VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

September 1, 1995

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC. 20555

Serial No. 95-430
NL&P/MAE: R7
Docket Nos. 50-338
50-339
License Nos. NPF-4
NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 and 2
PROPOSED TECHNICAL SPECIFICATIONS CHANGES
EMERGENCY DIESEL GENERATOR ALLOWED OUTAGE TIME

Pursuant to 10 CFR 50.90, the Virginia Electric and Power Company (Virginia Power) requests amendments, in the form of changes to the Technical Specifications, to Facility Operating License Nos. NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes will allow a single outage of up to 14 days for each emergency diesel generator (EDG) once every 18 months. The purpose of the outage is the performance of a preventive maintenance inspection which requires disassembly of the EDG. The proposed changes permit this maintenance inspection to be performed during operation. Currently, this maintenance inspection is performed during shutdown.

The alternate A. C. diesel was installed in response to 10 CFR 50.63 and is designed to support the postulated 4 hour station blackout. The alternate A. C. diesel will be required to be available during the proposed 14 day outages, and will be governed by the Technical Specifications under certain specified conditions.

The overall at-power annual core damage frequency increase associated with the proposed Technical Specifications changes is considered to be non-risk significant as defined by the draft Nuclear Energy Institute (NEI) Probabilistic Safety Assessment Applications Guide. Allowing the EDG preventive maintenance during operation will increase the availability of the EDGs while a unit is shutdown, and therefore decrease the risk of core damage during this time. In addition, the EDGs will have a higher availability during loss of off-site power events at shutdown, which will improve required safety system availability in these events. Currently, one EDG is inoperable for a majority of the outage.

In addition to being non-risk significant, these proposed Technical Specifications changes provide a cost savings of greater than 1.4 million dollars per year. Therefore, the proposed Technical Specifications changes are being submitted as part of our Cost Beneficial Licensing Actions (CBLA) program and comply with the NRC guidelines for consideration as a CBLA.

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A change is also being requested to Technical Specification 4.8.1.1.2.d.1, which requires that the EDG be subjected to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for its class of standby service, which was added to the North Anna Unit 1 Technical Specifications by license amendment No. 83 on August 22, 1986. The requirement was consistent with the guidance in NRC Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," dated July 2, 1984. The same requirement was incorporated in the original issuance of the North Anna Unit 2 Technical Specifications, dated August 21, 1980. The changes will allow the flexibility to perform these inspections in a more efficient manner.

A discussion of the proposed Technical Specifications changes is provided in Attachment 1. The proposed Technical Specifications changes are provided in Attachment 2. It has been determined that the proposed Technical Specifications changes do not involve an unreviewed safety question as defined in 10 CFR 50.59 or a significant hazards consideration as defined in 10 CFR 50.92. The basis for our determination that these changes do not involve a significant hazards consideration is provided in Attachment 3. Attachment 4 is the North Anna Power Station Units 1 and 2 Emergency Diesel Generator Preventive Maintenance Inspection Outage Probabilistic Safety Assessment. The proposed Technical Specifications changes have been reviewed and approved by the Station Nuclear Safety and Operating Committee and the Management Safety Review Committee.

Virginia Power requests approval of the proposed Technical Specifications changes in order to support the upcoming Unit 1 refueling outage which is currently scheduled to begin on February 9, 1996. Should you have any questions or require additional information, please contact us. To facilitate your review, we will be available to meet with you at your earliest convenience.

Very truly yours,

James P. O'Hanlon

James P. O' Hanlon
Senior Vice President - Nuclear

Attachments

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COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by J. P. O'Hanlon, who is Senior Vice President - Nuclear, of Virginia Electric and Power Company. He is duly authorized to execute and file the foregoing document in behalf of that Company, and the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 1ST day of September, 1995.

My Commission Expires: May 31, 1998.

Vicki L. Hull
Notary Public

(SEAL)

Attachment 1

Discussion of Changes

Discussion of Changes

Introduction

Virginia Electric and Power Company (Virginia Power) proposes to change the North Anna Units 1 and 2 Technical Specifications to allow a single outage, up to fourteen (14) days, for each emergency diesel generator (EDG), once every eighteen (18) months. The purpose of the outage is the performance of a preventive maintenance inspection, appropriate for diesels used for this class of standby service, which requires disassembly of the EDG. Currently this maintenance inspection is performed during refueling outages. The proposed changes permit this maintenance inspection to be performed during Modes 1 to 4 in addition to the current allowance during Modes 5 or 6.

A probabilistic safety analysis (PSA) has been performed which demonstrates that a fourteen (14) day maintenance inspection outage, once every eighteen (18) months for each EDG, results in no significant change in core damage frequency assuming adequate compensatory measures are in place. The compensatory measures include requirements that the other EDGs, off-site power supplies, and the alternate A.C. diesel (AAC DG) be operable during the preventive maintenance inspection outage.

A safety evaluation has been completed which concluded that performing this EDG maintenance inspection during Modes 1 to 6 would not result in an unreviewed safety question. Finally, the effect of the proposed change has been calculated to be an increase in core damage frequency of approximately 1E-6 per year, which is not considered to be a significant change (i.e., an acceptable change in risk, or a non-risk significant change) from the baseline core damage frequency of 4.1E-5.

Background

Current Licensing Basis

The Technical Specifications currently require that two EDGs be operable during Modes 1 to 4 for each unit. A 72 hour action statement is provided to restore an inoperable EDG to operable status, as appropriate, while in Modes 1 to 4. The Technical Specifications require that one EDG be operable during Modes 5 and 6 for each unit, and also require an extensive inspection of each EDG every 18 months during Modes 5 and 6.

The AAC DG was installed in response to 10 CFR 50.63 and in conformance with Regulatory Guide 1.155. The AAC DG is designed to support the postulated 4 hour

station blackout. There are no Technical Specification requirements concerning the AAC DG.

Technical Specification 3.0.5 states that when a system, subsystem, train, component, or device is determined to be inoperable solely because its emergency power source is inoperable, or solely because its normal power source is inoperable, it may be considered OPERABLE for the purpose of satisfying the requirements of its applicable Limiting Condition for Operation, provided: 1) Its corresponding normal or emergency power source is OPERABLE, and 2) All of its redundant system(s), subsystem(s), train(s), component(s), and device(s) are OPERABLE, or likewise satisfy the requirements of the Specification.

The Bases Section for Technical Specification 3.0.5 states the time limits for continued operation to be consistent with the ACTION statement for the inoperable EDG, provided the other specified conditions are satisfied. Examples are provided.

The Bases Section for Technical Specification 3/4.8.1 and 3/4.8.2 discusses the operability of the A.C. and D.C. power sources and associated distribution system during operation to ensure that sufficient power will be available to supply safety related equipment.

The Electrical Power System is described in Section 8 of the North Anna UFSAR.

Current Design Basis

The Emergency Electrical Power (EE) system provides a highly reliable power source to Class 1E loads and certain non-Class 1E loads during all plant conditions. The EE system consists of two redundant power distribution systems. One system is referred to as the H Train (orange) system. The other system is referred to as the J Train (purple) system. Each EE system train consists of a 4160V switchgear, two 480V load centers, and 480V MCCs, which supply power to motors, motor-operated valves (MOVs), heaters, lighting, and other loads, which are required to be powered during normal and design basis event plant operating conditions. Each train is normally energized continuously from the switchyard external grid system. This preferred power supply is available from the reserve station service transformers (RSSTs) via the transfer buses.

Upon loss of the switchyard "preferred power supply," each EE system train is supplied by a "standby power supply," which consists of one of the four EDGs at North Anna Power Station (two per unit). Each 100-percent capacity EDG is connected to its assigned train and is available to pick up load within 10 seconds after receipt of a start signal.

Each of the four EDGs installed at North Anna Power Station were manufactured by Fairbanks-Morse. An extensive maintenance inspection of each EDG is performed every 18 months. Currently, this maintenance is performed during shutdown conditions as required by Technical Specifications. Virginia Power has determined that this maintenance can now be performed during any mode (i.e, Modes 1 to 6) with no significant increase in core damage frequency because of completion of the AAC DG installation.

The EDGs are part of the Emergency Generator (EG) System which provides a reliable source of emergency electrical power to Engineered Safeguards Features (ESFs) and other essential loads in the event of a Loss of Off-site Power (LOOP). Each EDG independently powers a train of safety-related equipment, thereby providing redundancy in the event of a loss of an EDG. Each EDG on a unit will automatically start with a pre-set time delay upon sensing either degraded voltage on its associated 4kV bus or an improper 4kV supply breaker lineup. Then, an EDG's output breaker automatically closes, and loads sequentially connect to the emergency bus provided 1) the residual voltage on the bus is less than 30 percent, 2) a degraded or undervoltage condition exists, 3) the 4kV buses are aligned properly, 4) the EDG volts are greater than 95 percent, and 5) the EDG output breaker lock-out and EDG differential breaker relay are reset.

In order to comply with 10 CFR 50.63, the station blackout rule, a fifth diesel generator, AAC DG was recently installed at North Anna. The AAC DG is a Caterpillar 3612, four cycle, turbocharged, after-cooled, diesel engine. The AAC DG operates at 900 RPM, 4640 horsepower, and is capable of producing 3300 electrical kilowatts on a continuous basis. In addition, the engine is capable of a "2000" hour rating of 3640 kilowatts. The AAC DG may be started by local operator action or by receiving an auto start signal following the simultaneous loss of the D or E and F transfer buses. This logic will prevent unnecessary diesel starts when a single emergency bus is lost (one RSST) on a unit, while providing a diesel start when the potential exists for a station blackout (i.e., loss of both emergency buses on a unit). After it has started, the diesel will be available for manual loading onto any single emergency bus.

Discussion

A probabilistic safety assessment (PSA) was performed to evaluate the impact of the extended unavailability of the EDGs. The North Anna PSA model, which is referred to as the "95JUNE" model, was developed by upgrading and enhancing the Individual Plant Examination (IPE) model in order to better represent the current electrical configuration of North Anna Power Station. The "95JUNE" model includes:

- Update of the plant specific EDG unavailability data used in the IPE to reflect the operating practices during the last five years.
- Development of a detailed as-installed model of the AAC DG.

In order to quantify the change in core damage frequency with the EDG unavailability increased to include a 14-day maintenance inspection outage once every 18 months another PSA model was created. This model was called "EDG-AOT".

A more complete discussion of the PSA models and results are provided in the attached report, "North Anna Power Station Units 1 and 2, Emergency Diesel Generator Preventive Maintenance Inspection Outage." The report presents a discussion of the results in addition to event trees and key fault trees.

The PSA assumed that the AAC DG is OPERABLE during the EDG maintenance inspection outage. The operability of the AAC DG is proposed as a requirement of the Technical Specifications when the inspection outage is performed in Modes 1 to 4. The specific sub-systems which must be OPERABLE to ensure that the AAC DG is OPERABLE are administratively controlled by station documents. The other three EDGs (from both units) were also assumed to be OPERABLE during the EDG maintenance inspection outage, along with off-site A.C. power sources. The operability of the EDGs and the AAC DG is controlled by the proposed action statements for Technical Specification 3.8.1.1. The operability of off-site A.C. power sources is controlled by existing action statements for Technical Specifications 3.8.1.1. If the AAC DG, any of the other three EDGs, or off-site power sources become inoperable during an EDG's maintenance inspection outage, the appropriate 72-hour action statement becomes effective.

The PSA model assumes that the other risk significant equipment is unavailable on a random, average annual basis in compliance with Technical Specifications. At North Anna, on-line maintenance is performed in an integrated fashion so that all risk significant components are considered. Administrative controls ensure that equipment scheduled for on-line maintenance is determined in a way that minimizes risk due to simultaneous outages of equipment. These same administrative controls are to be used during the EDG maintenance inspection outage when it is performed during operation.

The PSA analysis demonstrated that there is no significant increase in core damage frequency due to performing the EDG maintenance inspection when the unit is on-line. The increase due to the extended EDG outage was approximately 1E-6/yr as shown in Table 1. The current CDF for North Anna Unit 1 with increased EDG unavailability is 4.2E-5/year as compared to the IPE CDF of 6.8E-5/year.

Table 1 - Summary Of Results		
Model Name	**AAC DG Yes/No**	**CDF /year**
IPE	No	6.8E-5
95JUNE	Yes	4.1E-5
EDG-AOT	Yes	4.2E-5
*95JUNE is the current base model, and EDG-AOT is the same as 95JUNE model including a 14-day EDG preventive maintenance inspection outage per EDG		

In order to implement the proposed operational strategy, the Technical Specifications must be changed to permit the additional EDG unavailability. Several changes to the specifications are proposed. The changes are required in order to define the revised outage time and the conditions upon which the associated limiting condition for operation action can be entered. The revisions specify operability requirements for the combinations of A.C. Sources which must be OPERABLE during the EDG outage. Operability of the AAC DG is required by the Technical Specifications with the definition of operability administratively controlled by station documents.

Specific Changes

The specific Technical Specification changes described below apply to both Unit 1 and 2. In addition to the specific changes described below, editorial changes have been made to define the distinction between the EDG and the AAC DG. So, in general, the words "diesel" and "generator" do not appear in the Technical Specifications without an adjective to describe which type of generator is being discussed.

TS 3.8.1.1 Replace Existing Action Statement b With The Following

b. With one EDG of 3.8.1.1.b inoperable, demonstrate the OPERABILITY of the off-site A.C. power sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter. If the EDG is inoperable due to any cause other than an inoperable support system, an independently testable component, or preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE EDG by performing Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours*, unless the absence of any potential common mode failure for the remaining EDG is demonstrated. In addition,

1. Restore the EDG to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, or

2. If the EDG is inoperable for the performance of Surveillance Requirement 4.8.1.1.2.f, restore the EDG to OPERABLE status within 14 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. This action can only be applied once every 18 months for each EDG, and

   Within 14 days prior to declaring an EDG inoperable for the performance of Surveillance Requirement 4.8.1.1.2.f, demonstrate that the alternate AC diesel (AAC DG) is OPERABLE, and

   If the AAC DG becomes inoperable during the performance of Surveillance Requirement 4.8.1.1.2.f, restore the AAC DG to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, and

   If either of the opposite unit's EDGs become inoperable during the performance of Surveillance Requirement 4.8.1.1.2.f, restore the opposite unit's EDGs to OPERABLE status within 72 hours or place this unit in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, and

   The provisions of Specification 3.0.4 are not applicable.

Delete Surveillance Requirement 4.8.1.1.2.d.1

Renumber the remaining surveillance requirements 4.8.1.1.2.d.1 through 4.8.1.1.2.d.10.

New Surveillance Requirement (SR) 4.8.1.1.2.f

f. Once per 18 months during any mode of operation, by subjecting each EDG to a preventive maintenance inspection in accordance with maintenance procedures appropriate for diesels used for this class of standby service.

Bases for TS 3.0.5

Change the words "a 72 hour" to "an" in the second sentence in the third paragraph. The new sentence should read, "The ACTION statement provides for an out-of-service time when one emergency diesel generator is not OPERABLE.

Bases for TS 3/4.8.1 and 3/4.8.2

The following three paragraphs are to be added after the second paragraph.

The fourteen day outage permitted once each 18 months per EDG for performance of a preventive maintenance inspection during power operation has been shown to have no significant impact on core damage frequency, providing the Alternate A.C. Diesel Generator (AAC DG) is OPERABLE as defined in administratively controlled station documents. Removal of other components from service during this time shall be governed by administrative procedure.

If the AAC DG is inoperable during the fourteen day period of EDG inspection, the OPERABILITY of the remaining EDG need not be demonstrated, since the AAC DG was designed and purchased according to specifications which adequately insure that common cause failure is not likely.

When one EDG is inoperable due to the fourteen day preventive maintenance inspection the three other EDGs and the AAC DG are required to be OPERABLE. The AAC DG is ensured OPERABLE by action statement b for Technical Specification 3.8.1.1. The other EDG on the same unit is ensured OPERABLE by action statement b for Technical Specification 3.8.1.1. The opposite unit's EDGs are ensured OPERABLE by action statement b for Technical Specification 3.8.1.1 of that unit.

Safety Significance

The safety significance of this operating strategy lies in the tradeoff between performing the maintenance during any mode versus at shutdown. The contribution to core damage frequency for each scenario is given below.

Core Damage Frequency At Power

The PSA shows that the core damage frequency increases by approximately 1E-6/yr if a 14-day outage occurs once every 18 months for each EDG. This is not significant and is only a small fraction (~10%) of the decrease in CDF realized from the installation of the AAC DG.

The study presented in the attached report shows the electrical transients initiating event group accounts for the majority of the change in core damage due to the AAC DG or due to varying the EDG unavailability. The availability of other highly reliable sources of A.C. power (i.e., off-site power and the EDGs) is the primary reason why the impact is small. Even when a low truncation limit of 1E-10 is used, the AAC DG or EDG failures only appear in top cut sets for sequences which start with the loss of off-site power as the initiating event. LOCAs and general transients are not as sensitive to the AAC DG or to EDG maintenance unavailability.

Shutdown Risk Improvement

If the Technical Specification change request is approved, the 14 day EDG maintenance inspection will typically be performed during Mode 1. This will mean a decrease in the EDG unavailability during Modes 3 to 6. Hence, any increase in risk associated with the inspection performed in Modes 1 to 2 is offset to some extent by the reduced risk of core damage during Modes 3 to 6. This effect is positive (i.e. overall CDF decreases) because the units typically will have both EDGs OPERABLE during shutdown outages. So, the EDGs will not only be available for the shutdown unit but also available to provide power for cross-connecting the charging pumps between the units for recovery of the operating unit, if required.

A shutdown PSA has not been performed for North Anna. However, a shutdown PSA was performed for Surry Power Station that is documented in NUREG/CR-6144. The Surry shutdown PSA found only reduced inventory plant operational states were significant contributors to core damage frequency. The study also found that "maintenance unavailability was the dominant cause of equipment unavailability" during the reduced inventory states. In this study the EDGs were defined to be part of the minimum equipment list for reduced inventory situations so they were assigned no maintenance unavailability.

The above Surry shutdown PSA was used along with a full power PSA to look specifically at the impact of EDG maintenance at power and during shutdown. The results of the comparison are reported in NUREG/CR-5994. This study shows that the change in CDF due to an EDG being in maintenance is the same as, or more significant, during most shutdown operational configurations than when the EDG maintenance is performed at power. This study indicates that some EDG maintenance at power is risk beneficial. The fourth EDG and the AAC DG at North Anna were not included in NUREG/CR-5994. However, it may be concluded that some shutdown risk is averted by doing the EDG preventive maintenance inspection at power.

Summary and Conclusions

The use of the AAC DG as a source of emergency power during the performance of the 18 month EDG inspection was evaluated and found to be acceptable, since the increase in core damage frequency was insignificant (~1E-6/yr) compared to the reduction (~1E-5/yr) in CDF associated with installation of the AAC DG. AAC DG operability and pre-inspection testing are analysis assumptions. All of the increase in CDF comes from the increased contribution of loss of off-site power scenarios. LOCAs, SGTR and other transients are unaffected by the increased EDG unavailability.

The proposed changes have been reviewed against the criteria of 10 CFR 50.59. This review concluded that these changes raise no unreviewed safety questions. The basis for this determination is as follows:

a. Operation under the proposed Technical Specifications changes does not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report. The PSA performed to support the proposed Technical Specifications changes showed no significant change in the core damage frequency as a result of this change to permit a single, fourteen (14) day diesel generator outage every eighteen (18) months. The proposed change permits a limited, specific increase in the time that operation in Modes 1, 2, 3 or 4 can occur with only one EDG OPERABLE. As a compensatory measure the AAC DG is assumed to be OPERABLE during this time. As a result of this reliance upon the AAC DG as a backup for an EDG when it is out-of-service for this special inspection, the core damage frequency was calculated to increase by approximately 1E-6/yr. Thus, operation with slightly increased EDG unavailability due to maintenance and the AAC DG OPERABLE results in no significant change in core damage frequency.

b. The proposed Technical Specifications changes do not create the possibility of an accident or malfunction of a different type than any evaluated previously in the safety analysis report. The proposed Technical Specification changes modify the operability of an EDG for a limited and defined period of time. The UFSAR accidents are analyzed assuming that loss of an EDG is the worst single failure. The probabilistic safety analysis (PSA) expands this analysis with the consideration of multiple failures rather than the single worst case failure. The UFSAR also analyses specific accident initiators. The PSA considers these accident initiators and others which were included for the Individual Plant Examination. No new initiators were defined as a result of a review of the PSA model. Therefore, it is concluded that no new or different kind of accident or malfunction from any previously evaluated has been created.

c. The proposed Technical Specifications changes do not result in a reduction in margin of safety as defined in the basis for any Technical Specifications. The PSA was performed to evaluate the concept of increased EDG unavailability due to performing the preventive maintenance inspection during power operation. The results of the analysis show no significant change in the core damage frequency if the contingency actions are followed. As described above the proposed Technical Specifications changes only modify the operability of an EDG for a limited and defined period of time. The PSA demonstrates that operation with increased EDG maintenance unavailability is acceptable.

<u>References</u>

Letter from W.L. Stewart (Virginia Power) to NRC, "Response to Generic Letter 88-20 and Supplement 1 Individual Plant Examination(IPE) for Severe Accident Vulnerabilities", With Attached IPE Report, December 14, 1992.

Letter from W.L. Stewart (Virginia Power) to NRC, "Response to Generic Letter 88-20 and Supplement 4 Individual Plant Examination of Non-Seismic External Events and Fires ", With Attached Final Report, June 28, 1992.

NUREG/CR-6144,"Evaluation of Potential Severe Accidents During Low Power and Shutdown Operations at Surry, Unit 1," Executive Summary, pp xxxii-xxxiii, June 1994.

"Emergency Diesel Generator: Maintenance and Failure Unavailability, and Their Risk Impacts," NUREG/CR-5994, Chapter 5, November 1994.

Attachment 2

Technical Specifications Changes