UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 259 TO FACILITY OPERATING LICENSE NO. DPR-52,

AND AMENDMENT NO. 218 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 2, AND 3

DOCKET NOS 50-260, AND 50-296

1.0 INTRODUCTION

On March 12, 1997, the Tennessee Valley Authority (TVA or the licensee) proposed that those Technical Specification (TS) sections for Browns Ferry Nuclear Plant (BFN), Units 2 and 3, that specify the Allowable Outage Time (AOT) for Emergency Diesel Generators (EDGs) be changed from 7 days to 14 days. This would permit vendor-recommended 12-year mechanical and electrical preventive maintenance (PM) activities to be performed in one EDG outage.

The staff's evaluation of the licensee's application encompassed a review of the information presented in the March 12, 1997 application, and in letters dated March 30, 1999, April 23, 1999, and June 18, 1999. The staff also considered information provided in the licensee's submittals dated June 19, 1997 and August 15, 1997 regarding a one-time extension of EDG AOT from 7 days to 14 days. The one-time extensions were approved as Amendments Nos. 250 and 209, respectively for Units 2 and 3.

An element of the licensee's supporting basis for the extension was stated to be that Unit 1 is in an indefinite nonoperational status, and, as a result, the facility can essentially be treated as a two-unit plant, each with four EDGs available for service. Accordingly, TVA did not request the same changes to Unit 1 TS. Prior to returning BFN Unit 1 to operation, TVA will provide additional justification for extending EDG AOTs for operating three units.

2.0 BACKGROUND

At the time of the application, the licensee was concerned that imminent 12-year PM activities could take longer than the currently allowed 7-day AOT, in which case it would have to schedule two separate maintenance activities of 7 days each; namely, one for the electrical PM and another for the mechanical PM. With eight EDGs at BFN, the licensee was concerned that multiple (16) maintenance activities could increase the potential likelihood of work-related errors arising out of repeated entering and exiting of limiting conditions for operations (LCOs). The PM for each EDG was subsequently performed while Amendments 250 and 209 were in effect. Thus the benefit of the proposed amendments would now apply to subsequent EDG outages.

3.0 DISCUSSIONS AND EVALUATIONS

The staff has reviewed the proposed extension of the TS AOT for an inoperable EDG at BFN, Units 2 and 3, using (1) the deterministic criteria of the Standard Review Plan, and (2) the probabilistic risk-informed criteria of Regulatory Guide (RG) 1.177. It is the staff's practice to consider risk and utilize RG 1.177 positions when evaluating an AOT or surveillance test interval (STI) extension. The licensee's application was treated as "risk-informed" because it involves an AOT extension.

3.1 Deterministic Evaluation

Industry experience with General Motors Electromotive Division (EMD) diesels indicates that the 12-year PM cycle for each diesel is estimated to require 13 days on a "two 8-hour shifts per day" work schedule. This is equivalent to a 10-day around-the-clock shift schedule. Since the licensee's in-house experience with the 12-year PM activities is limited by the infrequency of performance, the licensee believes that the predicted schedule duration has considerably more uncertainty than routinely conducted activities and could encounter unexpected delays, thus raising the potential for exceeding the LCO. The licensee believes that an extension of the 7-day EDG AOT to 14 days gives extra time for completing the task, thus reducing the risk of a TS forced reactor shutdown as a result of exceeding the 7-day LCO.

The licensee also believes that partitioning the 12-year EDG mechanical PM and electrical PM into two maintenance activities is not desirable from an overall EDG availability perspective since this approach removes the EDGs from service for a longer period of time than if the maintenance could be performed as a combined activity. This is because setup, restoration, and post-maintenance testing associated with the maintenance are often duplicative, and must be repeated each time the EDGs undergo maintenance. Subsequently, the licensee has estimated that the proposed combined outage approach can save 58 hours of outage time per EDG. For the eight EDGs, this is equivalent to a total of 464 hours (19.3 days), which represents a significant increase in overall EDG availability. With the proposed extension of an EDG AOT by a combined EDG PM, the EDG is available sooner to mitigate an accident, thus reducing the overall plant risk.

Additionally, previous work experience indicates that shorter EDG outages can be achieved by performing preventive maintenance while operating since work resources are focused on a single objective (e.g., EDG maintenance). This focus results in better planning of work, dedicated manpower allocation, and greater resource availability for contingency work. For these reasons, it is desirable to be able to perform EDG maintenance during power operations. Except for the 12-year EDG PM activities, the current 7-day AOT is generally sufficient to accommodate scheduled and unscheduled EDG maintenance. However, a 14-day AOT is also justifiable as a contingency provision for major unexpected EDG failures. It is expected this AOT would seldom be used since EDG operating experience indicates major failures are uncommon.

The licensee has provided a list of PM activities and PM duration to show the validity of its request. The staff has reviewed the list and concurs with the licensee that the overall EDG AOT

is less by combining two separate (mechanical and electrical PMs) 7-day EDG AOTs together into one 14-day AOT, increasing total EDG availability.

To support its contention that the duration of the extended period does not increase the plant risk significantly, the licensee provided the justifications listed in the following sections.

3.1.1 BFN Offsite Power Supply System

Plant auxiliary power for each unit at BFN is provided by its main generator through each unit's station service transformers during normal plant operation. If the unit is not operating, the plant's power is provided from the 500-kV switchyard (immediate offsite power source) through the main transformer and the unit station service transformers. There are seven 500-kV offsite power sources available. Power is also available from the 161-kV system via two common station service transformers (delayed offsite power source). In the event that all preferred offsite circuits from the 500-kV switchyard become unavailable, then it will result in an automatic transfer of safety-related loads to the common station service transformers. When no offsite power is available, safety-related loads will transfer to the EDGs.

Transmission system transient stability studies have been performed periodically to show the offsite power transmission system remains stable. Considering the large number of diverse generating units and strong transmission lines and interconnections, offsite power at BFN is highly reliable and stable; this, in turn, reduces the likelihood of the transmission system causing the loss of all offsite power. In fact, BFN has not experienced a complete loss of offsite power, a factor that further reduces the reliance on EDG power sources.

The licensee has made the following modifications to the power distribution system that further improved the reliability of the power distribution system:

(1) completion of Limestone 161-kV substation, improving the stability and capability of the 161 kV offsite power supply;

(2) installation of load tap changers on the common station service transformers, providing better voltage regulation on the plant offsite power distribution system;

(3) replacement of load tap changers on the unit station service transformers, recovering voltage faster during motor starting transients and regulating voltage better;

(4) addition of Watts Bar Unit 1, adding more generating capacity; and

(5) replacement of 250-V dc safety-related power batteries, improving BFN's shutdown capability, and installation of two new non-safety-related batteries, enabling transfer of non-safety loads previously fed from safety batteries.

3.1.2 BFN Onsite Power Systems

The BFN emergency onsite power system consists of eight EDGs and their associated distribution and transfer systems. The EDGs are arranged so that four provide standby power to

Units 1 and 2, and four provide standby power to Unit 3. Through the use of 4-kV Shutdown Buses 1 and 2, and the 4-kV Bus Tie Board, any EDG can be cross-connected with any 4-kV Shutdown Board and this alignment action can be performed from the control room. The arrangement provides considerable flexibility in supplying emergency ac power. Since BFN Unit 1 is in an indefinite non-operational status and will not be in service for the duration of the proposed TS, the facility can essentially be treated as a two-unit plant, each with four EDGs available for service. Therefore, the onsite power system at BFN has adequate redundancy and is capable of compensating for the EDG that is out of service.

The EDGs installed at BFN were manufactured by EMD. The PM program is based on the following EMD recommendation: (1) perform an extensive diesel engine disassembly every 12 years by removing pistons, cylinder liners, and connecting rods; and (2) refurbish or replace any mechanical or electrical components found to be excessively worn or damaged.

3.1.3 Usage of Proceduralized Risk Based Scheduling Maintenance

For planning maintenance activities, BFN uses a probability safety assessment (PSA) based on a dual unit maintenance matrix. The matrix identifies combinations of equipment that would increase risk above a predetermined criterion, if they are out-of-service simultaneously. These controls are proceduralized in the site work control procedure, Site Standard Practice (SSP)-7.1, "Work Control." Application of the maintenance matrix provides an additional administrative control to restrict removal of risk sensitive equipment from service beyond the restrictions in TS, minimizes equipment AOTs, and carefully controls other maintenance and testing activities during equipment outages. BFN has additional administrative controls in place related specifically to the entry of TS LCOs for EDGs. SSP-12.51, Appendix B, "Assessment of LCOs Related to Diesel Generator and Offsite Power Source Inoperability" must be performed prior to the LCO entry which verifies the availability of alternate train safety equipment and TS required offsite power sources.

3.1.3 EDG Availability

The licensee stated that the maintenance rule unavailability performance criterion for an EDG is 0.0342 (12.5 days per year). BFN also has set an EDG target unavailability goal of below 0.020 related to Institute of Nuclear Power Operations performance goals for safety equipment. Additionally, the target reliability for EDGs under the station blackout (SBO) rule is 0.95. From these goals, it is clear that there is considerable emphasis on maximizing EDG availability which can only be achieved by minimizing EDG outages. Therefore, while the proposed TS relaxes the current 7-day AOT, it is not expected that real EDG unavailability will significantly rise due to the emphasis placed on meeting the various EDG performance goals.

Increasing the allowable EDG AOT will likely increase EDG unavailability on the average since it is expected that the provision would occasionally be used to accommodate unplanned major EDG maintenance. However, a conservative PSA evaluation concluded that the risk contribution of the AOT extension is non-risk significant. For the 12-year EDG PM work activity, it is expected that the proposed TS would actually reduce unavailability since multiple outage would not be necessary to accomplish the maintenance activity.

3.1.4 Compensatory Measures

To limit other activities to minimize the potential for a loss of offsite power sources, and to maximize the availability of other onsite sources, the licensee implements the following compensatory measures during EDG maintenance outages:

(1) Ensures availability of an extra offsite power source available to the affected unit, above and beyond the two offsite sources required by the TS;

(2) Restricts work activities that could affect the ability to cross-tie the opposite EDG unit to the 4-kV shutdown board; and

(3) Restricts work activities on the 500-kV switchyard and stop scheduling high risk switchyard maintenance.

3.1.5 Staff Concerns

The staff was concerned that the major repair of an EDG including replacement of governor or voltage regulator would subsequently require pre-operational testing of that EDG at power. On March 30 and April 23, 1999, the licensee responded to the staff's request for additional information (RAI) dated November 17, 1998, summarized below:

The licensee stated that a single largest load rejection testing would be performed if the EDG governor or voltage regulator was replaced or if major maintenance work associated with these devices was performed. Load rejection testing would typically not be performed following 12-year vendor recommended PM. The single largest load rejection tests are performed with their respective 4-kV shutdown board isolated from the offsite power system and hence, the impact on plant electrical systems is minimal. These tests for EDGs A, C, 3B, and 3D are performed while Units 2 and 3 are in operation. However, these tests for EDGs B, D, 3A, and 3C are performed during refueling outages. Additionally, EDG testing following governor maintenance is performed in a graduated manner which reduces the likelihood of an unexpected transient on the EDG being tested. The EDG would not be reconnected to the main electrical system until testing has verified proper governor operation.

The staff informed the licensee in its RAI that because of the potential safety impact of extended outage time for an EDG, the staff believes that voluntary entry into an LCO action statement should not be scheduled when adverse weather is expected. On April 23, 1999, the licensee responded that the BFN safety philosophy would not allow risk significant maintenance to be planned or performed during periods when extreme bad weather is expected. The licensee committed to revise the plant procedure 0-TI-367, "BFN Dual Unit Maintenance," to prescribe that a scheduled EDG maintenance outage (outage length greater than 7 days) will be rescheduled if severe weather conditions are predicted. The staff finds the above response acceptable.

3.1.6 Findings - Deterministic Review

The staff evaluated the proposed change to extend the EDG AOT from 7 days to 14 days to ensure that the overall availability of the EDGs will not be reduced unnecessarily due to preventive maintenance activities. The staff concludes that the licensee's request for the 14-day EDG AOT to perform major maintenance is acceptable. Our conclusion is based on the following: (1) at BFN the 14-day EDG AOT reduces the entries into the LCO and reduces the number of EDG starts for major EDG maintenance activities; (2) implementation of procedures for risk-based maintenance scheduling; (3) improvements to the onsite distribution system; (4) no history of complete loss of offsite power events; and (5) improvements to the offsite power system that have been made to reduce the probability of an SBO. Further, we believe that precluding testing and maintenance of other electrical systems during the extended outage, and not scheduling preplanned maintenance when adverse weather is expected will reduce the likelihood of an SBO at BFN. Also, the staff finds that the change of the TS Bases Section is consistent with the requested EDG AOT extension and is therefore acceptable.

3.2 Probabilistic Evaluation

The staff also evaluated the net contribution of the change to overall plant risk due to the extended EDG AOT using the three-tiered approach of RG 1.177. The first tier evaluated the probabilistic risk assessment (PRA) model and the impact of the change on plant operational risk. The second tier addressed the need to preclude potentially high risk configurations if additional equipment will be taken out of service simultaneously or other risk significant operational factors such as concurrent system or equipment testing are involved. The third tier evaluated the licensee's configuration risk management program, to ensure that equipment removed from service prior to or during the proposed AOT will be appropriately assessed from a risk perspective. Each tier and associated findings are discussed below.

3.2.1 Tier 1: PRA Evaluation of AOT Extension

The Tier 1 staff review of the licensee's PRA with respect to EDG AOT extension involved two aspects: (1) evaluation of the PRA model and its application to the proposed AOT extension, and (2) evaluation of PRA results and insights stemming from the application.

3.2.1.1 Evaluation of PRA Model and Its Application to The EDG AOT Extension

The licensee's risk analysis used to support the proposed change is based on two PRA models. These PRA models are based on the Unit 2 PRA originally submitted to NRC on September 1, 1992, in response to Generic Letter (GL) 88-20, "Individual Plant Examination (IPE) for Severe Accident Vulnerabilities, November 1988." The IPE consisted of a Level 1 PRA which assumed only Unit 2 in operation and Units 1 and 3 shutdown. On September 28, 1994, the U.S. Nuclear Regulatory Commission (NRC) issued its staff evaluation report (SER) covering the BFN, Unit 2, PRA (Rev. 0). The SER concluded that TVA had provided the information sought by GL 88-20 for BFN, Unit 2, but requested that TVA address two potential containment performance improvement (CPI) enhancements for Unit 2 in the multi-unit analysis. Thus, the September 28, 1994, SER concluded IPE activities for BFN Unit 2, pending submission of additional information on the CPI enhancements.

BFN Units 1 and 3 IPE activities remained open pending receipt and review of additional information such as the Unit 2 Multi-Unit PRA (MUPRA). On April 14, 1995, TVA submitted the MUPRA, estimating the effect of operation of all three BFN reactors on core damage frequency for Unit 2. It was based on a revised version (Rev. 1) of the original (Rev. 0) Unit 2 PRA which was performed to account for plant changes since the IPE. The MUPRA submittal also provided the information requested by the staff in the September 28, 1994, staff evaluation addressing the two containment performance improvements items for Unit 2, closing out the IPE open items for that unit.

On June 19, 1997, the staff issued a request for additional information (RAI) to TVA subsequent to its review of the MUPRA for applicability to Unit 3. On August 6, 1997, TVA docketed a PRA for BFN Unit 3. This PRA assumed Unit 2 and Unit 3 operating and Unit 1 shutdown, and was based on the BFN Unit 2 model created in the MUPRA but modified to reflect BFN Unit 3 specific characteristics. On May 20, 1998, the NRC issued an SE on BFN Unit 3 PRA indicating the staff could not conclude, based on the combined review of the BFN Unit 3 PRA and the MUPRA, that GL 88-20 had been satisfied. TVA met with the staff on August 10, 1998 to discuss open items in that evaluation. On November 2, 1998, TVA submitted additional information in response to the staff's RAI issued on June 19, 1997. Based on this information, the staff concluded in the SER dated May 4, 1999, that the IPE process, including the BFN Unit 3 PRA, is capable of identifying the most likely severe accidents and severe accident vulnerabilities at Unit 3, thus meeting the intent of GL 88-20. However, the staff had noted that several weaknesses were found. These include no details provided for common cause failure modes, equipment failure rates employed in the analysis, the use of generic versus plant specific data, or internal flooding. In addition, the staff considered the lack of the back-end portion of the BFN Unit 3 IPE to be a weakness.

As noted previously, the licensee's risk analysis used to support the proposed EDG AOT extension is based on two current PRA models. These current PRA models are: (1) Unit 2 PRA model with Unit 3 operating, and (2) Unit 3 PRA model with Unit 2 operating. The licensee noted that these PRA models have been reviewed by the PRA Peer Review Certification team, sponsored by the Boiling Water Reactor Owner's Group in November 1997. The results of the peer review indicated that the BFN Unit 2 and Unit 3 PRAs were of "technical quality."

For front-end analysis, the BFN PRAs used a large event tree and small fault tree methodology. The RISKMAN computer code, developed by Pickard, Lowe, and Garrick, was used for quantification. The type of initiating events considered are generally consistent with other PRAs. The staff noted that electrical support systems such as ac and dc power were analyzed in the PRA, and no major deficiencies were identified. For common cause failures, the Multiple Greek Letter method was used and the associated parameters were generally consistent with other PRAs. In general, the database for the PRAs was based on both generic and plant-specific information. The staff, in its SER, reported that no significant problem or errors were found in the human reliability analysis. The IPE mean core damage frequency (CDF) for Units 2 (MUPRA) and 3 were reported to be of 3E-5/year and 9E-6/year, respectively. However, the licensee reported that CDF for Units 2 and 3 were re-evaluated for the EDG TS AOT submittal. The baseline CDF was reported to be about 5E-6/year for Unit 2 and 8E-6/year for Unit 3. The loss of offsite power initiator contributed approximately 39% of the baseline CDF for Unit 2 PRA (MUPRA) and 23% for Unit 3 PRA.

The Level 2 portion of the original IPE was not reported to be revised. However, the licensee performed calculations to estimate the large early release frequency (LERF) impact from the proposed extended EDG TS AOT. In the Unit 2 IPE, the translation of the Level 1 accident sequences into Level 2 Containment Event Tree and accident release characteristics was performed by mapping each of the accident sequences into Plant Damage States (PDS). The PDS were defined by the condition of the plant at the end of the Level 1 analysis. The staff review of the IPE found that BFN had made reasonable use of probabilistic techniques in performing the back-end analysis, and that the techniques employed are capable of identifying plant vulnerabilities. The licensee's submittal for EDG TS AOT indicated that the LERFs were about 1.6E-6/year for Unit 2 and about 2.5E-6/year for Unit 3.

The licensee's submittal also provided recent EDG unavailability data. The licensee indicated that the EDG unavailability data that have been updated from the Maintenance Rule database from June 1994 through February 1999 for all eight EDGs also includes the actual unavailability due to the 12-year vendor recommended preventive maintenance outages for all eight EDGs since these 12-year outages occurred during this period. The total EDG unavailability was reported to be 0.01660 per EDG which is comprised of an average planned unavailability of 0.01374 and an average unplanned unavailability of 0.00286. The staff noted that this unavailability is below the Maintenance Rule EDG unavailability performance criterion of 0.0342.

In addition to the information provided in the licensee's submittal for EDG TS AOT extension request, the staff reviewed parts of the Unit 2 IPE, the MUPRA, submittals pertaining to Unit 3 PRA, and previous staff evaluation reports that were relevant to examining the risk associated with the proposed AOT. The staff also considered the weaknesses identified in the IPE staff review and concluded that they do not pose significant impact on the risk analysis of the proposed AOT.

The staff did not identify any significant deficiencies associated with the BFN risk analysis to support the proposed TS AOT change. Therefore, the staff considers the licensee's risk analysis for the proposed EDG TS AOT extension to be of sufficient quality for the proposed application.

3.2.1.2 Evaluation of Risk Analysis Results and Insights

The licensee reported their baseline CDF estimates to be about 4.69E-6/year for Unit 2 and about 7.87E-6/year for Unit 3. The licensee estimated that the annual average CDF associated with the proposed 14-day AOT is about 4.74E-6/year for Unit 2 and about 7.96E-6/year for Unit 3. These figures represent Δ CDF of about 4.5E-8/year for Unit 2 and about 9.1E-8/year for Unit 3.

The baseline LERF was estimated to be about 1.58E-6/year for Unit 2 and about 2.52E-6/year for Unit 3. The annual average LERF associated with the proposed 14-day AOT was reported to be about 1.6E-6/year for Unit 2 and about 2.54E-6/year for Unit 3. These estimates represent Δ LERF of about 2E-8/year for both Units 2 and 3.

The incremental conditional core damage probability (ICCDP) estimated by the licensee was about 3.7E-8 for Unit 2 and about 6.2E-8/year for Unit 3. The incremental conditional large early

release probability (ICLERP) was estimated to be about 1.2E-8/year for Unit 2 and about 1.9E-8/year for Unit 3.

The staff finds that all of the above estimates (ΔCDF, ΔLERF, ICCDP, ICLERP) are small and are within the guidelines in RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis" and RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decision Making: Technical Specifications."

3.2.2 Tier 2: Avoidance of Risk Significant Plant Configurations

The second tier addresses the need to preclude potentially high risk configurations, should additional equipment outages occur during the AOT period. The licensee noted that any proposed system configurations are compared against the dual unit maintenance risk matrix contained in 0-TI-367 to determine if the proposed configuration is risk significant. This dual unit maintenance risk matrix is based on the current BFN PRA models and is color coded to alert the work scheduler to potential risk significant plant configurations.

The licensee did not identify additional TS restrictions or compensatory measures required to avoid potential risk significant configurations during an EDG outage. However, the licensee proposed additional procedural controls associated with severe weather conditions. The licensee stated that they would not allow risk significant maintenance to be planned or performed during periods when extreme bad weather is expected. The licensee committed to formalize this philosophy by revising plant procedure, 0-TI-367, BFN Dual Unit Maintenance, to prescribe that a scheduled EDG maintenance outage will be rescheduled if severe weather conditions are predicted. Therefore, the staff finds that the planning procedures are adequate to preclude potentially high risk plant configurations.

3.2.3 Tier 3: Risk-Informed Plant Configuration Management

RG 1.177 states that Tier 3 addresses the evaluation of the licensee's configuration risk management program (CRMP) to ensure that equipment removed from service immediately prior to or during the proposed AOT will be appropriately assessed from a risk perspective. With respect to this aspect of evaluating risk associated with the proposed EDG TS AOT extension, the licensee stated, in its April 23, 1999 letter, that development of a RG 1.177 type CRMP is not necessary at this time and that it would be more appropriate to postpone development of a CRMP until the revised Maintenance Rule is revised.

By a letter dated June 18, 1999, TVA reconsidered the April 23, 1999 position and revised the application to include a CRMP. The licensee committed to include, in the Technical Requirements Manual, a CRMP which provides a proceduralized risk-informed assessment to manage the risk associated with the inoperability of other equipment in the event an EDG is inoperable. The licensee's program includes elements consistent with those contained in the model CRMP provided in RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications." These include:

(a) Provisions for control and implementation of a Level 1 at-power internal events PRA-informed methodology. The assessment is to be capable of evaluating the applicable plant configuration

(b) Provisions for performing an assessment prior to entering the plant configuration described by the LCO Action Statement for preplanned activities.

(c) Provisions for performing an assessment after entering the plant configuration described by the LCO Action Statement for unplanned entry into the LCO Action Statement.

(d) Provisions for assessing the need for additional actions after the discovery of additional equipment out-of-service conditions while in the plant configuration described by the LCO Action Statement.

(e) Provisions for considering other applicable risk-significant contributors such as Level 2 issues and external events, qualitatively or quantitatively.

The licensee also stated that this CRMP is identical to that of the licensee's Sequoyah Nuclear Plant which we approved in amendments to those facilities' TS. These CRMP elements are consistent with the guidance provided in RG 1.177.

For scheduled online maintenance, risk is controlled through a 12-week rolling schedule. A schedule of sequenced work windows is established for online periods when combinations of plant systems can acceptably be out of service to perform preventive maintenance and surveillance activities. The predetermined work windows incorporate risk assessments to determine potential impacts to the safe and reliable operation of the unit and assures long-term maintenance activities are performed within required frequencies to maximize plant equipment and component availability. Within each schedule week, proposed system configurations are compared against the dual unit maintenance risk matrix contained in Procedure 0-TI-367 to determine if the proposed configuration is significant to risk.

The dual unit maintenance risk matrix is based on the current BFN PSA models and is color coded to alert the work scheduler to potential risk significant plant configurations. Prior to scheduling any work which could result in a risk significant configuration per the dual unit maintenance matrix, Engineering is contacted to perform a more detailed evaluation of the proposed configuration for risk significance. Similarly, if emergent work results in a risk significant configuration, a priority work request is generated to correct the situation and Engineering would evaluate the situation for risk significance. Additionally, BFN has also recently installed SENTINEL, an Electric Power Research Institute online risk management computer program tool to assist in the management of online risk.

The staff finds that the licensee's program to control the risk associated with the activities regarding EDG outages is consistent with RG 1.177. Therefore, the staff concludes that the licensee has met the intent of the Tier 3 guidance.

3.2.4 Findings of Probabilistic Evaluation

The staff finds that the risk analysis methodology and approach used by the licensee to estimate the risk impact were reasonable, and the risk impact, measured in ΔCDF, ΔLERF, ICCDP, and ICLERP, of the proposed change is small. The licensee also has an appropriate CRMP to evaluate the combined risk effects of inoperabiity of other equipment when an EDG is inoperable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Alabama State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (64 FR 35211). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The staff has reviewed the proposed changes to modify the EDG AOT from 7 days to 14 days from deterministic and probabilistic perspectives. Based on the findings of these evaluations, the staff has concluded that the results and insights of the PRA analysis (Tier 1 and 2) and the deterministic evaluation support the proposed EDG AOT extension from 7 to 14 days for BFN, Units 2 and 3.

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