Attachment 1

SAIC-90/1374

TECHNICAL EVALUATION REPORT

INDIAN POINT UNIT 2

STATION BLACKOUT EVALUATION

TAC No. 68556

Science Applications International Corporation
An Employee-Owned Company

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Prepared for:

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

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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 licensee 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 Regulatory Guide 1.155 provides a matrix for determining the required coping duration.

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

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

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

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

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

e. ability to provide appropriate containment integrity, and

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

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

The licensee's submittal for any proposed modifications to emergency AC sources, battery capacity, condensate capacity, compressed air capacity, 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 a review of the licensee's submittals dated April 14, 1989 (10) and March 27, 1990 (11), the information available in the plant Updated Final Safety Analysis Report (UFSAR) (13), a telephone conversation between NRC/SAIC and the licensee on June 4, 1990 and a draft

response (15) to the questions raised during this telephone conversation; 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, Consolidated Edison Company of New York, Inc. (Con Ed), calculated (10 and 11) a minimum acceptable station blackout duration of eight hours for the Indian Point, Unit 2 (IP-2). The licensee stated that no modifications are necessary 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 "P3" based on an expected frequency of grid-related LOOP events of greater than one per 20 years, per NUMARC 87-00 Section 3.2.1, Part 1A.

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

   The licensee stated that the EAC power configuration of the plant falls into group "A." The licensee stated that Indian Point 2 is equipped with three emergency diesel generators which are normally available to power the unit's safe shutdown equipment and are not credited as AAC power sources. The licensee stated that one EAC power supply is necessary to operate safe shutdown equipment following a LOOP.

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

   The licensee has selected a target EDG reliability of 0.95 based on having each nuclear unit average reliability of greater than

0.95 for the last 100 demands consistent with NUMARC 87-00 selection criterion.

Review of Licensee's Submittal

The factors which affect the estimation of the SBO coping duration are: the estimated frequency of grid-related LOOPs, the classification of the EAC configuration, and the selection of EDG target reliability. The licensee's estimate of expected frequency of grid-related LOOPs of greater that once per 20 years was taken from Section 3.2.1 of NUMARC 87-00. Therefore, the site offsite power design characteristic is classified as "P3." The severe weather, extremely severe weather and independence of offsite power groupings do no affect the required coping duration and were not addressed by the licensee or the reviewers.

The licensee assessed the emergency AC power configuration group "A" based on one out-of-three available EDGs required to achieve and maintain a safe shutdown. In response to questioning during the telephone conversation on June 4, 1990, the licensee submitted a "draft" list of equipment required for maintaining Indian Point 2 in a hot shandby condition following a LOOP (15). On this list, the licensee stated that the highest initial loading automatically placed on any EDG is 1,762.8 kW. The operator would then shed unnecessary running equipment (e.g., one of two CCW pumps) and manually connect some necessary loads, reaching a final loading of 1,739.8 kW. We agree with the licensee that one EDG has adequate capacity to maintain the plant in a hot standby condition. However, EAC grouping should be based on the ability to achieve and maintain a safe shutdown condition for an extended period. This would require the operation of at least an RHR pump (other support loads may also be required), which would add about 332 kW to the EDG loading resulting in a total load approximately 2,072 kW, which would exceed the current 2,000 hour EDG rating of 1,950 kW (13). If the current EDG rating were to be used, IP-2 would be in EAC configuration group "D" because two EDGs would be required. However, the licensee has proposed (16) to mechanically upgrade the EDGs and to

re-qualify them at a new design rating. The licensee stated that upon completion of the modifications (16) the new short term rating will be 2,100 kW for two hours within any 24 hour period. Pending the final EDG testing and the NRC approval of the proposed EDG modification as described in Reference 16 and summarized in Section 3.5, we accept the licensee's conclusion that IP-2 is in EAC configuration group "A."

The final characteristic needed to establish the required coping duration is the target EDG reliability. The licensee stated (10) that the assignment of the EDG target reliability of 0.95 is based on having an average EDG reliability of greater than 0.95 for the last 100 demands. Although this is an acceptable criterion for choosing an EDG target reliability, the guidance in RG 1.155 requires that the EDG reliability statistics for the last 20 and 50 demands also be calculated. Without this information it is difficult to judge how well the EDGs have performed in the past and if there should be any concern. We are unable to verify the demonstrated start and load-run reliability of the plant EDGs. This information is only available onsite as part of the submittals supporting documents. The available information in the NSAC-108, which gives EDG reliability data at U. S. nuclear reactors for calendar years 1983 to 1985, indicates that the EDGs at IP-2 experience an average of 70 valid start demands per diesel per calendar year and have reliability levels of higher than 0.95. Using this data, it appears that the EDG target reliability (0.95) selected by the licensee (10) is 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.

During the telephone conversation of June 4, 1990, the licensee stated that the existing EDG reliability program meets the guidance of RG 1.155. The licensee also stated (11) that the reliability program will be compared with and changes will be made in accordance with guidance based on the results of the Generic Safety Issue B-56 (Diesel Generator Reliability).

Based on the above, the offsite power design characteristic of IP-2 is "P3" with a minimum required SBO coping duration of eight hours.

3.2 Alternate AC (AAC) power source

Licensee's Submittal

The licensee stated that the AAC system consists of 3 internal combustion gas turbines (GT-1, GT-2 and GT-3). One turbine is located onsite, the other two are located at the Buchanan substation. The licensee stated that each gas turbine currently has blackstart capability and that each can be started from the IP-2 Central Control Room. The GT-2 blackstart capability is currently limited. The licensee proposed to install a blackstart diesel generator capable of carrying all auxiliary loads for GT-2. The licensee supplied Figure 1, which shows the multiple installed paths for routing power from the gas turbines to the shutdown buses (5A, 2A-3A and 6A).

The licensee stated (10) that the AAC power source meets the criteria specified in Appendix B of NUMARC 87-00, is available within one hour of the onset of the SBO event, and has sufficient capacity and capability to operate the systems necessary to cope with an SBO for the required duration of eight hours.

Review of Licensee's Submittal

One of the AAC power sources (GT-1) is located on the Indian Point Unit 1 (IP-1) property, which is directly adjacent to the IP-2, the other two sources (GT-2 and GT-3) are located at the Buchanan substation, which is located about half a mile from IP-2. GT-2 and GT-3 feed power through three underground (13.8 kV) feeders to IP-1 switchgear. IP-2 can receive power from IP-1 switchgear, and any of the three gas turbines via an underground 13.8 kV feeder line.

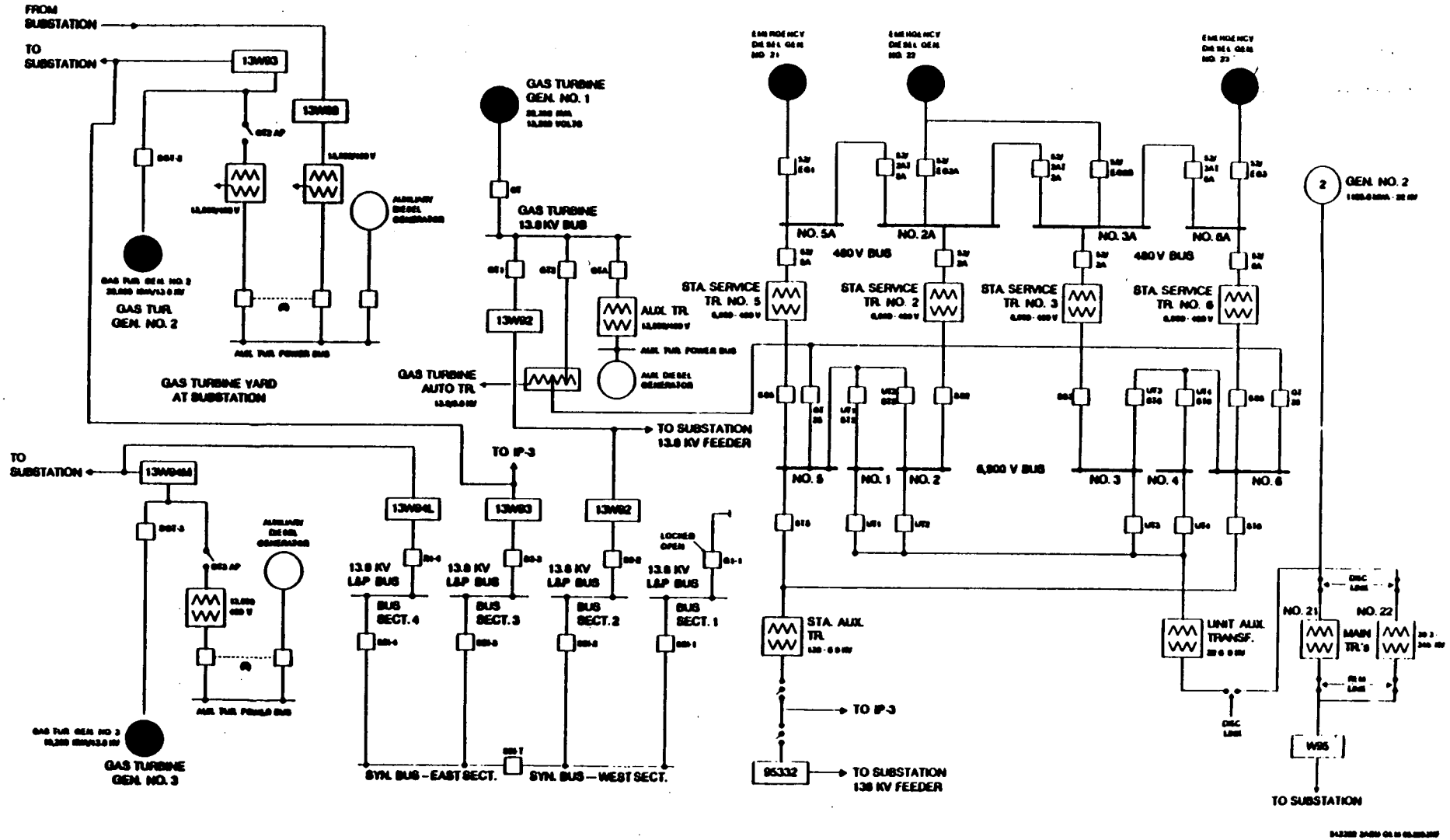

FIGURE 1. INDIAN POINT 2 ALTERNATE AC POWER SYSTEM

The licensee stated that GT-1 and GT-3 have blackstart capabilities and that GT-2 currently has limited blackstart capability. A blackstart diesel generator will be installed to give GT-2 a complete remote blackstart capability from the IP-2 control room.

The licensee stated the plant Technical Specifications requires that at least one gas turbine to be available during reactor operation (with a seven day LCO), and that monthly surveillance testing be performed on all gas turbines. The licensee stated that the existing maintenance and surveillance procedures for the gas turbines meet the guidance provided in NUMARC 87-00, Appendix B.

The licensee committed to demonstrate that each of the AAC power sources can power the shutdown busses within one hour of the onset of an SBO, in accordance with NUMARC 87-00 Sections 7.1.2 and Appendix B, Paragraph B.12, and RG 1.155, Section 3.3.5.3.

Based on the telephone conversation on June 4, 1990, and the information available in the plant's UFSAR, we conclude that following the completion of the above modification and tests, the licensee's AAC system will meet the criteria given in the guidance of NUMARC 87-00, Appendix B.

3.3 Station Blackout Coping Capability

The plant's capability for coping with an SBO for eight hours, including coping for the first hour without AC power, is assessed based on the following:

1. Condensate inventory for decay heat removal

Licensee's submittal

The licensee stated (11) that the IP-2 Technical Specifications requires a minimum condensate storage level of 360,000 gallons and

that 127,300 gallons are required for decay heat removal and primary system cooldown for eight hours at the current power rating and that 142,850 gallons are required at the proposed stretch power rating.

Review of Licensee's Submittal

IP-2 plans to increase the licensed power level from the current level of 2,700 MWt to a stretch power level of 3,083.4 MWt. Since condensate inventory calculations at the stretch power level clearly bound calculations performed using the current maximum power calculation, our evaluation is based on the stretch power level. Using NUMARC 87-00, Section 7.2.1, we estimated that the plant needs 109,614 gallons of condensate to remove decay heat for eight hours. We have not received or evaluated the amount of water required for cooldown, which we estimate to be 31,236 gallons based on a licensee-stated total condensate requirement of 142,850 gallons minus our estimate of 109,614 gallons. We conclude the minimum CST level allowed by technical specifications of 360,000 gallons ensures adequate condensate water for coping with an SBO with a duration of eight hours at either power level. The excess inventory available in the CST can be used to assist in SBO recovery.

2. **Class 1E Battery Capacity**

Licensee's Submittal

The licensee stated that the class 1E batteries at IP-2 must function for one hour following the onset of an SBO event.

Review of Licensee's Submittal

Section 8.2.3.5 of the plant's UFSAR states that the batteries are designed for two hours of operation with the expected shutdown

load without any AC power for charging. In an SBO scenario, the batteries are only required to last for one hour, after which AAC power will be available to provide the needed charging. Therefore, assuming each battery charger is powered by the AAC source, the licensee's approach is consistent with the guidance provided by NUMARC 87-00, Section 7.1.2 and NUMARC 87-00 Supplemental Questions and Answers. If both divisions' batteries are not charged by the AAC source, the licensee needs to include in its procedures a means to prevent the uncharged batteries from excessive discharge.

3. **Compressed Air**

Licensee's Submittal

The licensee stated that the air operated valves needed to cope with an SBO for a one hour duration can either be operated manually or have sufficient back-up sources independent of AC power. Additionally, the licensee stated that valves requiring either manual operation or backup sources for operation are identified in appropriate plant procedures.

Review of Licensee's Submittal

The instrument air system will not be available during the first hour of an SBO, but will be available once the AAC power source is on line. The UFSAR states that the instrument air system is designed such that all essential systems requiring air during or after an accident will be self supporting and all controls will fail to a safe position on loss of power. The plant has a turbine-driven auxiliary feedwater (AFW) pump that should operate during an SBO. The use of this pump requires the operation of pneumatic valves to control flow to the steam generators. These valves are equipped with compressed nitrogen for use while instrument air is not available, and, as a back-up, the valves can

be operated local-manually. The licensee stated that the plant's atmospheric steam dump valves (ADVs) are pneumatically operated, with a back-up nitrogen supply, and will be available during the first hour following the onset of an SBO. Since the licensee stated that existing plant procedures take the unavailability of compressed air into account, we assume that operators are properly trained to control the AFW flow for events similar to an SBO, and we conclude that the licensee complies with the guidance in NUMARC 87-00, Section 7.2.3.

4. Effects of Loss of Ventilation

Licensee's Submittal

The licensee stated (10) that the AFW pump room is the only dominant area of concern during an SBO, and that it will reach a final, steady-state ambient temperature of 126°F. The equipment in the AFW pump room was evaluated using NUMARC 87-00, Appendix F and the licensee determined that reasonable assurance of the operability of the equipment would be provided by opening a roll-up door.

The licensee evaluated equipment in the steam and feed penetration building (15) and stated that the main steam safety valves are designed to function in the expected SBO environment and that the main steam isolation valves and atmospheric relief valves are not required to function to maintain the unit in hot standby during an SBO. The licensee stated that existing procedural cautions for entry into the area ensure personnel safety and that the operability of all required SBO equipment in this building is bounded by the IP-2 High Energy Line Break Evaluation. Additionally the licensee described the procedure for restoring manually ventilation following the restoration of power via the AAC supply.

The licensee analytically determined that the control room would not exceed 120°F during an SBO, and therefore was not a dominant area of concern (10). The licensee stated (15) that following the restoration of power via the AAC power source all the required ventilation will be restored by the operator in accordance with appropriate procedures.

Review of Licensee's Submittal

During the telephone conversation on June 4, 1990, the licensee stated that control room cabinet doors will be opened within 30 minutes of the onset of an SBO event consistent with the guidance of NUMARC 87-00. Since the AAC source has the capacity (~13,000 to 20,000 KVA) and the connectability to power all the needed ventilation systems within one hour of the onset of an SBO event, the licensee's approach to providing ventilation meets the applicable SBO guidance.

5. **Containment Isolation**

Licensee's Submittal

The licensee stated (10) that they reviewed the plant list of containment isolation valves to verify that valves which must be capable of being closed or that must be operated under SBO conditions can be positioned (with indication) independent of the preferred and Class 1E power supplies. The licensee determined that no modifications are required to ensure that containment integrity can be provided under SBO conditions.

Review of Licensee's Submittal

During the telephone conversation on June 4, 1990, the licensee stated that there are 13 manual valves that would need manual operation or verification if containment integrity should be

required during the first hour of an SBO event. In response to discussion during this telephone conversation, the licensee stated (15) that all valves needed to maintain containment integrity are either:

- closed and locked and/or
- sealed and covered administratively by use of checkoff lists.

The plant's UFSAR does not contain adequate information to review the licensee's analysis. However, we accept the licensee's statement that it has identified the proper containment isolation valves, verified that all these valves have position indication (local, remote or mechanical), and incorporated them into the SBO procedures to ensure that appropriate containment integrity is obtainable during an SBO event.

6. **Reactor Coolant Inventory**

Licensee's Submittal

The licensee stated that the reactor coolant system inventory for the one hour following an SBO has been assessed in a plant-specific analysis. The licensee concluded that makeup systems in addition to those currently available under SBO conditions are not required to maintain core cooling under natural circulation.

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) and the technical specification maximum allowable leakage (estimated to be 25 gpm). During the first hour, prior to the establishment of the AAC power source, an estimated 7500 gallons

of RCS water will be lost. After one hour, the AAC system provides sufficient power to provide the make-up water necessary to replenish the RCS losses and maintain inventory. Therefore, we agree with the licensee's conclusion that existing make-up systems are adequate for maintaining RCS inventory.

NOTE:

The 25 gpm RCP seal leak rate was agreed to between NUMARC and the 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 plant procedures have been reviewed and modified, if necessary, to meet the guidance in NUMARC 87-00, Section 4 in the following areas:

1. AC power restoration,

2. Severe weather, and

3. SBO response.

The licensee stated that no procedure changes on AC power restoration or severe weather are necessary. The only procedural change is a revision to the loss of all AC procedure to include a manual action to open the roll-up door in the AFW pump room. Additionally, the licensee determined that the GT-2 operating procedures (31.2.1 and 31.2.2) will

have to be changed upon completion of the modification described in Section 3.5.

Review of Licensee's Submittal

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

3.5 Proposed Modifications

Licensee's Submittal

The licensee stated (10) that GT-2 currently has limited blackstart capability, so a blackstart diesel capable of carrying all auxiliary loads for the gas turbine will be installed. The licensee stated that the blackstart diesel will automatically start and load when the gas turbine is demanded.

The licensee is presently modifying the EDGs (16) to increase their short term rating from the current 1,950 kW to 2,100 kW for two hours within any 24 hour period. This modification is expected to be completed by February 1991. The modification includes replacement of the following EDG components:

- Turbocharger and fuel injectors,
- Pistons,
- Exhaust manifold,
- Exhaust header and silencer,

- Heat exchangers, and
- Air intake.

Additionally, room ventilation flow rate will be increased.

The licensee stated that the GT-2 modifications will be completed within two years of the notification provided by the NRC in accordance with 10 CFR 50.63 (c)(3).

Review of Licensee's Submittal

The licensee stated that the GT-2 modifications will be implemented in accordance with the applicable design and licensing requirements to comply with the guidance of RG 1.155 and NUMARC 87-00. If properly implemented, the GT-2 modification will improve the reliability and availability of the AAC power system. The NRC is currently reviewing the EDG modifications in a separate effort, it is not specifically covered by SBO guidance.

3.6 Quality Assurance And Technical Specifications

Quality Assurance

The licensee did not address quality assurance or technical specifications in their submittal. However, the licensee stated that all equipment used during an SBO is covered by either an NRC-approved (Appendix B or Appendix R of 10 CFR 50) QA program. This is consistent with the guidance provided in Appendices A and B of RG 1.155.

Technical Specification

The licensee did not identify any changes to current technical specification for the involved SBO equipment. Our review of the licensee's approach indicates that the equipment necessary to cope with

an SBO (gas turbines, EDGs, AFW, CST, batteries, etc.) is already covered by technical specification.

4.0 CONCLUSIONS

Based on our review of the licensee's submittals and the related supporting documents and discussions during a telephone conversation we find that the submittal conforms to the station blackout rule and the guidance of RG 1.155 with the following exception:

Proposed Station Blackout Duration

The licensee stated that IP-2 is in EAC group "A" based on the ability to achieve hot standby conditions with one EDG operating. Based on the current plant design, IP-2 is in EAC group "D" which in conjunction with the offsite power design characteristic of "P3" would require a minimum coping duration of eight hours and an EDG reliability target of 0.975. Upon successful completion of the EDG upgrade modifications and associated testing, we agree with the licensee that the EAC classification will be group "A," resulting in a required coping duration of eight hours with an EDG target reliability of 0.95.

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. Bram, S. B., letter to the Document Control Desk of U.S. Nuclear Regulatory Commission, "Station Blackout Rule 10 CFR 50.63," April 14, 1989.

11. Bram, S. B., letter to the Document Control Desk of U.S. Nuclear Regulatory Commission, "Supplemental Response Regarding Station Blackout Rule (10 CFR 50.63)," March 27, 1990.

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. Indian Point, Unit No. 2 Nuclear Power Station, Updated Final Safety Analysis Report.

14. 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," dated December 27, 1989.)

15. Consolidated Edison Company of New York, Inc.,"Draft - Answers to Questions Resulting from Conference Phonecall Regarding Station Blackout (SBO)," Telefaxed to the U.S. Nuclear Regulatory Commission on June 8, 1990.

16. Bram, S. B., letter to the Document Control Desk of U.S. Nuclear Regulatory Commission, "EDG Modification Test Plan," October 26, 1990.

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This requirement for confirmation and information affects one respondent; therefore, is not subject to Office of Management and Budget review under P.L. 96-511.

Sincerely,

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