown loads required to maintain the plant in a safe condition for an extended period (see item 1 above).

4. Quality Assurance and Technical Specifications

The licensee did not provide any information on how the plant complies with the requirements of RG 1.155, Appendices A and B.

5.0 REFERENCES

1. The Office of Federal Register, "Code of Federal Regulations Title 10 Part 50.63," 10 CFR 50.63, January 1, 1989.

2. U.S. Nuclear Regulatory Commission, "Evaluation of Station Blackout Accidents at Nuclear Power Plants - Technical Findings Related to Unresolved Safety Issue A-44," NUREG-1032, Baranowsky, P. W., June 1988.

3. U.S. Nuclear Regulatory Commission, "Collection and Evaluation of Complete and Partial Losses of Offsite Power at Nuclear Power Plants," NUREG/CR-3992, February 1985.

4. U.S. Nuclear Regulatory Commission, "Reliability of Emergency AC Power System at Nuclear Power Plants," NUREG/CR-2989, July 1983.

5. U.S. Nuclear Regulatory Commission, "Emergency Diesel Generator Operating Experience, 1981-1983," NUREG/CR-4347, December 1985.

6. U.S. Nuclear Regulatory Commission, "Station Blackout Accident Analyses (Part of NRC Task Action Plan A-44)," NUREG/CR-3226, May 1983.

7. U.S. Nuclear Regulatory Commission Office of Nuclear Regulatory Research, "Regulatory Guide 1.155 Station Blackout," August 1988.

8. Nuclear Management and Resources Council, Inc., "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," NUMARC 87-00, November 1987.

9. Nuclear Safety Analysis Center, "The Reliability of Emergency Diesel Generators at U.S. Nuclear Power Plants," NSAC-108, Wyckoff, H , September 1986.

10. Hairston III, W. G., letter to the document control desk of U.S. Nuclear Regulatory Commission, "Joseph M. Farley Nuclear Plant - Units 1 and 2 Station Blackout," Docket Nos. 50-348 and 50-364, dated April 12, 1989.

11. Joseph M. Farley Nuclear Plant - Units 1 and 2, Final Safety Analysis Report.

12. Thadani, A. C., Letter to W. H. Rasin of NUMARC, "Approval of NUMARC Documents on Station Blackout (TAC-40577)," dated October 7, 1988.

13. Thadani, A. C., letter to A. Marion of NUMARC, "Publicly-Noticed Meeting December 27, 1989," dated January 3, 1990, (Confirming "NUMARC 87-00 Supplemental Questions/Answers," December 27, 1989).

14. Hairston III, W. G., letter to Document Control Desk of U.S. Nuclear Regulatory Commission, "Joseph M. Farley Nuclear Plant Station Blackout," Docket Nos. 50-348 and 50-364, dated March 8, 1990.

15. Tam, P. S., Memorandum for, "Daily Highlight-Forthcoming Meeting with NUMARC on Station Blackout (SBO) Issues (TAC 40577)," dated April 25, 1990, (Providing a Draft Staff Position Regarding Use of Emergency AC Power Sources (EDGs) as Alternate AC (AAC) Power Sources, dated April 24, 1990).

16. Russell, W. T., letter to W. Rasin of NUMARC, "STATION BLACKOUT," dated June 6, 1990.