

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

November 18, 1997

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

Serial No. 97-648
NL&OS/ETS: R0
Docket Nos. 70-338
50-339
License Nos. NPF-4
NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
REQUEST FOR ADDITIONAL INFORMATION CONCERNING
EMERGENCY DIESEL GENERATOR ALLOWED OUTAGE TIME

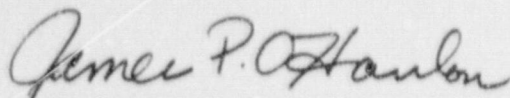
On September 1, 1995, Virginia Electric and Power Company requested amendments, in the form of changes to the Technical Specifications and to Facility Operating License Numbers NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes would permit a single outage of up to fourteen days for each emergency diesel generator once every eighteen months in order to perform preventative maintenance. Since that time, we have discussed the basis for and the implementation of the Technical Specifications changes with the NRC staff on several occasions. On November 13, 1996, the Staff requested additional information to complete the review of the proposed changes and a change in format of the specification. The Attachments to this letter provide the requested information and the revised proposed Technical Specification changes to address the staff concerns. Attachment 1 provides the response to the questions, Attachments 2 through 5 provide the procedures, risk matrix and Technical Specifications changes requested by the Staff.

As requested by the Staff, the proposed changes have been revised to establish a 14 day allowed outage time applicable whenever the EDG is inoperable. The revised proposed Technical Specifications changes for the EDG fourteen day AOT, including the original administrative changes, are provided in Attachment 2. It has been determined that the revised proposed Technical Specifications changes do involve an unreviewed safety question as defined in 10 CFR 50.59, but not a significant hazards consideration as defined in 10 CFR 50.92. The basis for our determination that the proposed Technical Specifications changes do not involve a significant hazards consideration is included in Attachment 6. The revised proposed changes have been reviewed and approved by the Station Nuclear Safety and Operating Committee and the Management Safety Review Committee.

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Should you have any questions or require additional information, please contact us.



James P. O'Hanlon
Senior Vice President - Nuclear

Attachments

1. Responses to Request for Additional Information
2. Discussion and Revised Technical Specifications Changes
3. Maintenance Operating Procedure 1-MOP-6.90
4. Configuration Risk Matrix
5. VPAP-2001 - Online Maintenance
6. Significant Hazards Consideration Determination

Commitment made in this letter:

1. Develop and implement a safety monitor for Surry and North Anna

cc: U. S. Nuclear Regulatory Commission
Region II
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Mr. M. J. Morgan
NRC Senior Resident Inspector
North Anna Power Station

Commissioner
Bureau of Radiological Health
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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 has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 18th day of November, 1997.

My Commission Expires: March 31, 2000.

Maggie McClure
Notary Public

(SEAL)

Attachment 1

**Request for Additional Information the North Anna 1/2
Application for Technical Specifications Change
on EDG Allowed Outage Time (AOT) Extension**

**Application for Technical Specifications Changes
on EDG Allowed Outage Time (AOT) Extension**

1. Proposed Technical Specification 3.8.1.1 Action b (Limiting Condition of Operation with one emergency diesel generator (EDG) inoperable) is unacceptable. This action statement must be rewritten such that the requested 14-day allowed time is always applicable when an EDG is inoperable for whatever reason - not just once every 18 months when an EDG is in special maintenance. Also, this action statement must be conditioned upon the Alternate AC Source (AAC) being operable and "connectable" (breakers required for alignment to inoperable EDG's bus are operable, control power is available, etc.). Also, if the AAC is not operable, allowed outage time is limited to the current 72 hours.

Response

Proposed Technical Specification 3.8.1.1 Action b has been rewritten as a 14-day action statement contingent upon the operability of the opposite unit's EDGs and the operability and connectability of the AAC source to the inoperable EDG's bus. The revised Technical Specification is included in Attachment 2 to this letter.

2. Proposed Technical Specification 3.8.1.1.b.2 states that the provisions of Specification 3.0.4 are not applicable. This is unacceptable to the staff. The licensee should remove this statement from the proposed Technical Specification.

Response

This statement has been removed from the revised proposed Technical Specification change. The revised Technical Specification is included in Attachment 2 to this letter.

3. The licensee should provide the actual out-of-service time needed to perform the planned EDG maintenance.

Response

Over the last 5 years we have averaged 10 to 12 days plus 1 day for testing. The shortest inspection/maintenance interval was 8 days and the longest 21 days.

4. Recently the staff has become concerned, due to the inadequate design at another power plant, about the adequacy of the DC voltage supply to the AAC. Specifically, the scenario of concern starts with the loss of offsite power and the loading of the EDG(s). If the battery charger for the DC supply to the AAC is not powered from an EDG-powered bus and the associated battery does not have

adequate capacity, the availability of the AAC source is questionable should all AC sources be subsequently lost. In light of this scenario, discuss the details of the power sources to the battery charger associated with the AAC source and the capacity of the charger and its associated battery.

Response:

The AAC power system is equipped with a DC power source that is electrically independent from the Station's safety-related power system. The AAC DC power source charger is powered from the AAC 480VAC MCC Bus 0M1-1. The AAC 480VAC distribution system is normally powered by either offsite power or station service power. Once the AAC diesel generator is running and powering its bus, the charger is powered from the DG. The battery is sized to power its normal loads for one (1) hour with the charger disabled and then support an SBO event prior to returning the charger to service. The minimum design requirement for the battery is to power the DC system for ten (10) minutes during a Station Blackout Condition.

Certain breakers required for connecting the AAC diesel generator to the Station emergency buses utilize DC control power from the existing Station 1E batteries. These Station batteries are sized to support its DC system for two (2) hours under accident scenarios and can support an SBO event for four (4) hours.

The EDG batteries have been verified to operate under Station Blackout Conditions for the four (4) hour event. The load profile assumes three (3) unsuccessful automatic starts (due to mechanical problems), followed by a continuous load and a final successful start at the end of the four (4) hour duty cycle. Field flashing will occur only upon successful mechanical start.

5. By letter dated April 12, 1996, the NRC requested additional information for review of your proposed changes to the North Anna Technical Specifications (TS). This request included a discussion of the three-tier approach the NRC staff expects licensees to utilize in proposing risk-based modifications. Tier one involves determination of the operational risk. Tier two involves assurance that risk-significant plant equipment outage configurations will not occur while the plant is subject to the Limiting Condition for Operation (LCO) for the proposed modification. The third tier assures that, before performing maintenance activities including removal of any equipment from service that the licensee performs a thorough assessment of the overall impact of the activity on safety functions of related TS activities. During the September 25, 1996 meeting between NRC staff and your staff, discussions involved how the three tiers are satisfied at North Anna. The following questions reflect our discussion of these items.

Tier 2

1. Please submit a copy of the procedure 1-MOP6.90 that list combinations of equipment that cannot be removed from service simultaneously.

Response

The procedure is included as Attachment 3 to the letter. This procedure provides guidance on equipment combinations which cannot be removed from service simultaneously when initiating this maintenance procedure. These initial conditions prohibit removing an EDG from service when the AAC DG is inoperable. Once the maintenance has been initiated, then on-line maintenance risk evaluations limit the equipment which can be simultaneously out of service.

Tier 3

2. Please submit a copy of the configuration risk management matrix discussed in the meeting and please discuss the probabilistic risk assessment basis of the matrix. In your explanation of the basis of the matrix, please explain how the elements of the matrix are determined and categorized.

Response

A copy of the most recent revision of the configuration risk matrix included in "Engineering Transmittal NAF-97-0024, Revision 26, PSA Evaluation of On line Maintenance Configuration Matrix North Anna Power Station Units 1 and 2," is included as Attachment 4 to the letter. This document is updated as additional configurations are identified and analyzed. Risk significant equipment are represented by rows on the matrix. The technical basis for the configurations is a complete computer solution of all fault trees and event trees. The first two columns provide the risk information related to the specific configuration. The remaining four columns on the same row provide results for one additional functional equipment group (FEG, e.g., equipment and its associated supporting equipment). The configuration plus one functional equipment group basis is a conservative analysis of the risk achievement worth (RAW) values for the basic events associated with the configuration analyzed. Engineering Transmittal NAF-97-0024 contains additional explanation of the elements of the matrix. Once a configuration is analyzed, the results are placed in the matrix. The station may re-enter that same configuration in the future by referring to the matrix.

3. How do you assess the resulting overall impact on safety functions when equipment that is not in the matrix is removed from service?

Response

This question can be interpreted to mean either: 1) how is equipment, which has no impact on CDF, evaluated when it is removed from service since the matrix is CDF based, or 2) how is the risk impact for unscheduled maintenance evaluated. Both viewpoints are discussed below.

The on-line maintenance configuration matrix includes equipment which can impact the core damage frequency by $1E-6$ or more if that equipment were to be removed from service. The low risk equipment which does not have an on-line maintenance risk important impact is not included in the matrix. However, defense-in-depth is maintained for this low risk equipment through the use of procedural guidance contained in VPAP-2001 and guidelines provided with the configuration matrix.

The matrix provides risk results for planned configurations in the first two columns. The remaining four columns on the same row provide risk results assuming one additional functional equipment group (FEG, e.g., equipment and all of its associated supporting equipment) is out of service. These final four columns are used to provide an estimate of the risk associated with unscheduled maintenance. Since work is planned on a daily basis, it is unlikely that more than one additional FEG will be removed from service due to emergent work. As the station prepares for the next day's work, the actual equipment configuration is taken into account and existing unscheduled maintenance incorporated into the analysis at that time. Therefore, unscheduled maintenance is initially estimated based on risk achievement worth. By the next day the impact is explicitly evaluated and additional maintenance is scheduled or deferred as necessary.

4. Please also explain and submit a copy of the procedural program in which the configuration risk management matrix is imbedded.

Response

The configuration risk management matrix is controlled by company procedure VPAP-2001 "Online Maintenance." A copy of the procedure is included as Attachment 5 to this letter. The procedure defines the intended use of and limitations of the matrix. In particular, the procedure defines the duration of outages. The procedure also provides guidance on what to do if the equipment to be removed from service is not on the matrix or if emergent work is required. Additionally, there are station procedures which provide detailed guidance on how to use the matrix for emergent work activities and plan of the day reviews.

The requirements of VPAP-2001, "On-line Maintenance" are implemented through the maintenance schedule construction and review process. Proposed schedules are reviewed by the Supervisors in the Planning Group for adherence to VPAP-2001 requirements. Additional management oversight of scheduled activities is accomplished by review of weekly schedules and daily POD by the Management review team and approval of the weekly and daily POD by the Assistant Station Manager Operations and Maintenance.

The requirement for PSA review of on-line maintenance activities is accomplished using the "on-line maintenance matrix" (see response to Tier 3, Question 2). The matrix is used when constructing schedules to evaluate risk associated with on-line maintenance activities. If a proposed schedule removes a group of equipment from service that has not been previously analyzed, the PSA group evaluates the risk associated with that combination and adds that specific group to the matrix prior to removing the equipment from service. Daily additions to the POD are reviewed by the Supervisor in the Planning Group to ensure the required evaluations are included in the matrix, and the matrix risk windows are indicated in the POD for management review and approval.

5. Are there currently plans to acquire a safety monitor as a more accurate method of enhancing configuration risk management? If so, when do you plan to implement the safety monitor, how do you plan to maintain the monitor, and who will be trained? If not, describe how you assess the risk-based significance of taking or having a component taken out of service.

Response

Virginia Power has begun development of a Safety Monitor for Surry Power Station. When the Surry project is completed, the North Anna Safety Monitor project will commence. Currently, the Safety Monitor implementation dates are December 1998 for Surry and December 1999 for North Anna. The current plan is to maintain the Safety Monitors by a process (program) similar to that which is used to maintain the existing PSA models. It is anticipated that station scheduling personnel responsible for on-line maintenance planning will be trained as the primary user of the tool. PSA personnel responsible for model maintenance will be trained in the maintenance aspect of the monitor. Training for other personnel will be on an as needed basis.

Additional Relevant Information

During the week of October 5, 1997 the NRC conducted an inspection of the implementation of the Maintenance Rule at North Anna. From this inspection an inspector follow-up item (IFI) was established to confirm the incorporation of previously self-identified enhancements into the plant's PSA model.

During the preparation of the response to this RAI those enhancements that directly affect the emergency electrical (EE), electrical power (EP), emergency diesel generator (EG), and the alternate AC power (AAC) systems were collected and incorporated into a test version of the model. The changes included test and maintenance term adjustments and the removal of a cross connect between the 2H and 1J EDGs. The cross connect exists but is not routinely used. Therefore, it was recommended for removal from the PSA model by the expert panel. When these changes were incorporated into a test version of the EDG AOT model there was no material change to the original results. Therefore, it is concluded that incorporation of the enhancements identified in the IFI will not materially affect the bases for the subject Technical Specification change request.

Attachment 2
Discussion and Revised Technical Specifications Changes
North Anna Units 1 and 2

Discussion of Change

Introduction and Background

On September 1, 1995, Virginia Electric and Power Company requested amendments, in the form of changes to the Technical Specifications, to Facility Operating License Numbers NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes would permit a single outage of up to 14 days for each emergency diesel generator once every 18 months in order to perform preventive maintenance. Since that time, we have discussed the basis for and the implementation of the Technical Specifications changes with the NRC staff on several occasions. On November 13, 1996, the Staff requested additional information to complete the review of the proposed changes as well as revise the Technical Specification action statement to be more generic and include conditions of operability for the Alternate AC source.

Specifically the NRC staff stated, "Proposed Technical Specification 3.8.1.1 Action b (Limiting Condition of Operation with one emergency diesel generator (EDG) inoperable) is unacceptable. This action statement must be rewritten such that the requested fourteen day (14) allowed time (AOT) is always applicable when an EDG is inoperable for whatever reason - not just once every 18 months when an EDG is in special maintenance. Also, this action statement must be conditioned upon the Alternate AC Source (AAC) being operable and "connectable" (breakers required for alignment to inoperable EDG's bus are operable, control power is available, etc.). Also, if the AAC is not operable, allowed outage time is limited to the current 72 hours."

Based on the NRC staff's request, we are revising the proposed Technical Specification change to establish a fourteen day action statement for the EDGs that can be entered anytime the operability restrictions for the other diesel generators are met.

The PSA evaluation for the performance of the 18 month preventive maintenance inspection during operation in Modes 1 and 2 is also valid for a fourteen day AOT. Although the PSA identifies a small increase in core damage frequency as a result of increased EDG unavailability resulting from a fourteen day AOT, the increase in core damage frequency is bounded by the IPE. The original IPE was performed assuming only the operability of the EDGs. Whereas the PSA for the extended EDG AOT was performed assuming the operability of the EDGs and the AAC DG. As a risk reduction measure the other unit's EDGs and the AAC DG are required to be OPERABLE during this time or the allowed outage time remains 72 hours. The change in risk evaluated and documented in our original submittal of September 1, 1995, remains valid for the revised fourteen (14) day allowed outage time.

Specific Changes

Only those changes associated with the generic fourteen (14) day allowed outage time (AOT) are discussed below. The changes to the allowed outage time apply to both Units 1 and 2.

- TS 3.8.1.1 Replace existing actions statement b with the following:
 - b. With one EDG of 3.8.1.1.b inoperable demonstrate: the OPERABILITY of the offsite 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 independent 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. Restore the EDG to OPERABLE status within 14 days if the AAC DG and the opposite unit's EDGs are OPERABLE or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. In addition,
 - 1. If one or more of the three diesel generators (i.e., AAC DG or opposite unit's EDGs) required for entry into the 14 day action statement is inoperable at the start of the 14 day action statement, restore the diesel generator(s) 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.
 - 2. If one or more of the three diesel generators (i.e., AAC DG or opposite unit's EDGs) required for entry into the 14 day action statement become(s) inoperable during the 14 day action statement, restore the diesel generator(s) 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.
- Surveillance Requirement 4.8.1.1.2.d.1 is being deleted and Surveillance Requirement 4.8.1.1.2.f. is being added. This change permits the 18 month surveillance of the EDGs to be performed in any mode of operation and was included in the original September 1, 1995 submittal.
- Proposed Technical Specification 3.8.1.1.b.2 stated that the provisions of Specification 3.0.4 are not applicable. This statement has been removed from the revised Technical Specification change.

- Bases 3/4.8.1 and 3/4.8.2 A.C. and D.C. Power Sources and Distribution Paragraphs three and four are changed as follows and a new paragraph added:

Entering the fourteen day EDG action statement 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 and the opposite unit's EDGs are both OPERABLE. Removal of other components from service during the action statement is governed by administrative procedures. The EDG and AAC DG annual unavailability is limited by the Maintenance Rule Program.

When one or more of the diesel generators (i.e., AAC DG or opposite unit's EDGs) required to enter the 14 day action statement is (are) inoperable or becomes inoperable during the 14 day action statement of the affected EDG, a 72 hour action statement is entered. If the three diesel generators (i.e., AAC DG or opposite unit's EDG) required to support entry into the 14 day action statement are restored to OPERABLE status within 72 hours, the remainder of the 14 day action statement can be used. Restoring the affected EDG to service removes the conditional OPERABILITY requirements for the AAC and opposite unit's EDGs.

The OPERABILITY requirements for the AAC DG are specified in the Technical Requirements Manual. In addition, to be considered OPERABLE to support the 14 day action statement the AAC DG must be capable of providing power to the affected bus (i.e., connectable to the bus with the associated breakers and control power available). If the AAC DG becomes inoperable during the 14 day action statement, the OPERABILITY of the remaining EDGs does not need to be demonstrated since the AAC DG was designed and purchased according to specifications which adequately ensure that common cause failure is not likely.

- The administrative type changes in the original Technical Specifications change request package are still being requested. (e.g., changing the diesel generators to EDG or emergency diesel generators, etc.)

Safety Significance

The PSA performed for the original September 1, 1995 Technical Specifications change submittal remains bounding for the revised Technical Specifications changes. The PSA was based on an assumed EDG total unavailability. The core damage frequency for the extended EDG allowed outage time is significantly smaller than that reported for the IPE. This is a result of the installation of the AAC DG which represents a significant reduction in CDF since it can be aligned to provide power to any one of the four emergency busses. The extended AOT results in an increase in CDF of about $1.0E-6$ /yr. But, this increase represents about only 10% of the reduction obtained from adding the fifth diesel. As described above, the proposed Technical Specifications changes only modify the EDG AOT. Thus, operation with increased

EDG unavailability due to maintenance is acceptable given that the AAC DG and the other unit's EDGs are OPERABLE.

The proposed Technical Specifications changes do not create the possibility of an different kind of accident, but do create the possibility of a malfunction of a different type than any evaluated previously in the safety analysis report. The proposed Technical Specifications changes increase the AOT of an EDG. The UFSAR accidents are analyzed assuming that the EDG is the worst single failure. One additional failure mode (malfunction) is possible when the unit is in this configuration. Human error can cause the failure of the ACC DG. However, the result of the human error is a failed diesel which is the design basis assumption. Similarly, the PSA performed to evaluate the proposed Technical Specifications changes considered all of the initiating events defined for the PSA performed for the Individual Plant Examination. No new initiators result from the change. Therefore, it is concluded that no new or different kind of accident from any previously evaluated has been created but one additional type of malfunction has been created.