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SUBJECT: Comments on 900615 safety evaluation re station blackout
 rule 10cfr50.63.

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P.O. Box 14000, Juno Beach, FL 33408-0420

SEPTEMBER 21 1990

L-90-338
10 CFR 50.63

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Re: Turkey Point Units 3 and 4
Docket No. 50-250 and 50-251
Comments on NRC's Safety Evaluation
for Station Blackout

By letter dated June 15, 1990, the Nuclear Regulatory Commission (NRC) provided Florida Power & Light Company (FPL) with a Safety Evaluation (SE) on FPL's response to the requirements of the Station Blackout (SBO) Rule, 10 CFR 50.63, for Turkey Point Units 3 and 4. The NRC found FPL's response, which incorporated plant changes that will be made during the Emergency Power System (EDGs) upgrade, to be acceptable. However, the SE requested FPL to confirm that one Emergency Diesel Generator (EDG) is capable of maintaining both units in a hot standby condition for an eight hour duration.

Resolution of the SBO issue at FPL's Turkey Point Plant is predicated upon the licensing criteria which were provided in Attachment C.1, "Licensing Basis Criteria", of FPL letter L-89-56 dated April 17, 1989. The capability of one EDG to maintain both units in hot standby is an existing plant design feature which will be incorporated into the Licensing Basis Criteria.

Notwithstanding FPL's acceptance of an eight hour duration for a loss of offsite power event, one requirement of the SBO rule is to determine "the probable time needed to restore offsite power" (10 CFR 50.63 (a) (iv)). Based on analysis of all FPL system historical power restoration data, the mean time to restore offsite power applicable to the Turkey Point site is approximately 26 minutes. From this data, there is a 99% probability of restoration of offsite power in about two hours.

As provided by FPL's supplemental information letter, L-90-56, dated March 29, 1990, restoration of AC power can be provided from the FPL grid or offsite blackstart gas turbines. In addition, any two of Turkey Point's five black start diesel generators can supply power via the C-bus. Existing plant operating procedures allow for the black start diesels to be made available. Restoration of off-

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site power to FPL's nuclear plants is controlled by system operations procedures to provide power to the Turkey Point switch yard on a priority basis.

Attached to this letter are additional details, comments and clarifications on inaccurate or improper statements in the SE.

This letter serves to document the information provided to the NRC during a meeting held with the NRC on August 30, 1990, which was attended by NRC and FPL representatives. If you have additional questions on this please contact us.

Very truly yours,



K. N. Harris
Vice President
Turkey Point Nuclear Plant

KNH/RWG/lef

Attachment

ATTACHMENT
To L-90-338
FPL COMMENTS and CLARIFICATIONS

1) SE Section 1.0 INTRODUCTION

Resolution of Station Blackout (SBO) for Florida Power and Light (FPL) consists of plant enhancements and modifications which will result in reduced frequency of core damage from a unit or station blackout event to less than 10^{-5} /reactor year. FPL's compliance with 10 CFR 50.63, "Loss of all Alternating Current Power", and the guidance provided by Regulatory Guide 1.155 and NUMARC 87-00 encompasses meeting the value of 10^{-5} /reactor year as an acceptable frequency for core damage contribution from sequences initiated by a station loss of offsite power (LOOP)¹ as established by the NRC.

The NRC did recognize that some licensees could provide, or may actually have in place, alternative ways that would significantly enhance the overall AC power reliability (as provided in 10 CFR 50.63) by additional diesels, gas turbines or cross-connect options at two-unit sites that could serve as a one-of-four emergency diesel generator (EDG) configuration rather than one-of-two EDG configurations for unit blackout considerations¹. This led to the "10-minute" alternate AC source at multi-unit sites. The statements of consideration for the rule identified this approach as a "preferred option" to resolve this issue.

During the NRC/SBO audit in October 1989, FPL provided the NRC with an overview of the methodology FPL used to comply with 10 CFR 50.63. Specifically, FPL addressed the rule requirements to resolve SBO based on the factors delineated in 10 CFR 50.63 (a) (i), (ii), (iii), and (iv). As presented in our March 29, 1990 submittal, FPL has demonstrated:

- a) Redundancy of the onsite emergency AC power sources at Turkey Point Nuclear site will be increased from two to four (modification for SBO will be completed during the dual unit outage in which the EPS upgrades will be performed).
- b) The reliability of the onsite emergency AC power sources is greater than 0.95.
- c) Based on recent performance (1980's), the expected frequency of loss of offsite power is consistent with other U. S. electrical grids.

¹NRC staff responses to questions from Commissioners Asselstine, Bernthal, Roberts and Zech during final rule making decision on "Station Blackout" regulation date November 10, 1985.

- d) The mean restoration time for offsite power is approximately 26 minutes. Based on historical FPL system data, the probability of restoration of offsite power in about two hours is 99%

As part of the EPS upgrade, FPL proposed to add two EDGs and system electrical interties to cross-connect electrical buses such that the reliability of the emergency AC power system configuration after a LOOP is significantly enhanced. The new configuration permits any one of four EDGs to mitigate the effects of a unit blackout at the site. One EDG has been shown to be sufficient to provide all the necessary loads associated with placing both units in hot standby from 100% power for the required transient time duration. FPL has performed a preliminary risk assessment which reflects the significant risk reduction gained by the modifications for a postulated SBO event.

Results of the FPL evaluation demonstrates the risk of a SBO after a LOOP event has been reduced from approximately 7.6×10^{-4} to 2.9×10^{-6} per reactor year. This is directly attributable to the proposed cross-tie capability of the electrical system and adding two EDGs. The evaluation results in a risk reduction factor in excess of 200. By comparison, in NUREG-1032, "Evaluation of Station Blackout Accidents of Nuclear Power Plants" and in NUREG-1109, "Regulatory Analysis for the Resolution of Unresolved Safety Issue A-44, Station Blackout", the NRC staff reports a risk reduction factor of approximately 2.5 (i.e. 2.1×10^{-5} to 0.8×10^{-5} per reactor year) as the basis for issuance of the SBO rule for units with a 4 hour DC coping capability and one-out-of-two EDG configuration².

FPL has reduced the vulnerability of a hurricane induced LOOP resulting in a core damage from a SBO. Site specific frequency of hurricane wind speeds of greater than 125 mph is less than 10^{-2} per reactor year as reported by three independent sources³. FPL will implement design and procedural precautions to remove or reduce the effects of a hurricane on a SBO event:

²Rulemaking Issue Affirmation, SECY-88-22, January 21, 1988.

³NUREG/CR-4762, "Shutdown Decay Heat Removal Analysis of a Westinghouse 3-LOOP PWR" 3/87.

Dames & Moore, "Probabilistic Hurricane Analysis" 1/89.

University of South Florida, "Statistical Frequency Hazard Model for Hurricane Wind Speed" 1/90.

- 1) Design wind loads for Class I structures, systems and equipment (including the safety-related equipment which is relied upon to mitigate a SBO) meet or exceed those required by the South Florida Building Code. In addition, Class I structures which house safety-related equipment are designed to resist the effects of a tornado. All existing Class I structures have been designed to withstand tornado wind velocities of 225 mph acting concurrently with rapid pressure drop of 1.5 psi. The new EDG building has been designed to 360 mph and pressure drop of 3.0 psi.
- 2) Turkey Point Units 3 and 4 will commence unit shutdown 2 hours prior to the projected onset of hurricane force winds (75 mph sustained winds) arrive at the site.

The results of the above actions will insure that Turkey Point's vulnerability to a hurricane induced LOOP resulting in core damage from a postulated unit blackout is minimal.

It is the understanding of FPL that the Technical Evaluation Report (TER) attached to the SE is for information only. The Licensing basis for SBO for the Turkey Point plant is defined by the NRC's Safety Evaluation (SE). This was discussed and agreed upon in the August 30, 1990 meeting with the NRC.

- 2) SE Section 2.0 EVALUATION
SE Section 2.1 "STATION BLACKOUT DURATION"

FPL is interpreting the "duration" as defined in this section as the duration the Turkey Point plant must maintain both units in hot standby using one EDG. A coping analysis is not required pursuant to 10 CFR 50.63 (c) (2) therefore, FPL interprets this section of the SE not to be applicable to Turkey Point plant.

The evaluation presented in our March 1990 submittal is valid for a 4-hour duration of SBO. However, since existing plant equipment and operating requirements permit extending the duration to 8-hours, FPL accepts the 8-hour Alternate AC (AAC) duration.

FPL will verify that one EDG has sufficient AC power capacity (within the FSAR ratings of the EDGs) and capability to shutdown and maintain hot standby for units 3 and 4.

3) SE Section 2.2 ALTERNATE AC (AAC) POWER SOURCE

SE Section 2.2.1 GENERAL STAFF POSITION ON AAC POWER SOURCE

The capability and capacity of any one EDG as defined in the licensed design bases for Turkey Point units 3 and 4, is sufficient to place both nuclear units in hot standby after a LOOP (i.e., one-of-four redundancy is met for LOOP). The EDGs have been re-evaluated in accordance with SBO criteria for the purpose of maintaining hot standby in the event of a SBO. We have concluded that one EDG can maintain both units in extended hot standby after a LOOP; therefore, this qualifies the EDG as an alternate AC source.

The addition of two EDGs does not alter the design bases for the shared electrical system. The enhanced electrical design will permit AC power from any one of four EDGs to maintain both units in hot standby for an eight hour duration after a LOOP event.

It is our position that the alternate AC power source is capable of powering at least one train of "normal safe shutdown" (hot standby) systems and equipment on both units. This includes decay heat removal, battery charging, HVAC, emergency lighting, and the associated controls and instrumentation. Thus, the AAC source can support and maintain safe shutdown following SBO from the control room coupled with operator actions outside the control room.

4) SE Section 2.2.1.1 EDGs USED AS AAC POWER SOURCE

The TER (page 15) statement concerning loading additional equipment on the operable EDG (i.e. Residual Heat Removal (RHR) pump, computers, etc.) is inconsistent with the SBO rule requirements to load only safe shutdown loads. Consistent with NUMARC 87-00 guidance letter of May 7, 1990, the Turkey Point EDG load evaluation assumes that safety grade loads, required by the design bases for LOOP events to maintain both units in hot standby, will automatically load on the EDG. In addition, select non-safety grade loads (i.e., charging pumps, pressurizer heaters, etc.) will be manually loaded as necessary. FPL is interpreting "the full contingency of safety train loads" as those loads necessary to maintain hot standby after a LOOP event. These loads will be supplemented by other safety and non-safety grade loads the plant operators deem helpful to mitigate the unit blackout.

Turkey Point plant has no design bases requirements to depressurize after a LOOP. The SBO rule, NUMARC 87-00 and the licensing bases define safe shutdown as hot standby. For EDG evaluation purposes, we intend to maintain the units at hot standby for the eight hour duration. For units in hot standby, operating pressures and temperatures prohibit the use and operation of the RHR system.

Pursuant to the design bases of the Turkey Point nuclear units, the RHR system is placed into service when the Reactor Coolant System (RCS) is below 350°F and 450 psig. Our SBO loading evaluation will not consider mode changes during the eight hour period; therefore, the RHR system will not be used during this time. Based on the above, FPL will not include the RHR pump loads in the EDG load evaluation for SBO.

It is our position that operator actions, their associated training and operating procedures used to respond to a LOOP event and failure of three of four EDGs (unit blackout) will focus on achieving and maintaining hot standby for both units. Current FPL emergency procedures and operator training rely on a certain amount of operator action after a LOOP event and failure of one EDG. Operator actions and their training are fundamental tenets of the SBO rule and the guidance provided in NUMARC 87-00. A LOOP affects both units equally, as will a unit blackout. Operator action is required to maintain both units in hot standby for eight hours. Trained operators are an important and necessary part of the plant's response to any LOOP and concurrent unit blackout recovery plan. FPL maintains that operators can and will perform load management actions as required to maintain the necessary loads for safe shutdown while ensuring the EDG remains within its load rating. The SBO loading evaluation confirms that safe shutdown equipment will not need to be de-energized on one unit to provide additional capacity for loads on the other unit.

The term "normal equipment complement" is used in reference to the loads necessary for the non-blackout (NBO) unit to retain, while supplying the SBO unit with the necessary power. As agreed to with the NRC in the August 30th meeting we will define this term to mean "safe shutdown equipment".

5) SE Section 2.2.1.2 CONNECTABILITY OF AN AAC POWER SOURCE

It is our position that the SBO rule and NUMARC 87-00 guidance require the assumption of an arbitrary failure of one train (i.e. one EDG) of electrical redundancy on the non-blackout (NBO) as a means to qualify that unit's remaining EDG as an AAC source. Turkey Point Plant's response to a unit blackout does not consider, nor postulate, additional failures beyond the loss of three EDGs. It is our position that the SBO rule, the regulatory analysis (i.e., NUREG-1032) and R.G.1.155 do not require single failure nor do they require application of Appendix A single failure criterion. Failures beyond those which produce a unit blackout to qualify an AAC source on the NBO unit are not considered. Our analysis does not apply single failure criteria to the NBO unit concurrent with the EDG failures postulated.

6) SE Section 2.2.2 PROPOSED AAC POWER SOURCE

The design ratings of the most limiting EDG (proposed AAC power source) are provided in FSAR Section 8.2.3 "Emergency Power". FPL will not exceed the design ratings provided in the FSAR. As long as the EDGs are operated within these ratings, it is our position that the EDGs are not considered to be overloaded.

7) SE Section 2.3.4 Effects of Loss of Ventilation

As provided in our March 29, 1990 submittal (answer to question 9), HVAC systems for batteries, chargers, inverters, switchgear and charging pump rooms is provided and included in the EDG load list. FPL is presently evaluating select plant areas for additional SBO HVAC requirements. In the unlikely event that additional fans are required, FPL will include them in the load list and modify procedures as required. The EDG loading will be evaluated to ensure the EDG load rating is not exceeded.

8) SE Section 2.3.6 Reactor Coolant Inventory

Turkey Point Units 3 and 4 use AAC for safe shutdown during an SBO event. The generic Reactor Coolant Pump (RCP) leakage criteria of 25 gpm per pump (for plants with DC coping), was intended to address units that do not provide cooling to the RCP seals. As an AAC plant, Turkey Point Plant will commence cooling to the seals on the SBO unit shortly after energizing the intertie (in approximately 10 minutes). As a result, no seal damage is postulated and only normal seal leakoff need be assumed for the RCPs.