Entergy
Operations

Entergy Operations, Inc.

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Subject: Arkansas Nuclear One - Units 1 and 2
Docket Nos. 50-313 & 50-368
License Nos. DPR-51 & NPF-6
Conceptual Design for Station
Blackout Modification
(TAC Nos. M68508 and M68509)

Gentlemen:

In letter dated April 15, 1991 (0CAN049107), Entergy Operations submitted a revised response to the Station Blackout (SBO) Rule for Arkansas Nuclear One, Units 1 and 2 (ANO-1&2). In that submittal, Entergy Operations committed to install an independent alternate AC (AAC) power source capable of providing electrical power under blackout conditions to the affected unit.

Entergy Operations also committed to provide the conceptual design of the AAC power source to the NRC for review prior to beginning any plant modifications. The conceptual design of the AAC power source has been completed and is being provided for NRC review. The conceptual design has been prepared in order to establish clear positions on complicated design issues early in the design phase of the project, as well as, establish a detailed cost estimate and construction plan. The conceptual design is presented in the following attachments:

Attachment 1 - Alternate AC Generator System Upper Level Design Description Document (ULD-0-SYS-19, Draft) This is a draft design bases document that provides a system definition, functional description, design requirements/commitments, and design features description for the AAC Generator System.

Attachment 2 - Design Basis for Alternate AC Generator Building and Foundations for Arkansas Nuclear One. This draft document identifies the assumptions, applicable codes and standards, unique ANO requirements, functional performance requirements, and design parameters for the new AAC generator building and its foundation.

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Attachment 3 - Conceptual Design Drawings for the AAC Power Source (i.e., P&IDs, electrical one-line and three-line diagrams, site drawings, schematic drawings, logic diagrams, etc.). The attached drawings are "C" size. Five "E" size copies of these drawings are being submitted to the ANO-1 NRR Project Manager directly.

There are several specific points in the conceptual design that should be highlighted. These design features will be presented in two categories: AAC Power Source Equipment Characteristics and AAC Power Source Operational Characteristics as follows:

AAC POWER SOURCE EQUIPMENT CHARACTERISTICS

AAC Power Source

A diesel generator has been selected (make and model will be established through competitive bidding in the detail design phase) as the AAC power source for ANO-1&2. The diesel generator will be manually started from the Unit 2 control room and will be able to be aligned to any of the four safety buses in ANO-1&2 without any necessary actions outside of the control rooms. Power will be available within 10 minutes of the onset of the SBO event (i.e., within 10 minutes after the operators have procedurally determined that a SBO event has occurred) and will be sufficient to operate the necessary systems to bring the unit to a safe shutdown condition for the duration of the event.

With regards to capacity, both units' existing Emergency Diesel Generators' (EDGs) loading calculations have been reviewed and a review of pending regulations and future design requirements has been conducted to establish a design basis for the sizing of the AAC power source. In order to meet SBO requirements, utilize the AAC power source for Limiting Conditions of Operation (LCO) extensions on the units' existing EDGs, and provide margin to meet potential future regulatory requirements, the AAC diesel generator will be capable of continuous running under the following simultaneous loads:

- Greatest short time EDG load of either unit
- Auxiliaries associated with the AAC diesel generator/building
- Margin for future loads or degraded conditions

It should be noted that the AAC diesel generator will be completely independent of all other emergency AC power sources including their auxiliaries (eg. fuel oil supply, starting air, cooling water source, etc.).

AAC Power Source Bus

The AAC power source bus arrangement consists of a cable network and switchgear lineup which will allow the AAC diesel generator to access any of the four safety buses in ANO-1&2 without any necessary actions outside of the control rooms. Additionally, the bus arrangement will allow the AAC power source to be aligned to one non-safety 4160 V bus in each unit to facilitate the following:

- Testing of the AAC diesel generator
- Restoration of power to some beneficial non-safety equipment during a LOOP after the availability of AC power to the safety buses has been secured via the EDGs

All the switchgear associated with the AAC bus arrangement will be operable from the ANO-2 control room. The switchgear associated with either unit's safety bus crossties will continue to be operated from their respective control rooms.

AAC Generator Building

The AAC Generator Building will house the diesel generator, its auxiliaries, and the electrical and control equipment required for its operation, protection and distribution of power. The building will be designed to the Uniform Building Code (UBC).

Based on Entergy Operations' understanding of 10CFR50.63, Regulatory Guide 1.155, and NUMARC 87-00, the AAC Diesel Generator Building does not need to be designed to withstand the effects of tornados including tornado generated missiles as these phenomena are not addressed by the UBC. The electrical cables that run between the AAC Generator Building and the AAC Bus arrangement located in the Turbine Building, will be routed in an underground duct bank between buildings in order to protect them against the effects of weather-related events that may initiate the LOOP event. Additionally, the location of the AAC Generator Building in relationship to the ANO-1&2 switchyard provides additional "reasonable assurance" that no single point of vulnerability exists whereby a weather-related event (specifically a tornado) could disable any portion of the blacked-out unit's onsite emergency AC power sources or the preferred power sources and simultaneously fail the AAC power source.

AAC POWER SOURCE OPERATIONAL CHARACTERISTICS

Station Blackout

The AAC diesel generator will be capable of being started and manually connected from the ANO-2 control room to any one of the four ANO-1&2 safety buses within 10 minutes of a SBO having been procedurally determined.

Loss of Off-site Power (LOOP)

It is expected that the AAC power source may prove useful in restoring power to various non-safety equipment that would enhance the station's ability to mitigate the effects of a LOOP. There are a significant number of scenarios where both EDGs are available or where one EDG has failed that the AAC power source would reduce the potential for plant damage. The use of the AAC power source in these situations will have to be dictated by procedural controls associated with the unit's individual procedures addressing a LOOP event.

Testing

The flexibility of the AAC power source due to its bus arrangement will allow the system to be loaded in parallel to the normal power sources on one of the non-safety buses of either unit. This allows the AAC diesel generator to be tested during various modes of operation to verify its ability to carry its rated capacity without interfacing with the Class 1E safety buses. The bus arrangement will also allow the AAC diesel generator to be tested during unit shutdown as a replacement to any one of the four EDGs in order to verify its ability to provide power to the safety loads. Testing will meet the guidelines of NUMARC 87-00 as a minimum, with additional testing being performed as necessary to meet reliability goals.

TECHNICAL SPECIFICATION LCO EXTENSION

As discussed with the ANO NRR Project Manager and previously indicated in our April 15, 1991 letter, Entergy Operations desires to utilize the AAC power source as a basis for extending the ANO-1&2 Technical Specifications LCO when having only one Class 1E EDG operable while at power provided the AAC diesel generator is operable.

ANO will be utilizing a non-Class 1E AAC power source to meet the requirements of the SBO rule. In order to provide improved operational flexibility for the LCO extension, ANO proposes to install a system that exceeds the guidelines described in Regulatory Guide 1.155 and NUMARC 87-00, Appendix B. In particular, the proposed system will have the following additional attributes:

- The rating of the AAC power source will exceed the capacity and capability to supply one train of the loads required to mitigate any design basis accident (DBA) and achieve safe shutdown for the affected unit.

- All testing and surveillance requirements that presently apply to the Class 1E EDGs will be applied to the AAC power source.

- The AAC fuel oil supply will be sufficient to provide for four and one-half days of operation at the full capacity of the AAC diesel generator.

In the event that an EDG is taken out of service or declared inoperable, the AAC power source would have the capability of being manually aligned with that unit's division effectively providing a functional replacement to the EDG. If required, the AAC would be fully capable of powering the necessary loads that would otherwise have been powered by the EDG if it were not out of service. However, no special provisions are being made to ensure the availability of the AAC power source during and after a seismic event.

The above discussed operational characteristics are based upon favorable NRC consideration regarding LCO relief on the existing EDGs. The specific LCO duration extension will be subject to further NRC and Entergy Operations discussion. However, Entergy Operations requests that the scope of the Staff's review of the ANO AAC conceptual design be performed in light of ANO's LCO relief goals.

JUSTIFICATION FOR 10CFR50.63 SCHEDULE EXTENSION

Entergy Operations' current schedule for the completion of the detailed design is December, 1993. Construction of the AAC power source is expected to be complete December 31, 1994. The unit specific tie-ins will occur during 1R11 (currently scheduled for the fall of 1993) and 2R10 (currently scheduled for the spring of 1994) and the remaining scope of the modification will be completed non-outage, as was discussed in letter dated April 15, 1991.

It is recognized that this schedule exceeds the two-year implementation schedule as discussed in paragraph (c)(4) of 10CFR50.63. The extended implementation schedule is considered by Entergy Operations to be justified based on the design, procurement and installation lead times for a major modification as a new diesel generator. Specifically, this includes:

1) development of an initial scoping study and conceptual design including the identification of specific design criteria

2) generation of a detailed design change package

3) the procurement of a new diesel generator and all diesel auxiliaries and supporting equipment

4) the erection of a new diesel enclosure, diesel radiator, conduit trenches, and other associated support systems, and

5) installation of final tie-ins

The total implementation of the new machine is expected to take a total of approximately 3.5 years from project inception.

Due to the total time constraints associated with the installation of a new diesel generator, Entergy believes that the schedule extension is justified in accordance with paragraph (c)(4) of 10CFR50.63.

As discussed in letter dated June 8, 1992 (0CAN069202), Entergy Operations requests the NRC's concurrence with this conceptual design by the Fall of 1992.

Should you have any questions regarding this issue, please contact me.

Very truly yours,

James J. Fisicaro
Director, Licensing

JJF/RWC/sjf

Attachments

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ATTACHMENT 1

ALTERNATE AC GENERATOR SYSTEM UPPER LEVEL DESIGN DESCRIPTION DOCUMENT (DRAFT)