ENCLOSURE 2

SAIC-89/1641

TECHNICAL EVALUATION REPORT
PRAIRIE ISLAND NUCLEAR GENERATING PLANT
UNIT NOs. 1 AND 2
STATION BLACKOUT EVALUATION

TAC Nos. 68588 and 68589

SAIC
Science Applications International Corporation
An Employee-Owned Company

Final
July 18, 1990

Prepared for:

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Contract NRC-03-87-029
Task Order No. 38

9007270156 XA

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TECHNICAL EVALUATION REPORT

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
UNIT NOs. 1 AND 2
STATION BLACKOUT EVALUATION

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 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/Answers (14) 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 13, 1989 (10) and March 29, 1990 (13), and the information available in the plant Updated Final Safety Analysis Report (UFSAR) (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 Submittal

The licensee, Northern State Power Company (NSC), calculated (10 and 13) a minimum acceptable SBO duration of 4 hours for the Prairie Island Nuclear Generating Plant (PINGP) Unit Nos. 1 and 2 site. The licensee stated that in order to attain this coping duration category the existing 4.16 kV station auxiliary system will be modified to provide two dedicated emergency diesel generators (EDGs) for each unit. The licensee has proposed to install two class 1E EDGs independent of the existing electrical and support systems, see Section 3.5 for more detail.

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

1. Offsite Power Design Characteristics

   The plant AC power design characteristic group is "P2" 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 "2."

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

The EAC power configuration of the plant is "C." Each unit at PINGP will be equipped with two emergency diesel generators. One EAC power supply per unit is necessary to operate safe shutdown equipment following a loss of offsite power.

3. **Target Emergency Diesel Generator (EDG) Reliability**

The licensee has selected a target EDG reliability of 0.975. The selection of this target reliability is based on having an average EDG reliability of greater than 0.95 for the last 100 demands consistent with NUMARC 87-00, Section 3.2.4.

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 licensee's estimation of the frequency of LOOPs due to ESW condition conforms with that given in Tables 3-2 of NUMARC 87-00. Using the data provided in Table 3-3 of NUMARC 87-00, the expected frequency of LOOPs at PINGS due to SW condition is estimated to be "0.0193" or "0.0091." This is based on the site having offsite power transmission lines on one, or multiple rights-of-way, which places the site in SW group "3" or "2," respectively. The licensee stated that the plant is in SW group "2." Therefore, PINGP must have power transmission lines on two or more rights-of-way. A review of the PINGP UFSAR and the definition of the right-of-way, provided in Question/Answer No. 22 of Responses to Questions Raised at NUMARC 87-00 Seminars (October 1988), indicate that the site could be considered as having power transmission lines on two rights-of-way.

The licensee stated that the independence of the plant offsite power system grouping is "11/2." A review of PINGP UFSAR indicates that:

1. All of the offsite power sources are connected to two electrically connected switchyards.

2. Only one of the Unit 1 safeguard buses, Bus 15, can be powered directly from the unit auxiliary transformer which is fed from the unit main generator. Other safeguard buses (Bus No. 16, 25, and 26) can only be powered through startup, or reserve transformers (1R and 2R transformers). Since neither the UFSAR nor the submittal identify the normal power line-up of the emergency buses, we assumed that in each unit, during power operation, all safeguard buses are powered from the startup transformer (preferred power source).

3. The power to these transformers is fed from two different power sources. The Unit 1 reserve transformer is fed from a 161 kV and the Unit 2 transformer is fed from a 345 kV offsite power source. Each offsite power source is of sufficient capacity to supply all critical loads for either or both units.

4. The plant is equipped with bus ties (i.e. 2RYBT, 12RYBT, and 1RYBT) which allow crossfeeding between units should one of the start-up transformers be out of service, see Figure 1 (10).

5. Upon loss of preferred power source, (i.e loss of power from start-up transformer), all emergency buses can be connected to an alternate power source by a manual transfer. The alternate power source for each of the emergency 4.16 kV buses is through the corresponding emergency bus of opposing unit. This is only available when the proposed modifications are completed.

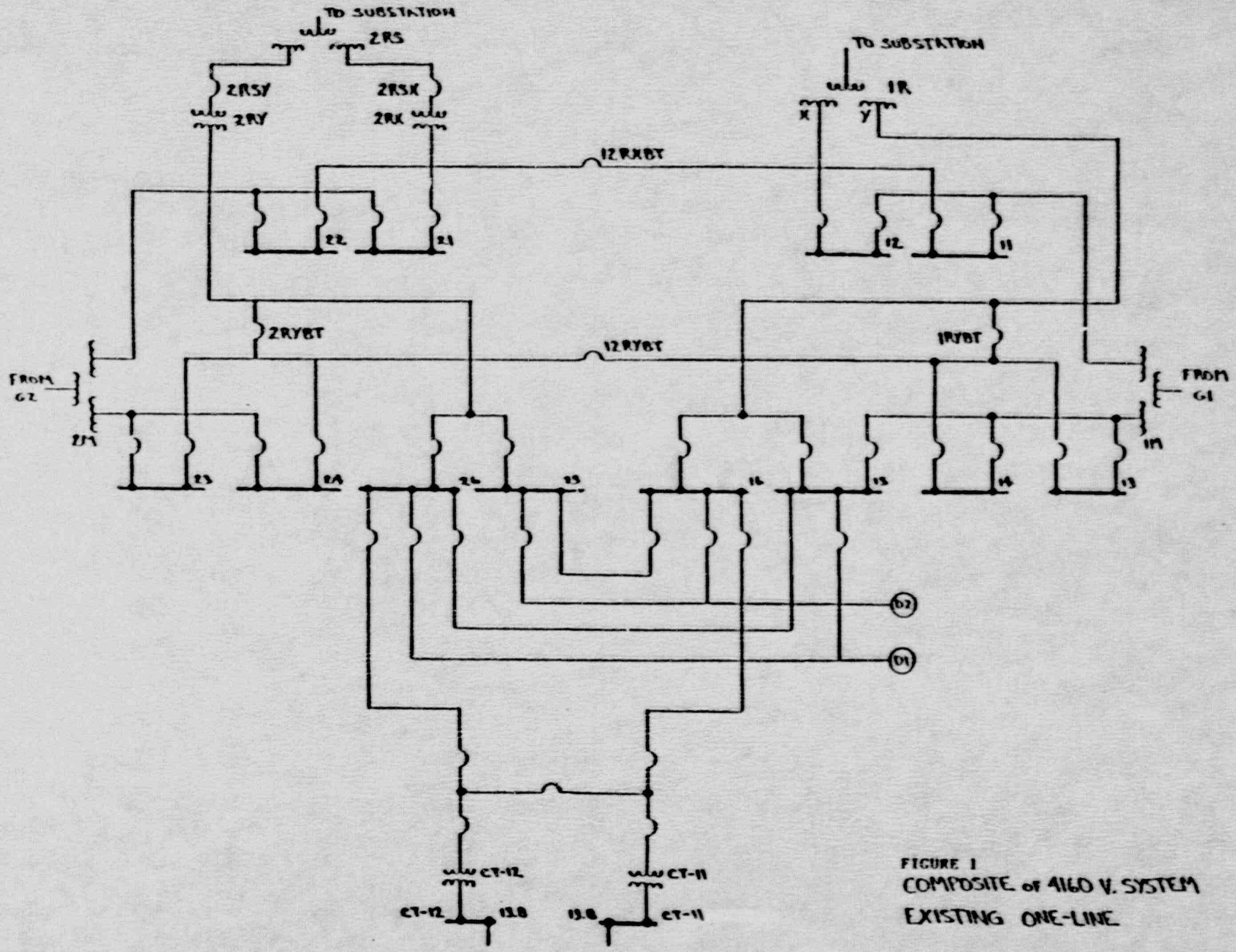

FIGURE 1
COMPOSITE OF 4160 V. SYSTEM
EXISTING ONE-LINE

6. The cooling tower substation which can be connected to a 4.16 kV emergency in each unit can not be considered as an alternate power source since it does not conform to the guidance provided in Table 5 of RG 1.155. The guidance requires that the alternate power source be connectible to all safe shutdown buses.

Using the guidance provided in Table 5 of RG 1.155 the independence of offsite power characteristics can be categorized as "I2."

The EAC classification of PINGP after implementation of the proposed modification will be "C." We are unable to verify the assignment of the EDG target reliability at this time. However, based on the 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 PINGP experienced an average of 44 valid start demands per calendar year with an average unit reliability of 0.996 per diesel per year. Using this data, it appears that the target EDG reliability (0.975) selected by the licensee (10) to be appropriate. An audit may be required to ensure compliance and to identify whether the licensee has any formal EDG reliability program consistent with the guidance of the RG 1.155, Section 1.2, and NUMARC 87-00, Appendix D.

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 PINGP did not have any grid-related LOOP prior to the calendar year 1984.

Based on above evaluations, the plant can be categorized as "P2" with a minimum required SBO coping duration of four hours.

3.2 Alternate AC (AAC) Power Source

Licensee's Submittal

The licensee stated that, once the modifications are completed, an AAC power source will be available at PINGP that meets the criteria specified in Appendix B to NUMARC 87-00. The AAC source will be an EAC power source which meets the assumption 2.3.1(b) of NUMARC 87-00. The AAC power source will be an emergency diesel generator of the non-blacked out unit, see Figure 2 (10). The AAC power source will be available within 10 minutes from the onset of an SBO event and will have sufficient capacity and capability to operate systems necessary for coping with an SBO for the required duration of 4 hours to bring and maintain the plant in safe shutdown.

Review of Licensee's Submittal

Based on information provided in the plant submittal, the AAC power source (one of the class 1E EDGs) meets the criteria stated in Appendix B of NUMARC 87-00. Each of the new EDGs has 5400 kW capacity, which is almost twice the capacity of the existing emergency diesel generator. The existing EDGs is rated at 3000 kW with a maximum capacity of 3250 kW. The installation of new EDGs meets stricter criteria, (i.e. criteria applicable to the class 1E power supply), than those provided in Appendix B to NUMARC 87-00. The licensee needs only to demonstrate by a test that the AAC power source can be established within 10 minutes from the onset of an SBO, in accordance with NUMARC 87-00 Section 7.1.2 and RG 1.155, Section 3.3.5.3.

The only concern that may arise from using an existing EDG as an AAC power source at a multi-unit site where the EDGs per unit just meet the minimum redundancy requirements is how the EDG does conform to the guidance as documented in NUMARC 87-00 Supplemental Questions/Answers

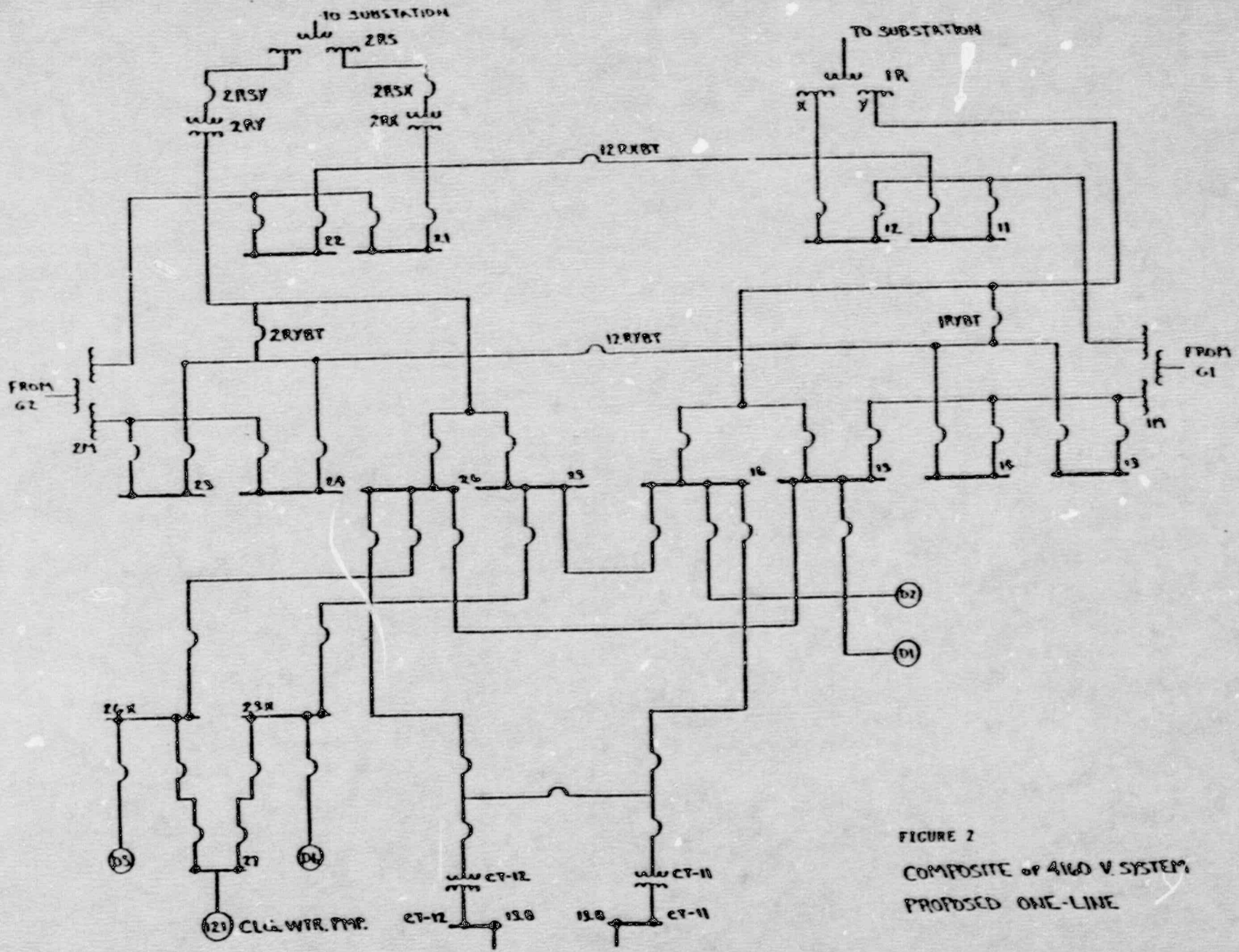

FIGURE 2

COMPOSITE OF 4160 V. SYSTEM: PROPOSED ONE-LINE

(14) and further explained in References 15, 16 and 17. Our review of the list of the EDG loads given in Table 8.4-1 of plant UFSAR against the above guidance indicates that each of the existing EDGs, which has a smaller capacity than that of one of the new EDGs, has sufficient capacity to power the specified loads in the blacked out unit and the required loads in the non-blacked out unit. In fact, each of the existing EDGs can support the loads required for the design basis accident in one and the hot shutdown in another unit with a concurrent LOOP event. Therefore, the AAC power source meets the requirements of the SBO rule and the guidance provided in References 15, 16 and 17.

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 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 that they are adequately powered from the AAC power source for the required duration. The plant coping capability with an SBO event for the required duration of 4 hours is assessed based on the following results:

1. Condensate Inventory for Decay Heat Removal

Licensee's Submittal

The licensee's submittal stated that 89,000 gallons of water are required for the decay heat removal for four hours and for rapid cooldown of reactor coolant system (RCS) to minimize reactor coolant pump (RCP) seal leakage. The minimum permissible condensate storage tank level per technical specification provides 100,000 gallons of water which exceeds the required quantity for coping with a 4-hour station blackout.

Review of Licensee's Submittal

The licensee stated that 89,000 gallons of water are needed for decay heat removal and rapid plant cooldown during a 4-hour SBO event. Since the licensee did not specify whether the 89,000 gallons are needed for each unit or for the site, we assumed that it is for each unit. Using the expression provided in NUMARC 87-00, we have estimated that a total of ~37,300 gallons of condensate water would be needed to remove decay heat from the reactor core during a 4-hour SBO event. This estimate is based on a maximum reactor thermal power of 1683 MWt (as given in Table 11.9-2 of the plant FSAR for cooldown calculations).

The cooldown process is performed by following the Westinghouse emergency guidelines ECA 0.0. Based on these guidelines and the information in the plant UFSAR, the plant cool down is expected to be to a hot leg temperature of approximately 350°F. To estimate the required condensate to cool down the RCS from an average RCS temperature of 567°F to 350°F, we need the total stored energy of the RCS (including both metal and liquid) for each unit. Since we were unable to infer this information from the plant UFSAR, we performed a bounding calculations using the RCS stored energy data from a similar PWR plant. We also estimated the additional required condensate to supplement the level shrinkage in the steam generators during the cooldown. Our calculations indicate that the condensate requirements for each unit is bounded by the licensee's estimated requirement of 89,000 gallons.

The licensee stated that the minimum condensate inventory per technical specifications is 100,000 gallons. The licensee did not specify whether this minimum condensate inventory is for each unit or for the site. According to the NRC project manager for PINGP,

the 100,000 gallons technical specification minimum CST level is for each unit.

Based on the above, we agree with the licensee that the site has sufficient condensate inventory to cope and recover from a 4-hour SBO duration.

2. **Class 1E Battery Capacity**

Licensee's Submittal

The AAC power source will supply the battery charger(s) within 10 minutes of the onset of an SBO event. Therefore no analysis of battery capacity calculation is needed.

Review of Licensee's Submittal

A review of the plant UFSAR indicates that each unit has two battery banks. Each battery bank is capable of carrying the connected load for one hour without charge. Since the AAC power source will be available within 10 minutes and supply the battery charger(s), we conclude that the plant has sufficient battery capacity.

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

The list of the EDG loads in the plant UFSAR references to powering instrument air at both units after a DBA accident in one unit concurrent with a site LOOP event. Therefore, we consider that the instrument air is available during an SBO event. This is consistent with the licensee's submittal that the equipment necessary to cope with an SBO in accordance with NUMARC 87-00, Section 7, will be powered.

4. **Effects of Loss of Ventilation**

Licensee's Submittal

The licensee stated that the AAC power source provides power to heating, ventilation and air conditioning (HVAC) systems serving dominant areas of concern to achieve and maintain safe shutdown during an SBO event. Therefore, consistent with the NUMARC 87-00, Sections 7.2.4 and 7.2.1, the effects of loss of ventilation were not assessed. The licensee added that no modifications and/or procedures are required to provide reasonable assurance for operability of ventilation equipment.

Review of Licensee's Submittal

The licensee's action is consistent with the guidance provided by NUMARC 87-00 and the NRC staff. We would like to emphasize that the dominant areas of concern should not be limited only to those identified in NUMARC 87-00. The licensee needs to ensure that other areas which have heat generation sources, i.e. operating equipment, are provided with appropriate area cooling.

5. Containment Isolation

Licensee's Submittal

The licensee stated that the AAC power source which will be available within 10 minutes, therefore, no analysis of the containment isolation valves (CIVs) is necessary.

Review of Licensee's Submittal

The licensee's action is consistent with the guidance provided in NUMARC 87-00, Section 7.1.2. Our evaluation of the AAC power source indicates that one division of the safety buses will be powered from the AAC power source. With power available to one division, the licensee needs to verify that appropriate containment integrity can be assured during an SBO event.

6. Reactor Coolant Inventory

Licensee's Submittal

The licensee stated that the AAC source powers the necessary makeup systems to maintain adequate reactor coolant system inventory to ensure that the core is cooled for the required coping duration.

Review of Licensee's Submittal

Reactor coolant makeup is necessary to replenish the RCS inventory losses due to the RCP seal leakage (25 gpm per pump per NUMARC 87-00 guideline), the technical specifications maximum allowable leakage (estimated to be 25 gpm), and the water volume shrinkage due to the RCS cooldown. The make-up, or the charging, system at PINGP has three positive displacement pumps. Each pump has a

design flow capacity of 60.5 gpm. If the RCS were to cool down to a hot leg temperature of 350°F, the RCS level shrink alone would require a makeup of -35.0 gpm to maintain the RCS volume (or the pressurizer level) at a level corresponding to the full load condition. With an assumed 75 gpm RCS leak rate, a makeup system with a minimum pump capacity of 110.0 gpm would, therefore, be required. This translates to the requirement that two-out-of-three charging pumps be operational from the onset of an SBO event. However, if only one charging pump is operating, our analysis indicates that the core will not be uncovered during the 4-hour SBO event and that the reactor cooldown is sustained by natural circulation and reflux condensation in the steam generator U tubes.

3.4 Proposed Procedure 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. Station blackout response guidelines,

2. AC power restoration, and

3. Severe weather.

The licensee listed the names of the plant procedures, which fall in each of above categories, in the SBO submittal. The licensee stated that these procedures will be revised, if necessary, to meet NUMARC 87-00 guidelines. The licensee has identified an additional procedure change to use the non-safeguards diesel-generators, (two DGs), in an interim basis until the class 'E EDGs are built. Either of these DGs has sufficient capacity to provide power for blackout loads for both

units. The licensee indicated that this interim procedure does not meet the one hour time response required of an AAC sources.

Review of Licensee's Submittal

We neither received nor reviewed the affected SBO procedures. We consider these procedures as plant specific actions concerning the required activities to cope with an SBO. We believe that 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 Submittal

The licensee stated that modifications are required to separate the existing 4.16 kV station auxiliary system into independent systems for each unit. The existing system provides two EDGs, each of which is capable of providing EAC power to the associated emergency buses of both units, see Figure 1. The planned modification will provide two dedicated EDGs for each unit. These EDGs will be independent of the other unit's electrical and support systems and will be capable of being manually connected to the other unit's associated 4.16 kV bus using the bus tie circuit breaker.

Interlocks will be provided so that the bus tie circuit breakers must be open before the EDG output circuit breakers could be closed. After EDG output breaker closure, the bus tie breaker can be manually closed. Procedures for operation, maintenance, surveillance, and testing of the modified 4.16 kV station auxiliary system will be revised, or created as necessary. Emergency operating procedures 1EAC-0.0 and 2EAC-0.0 will be

revised to instruct the operators to utilize the AAC power source if both EDGs for a unit are unavailable.

Review of Licensee's Submittal

The proposed modification (see Figure 2) is consistent with the guidance provided in NUMARC 87-00 and RG 1.155. The installation of new EDGs will meet stricter criteria than those given for an AAC power source, therefore, their use as an AAC source conforms with the guidance provided in RG 1.155 and NUMARC 87-00.

3.6 Quality Assurance and Technical Specifications

The licensee did not provide any information concerning the conformance with the guidance of RG 1.155, Appendices A and B.

4.0 CONCLUSIONS

Based on our review of the licensee's submittal and the information available in the UFSAR for Prairie Island Nuclear Generating Station (PINGP), we find that the submittal conforms with the requirements of the SBO rule and the guidance of RG 1.155 with the following exceptions:

1. **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 the RG 1.155, Section 1.2 and NUMARC 87-00, Appendix D, however, it is stated that the EDG target reliability of 0.975 will be maintained.

2. **Effects of Loss of Ventilation**

   The licensee stated that the AAC power source will be available within 10 minutes and provides power to HVAC systems serving dominant areas of concern. We would like to emphasize that the dominant areas of concern should not be limited to those identified in NUMARC 87-00. The licensee needs to ensure that other areas which house operating systems, (heat generation sources), during an SBO event are provided with appropriate area cooling.

3. **Quality Assurance and Technical Specifications**

   The licensee's submittal does not document the conformance of the plant's SBO equipment with the guidance of RG 1.155, Appendices A, and B in its submittal.

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. Musolf, D., letter to the Director of Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Attention: Document Control Desk, "Prairie Island Nuclear Generating Plant Docket Nos. 50.282 and 50-306, License Nos. DPR-42 and DPR-60, Loss of all alternating Current Power Information Required by 10 CFR Part 50, Section 50.63(c)(1)," dated April 13, 1989.

11. Prairie Island Nuclear Generating Plant, Updated Final Safety Analysis Report.

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

13. Parker, T. M., letter to the Document Control Desk of the U.S. Nuclear Regulatory Commission, "Prairie Island Nuclear Generating Plant Docket Nos. 50-282 and 50-306 , License Nos. Dpr-42 and DPR-60, Supplemental Response to Loss of All Alternating Current Power Information Required by 10 CFR 50, Section 50.63(c)(1)," dated March 29, 1990.

14. Thadani, A. C., letter with attachment 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).

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

16. Rosa, F., letter to Duquesne Light Company - Beaver Valley Units 1 and 2, "Meeting Summary - Meeting of February 22, 1990, on Station Blackout Issues (TAC 68510/68511)," Docket Nos. 50-334 and 50-412, dated March 6, 1990.

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