ROBERT E. DENTON
Vice President
Nuclear Energy

Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657
410 586-2200 Ext. 4455 Local
410 260-4455 Baltimore

BGE

August 2, 1994

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
License Amendment Request; Emergency Diesel Generator Crankcase High Pressure Trip

Pursuant to 10 CFR 50.90, the Baltimore Gas and Electric Company hereby requests an Amendment to Operating License Nos. DPR-53 and DPR-69 by the incorporation of the changes described below into the Technical Specifications for Calvert Cliffs Unit Nos. 1 and 2.

DESCRIPTION

The proposed amendment would revise the Technical Specifications for both Units 1 and 2 regarding surveillances associated with the Emergency Diesel Generators (EDGs). The revision will add high crankcase pressure to the EDG trips which are verified to be automatically bypassed on a Safety Injection Actuation Signal (SIAS).

BACKGROUND

There are three 4160 volt, 3-phase, 60 cycle Fairbanks Morse EDGs in use at Calvert Cliffs. The EDGs are designed to provide reliable in-plant AC power to facilitate safe plant shutdowns and standby conditions in the event of a loss of offsite power. Each EDG is physically separated and electrically isolated from the others, and has a continuous rating of 2500 kW.

Normally, one EDG is dedicated to each unit and supplies power to one of the unit's two 4160 volt Engineered Safety Features (ESF) busses. The third "swing" EDG is capable of being aligned to either unit to supply power to the other ESF bus for that unit. In this manner, the "swing" EDG provides protection against single failure. Upon receipt of an ESF bus undervoltage signal, the EDGs will start and a

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sequencer will load appropriate shutdown equipment onto the dedicated EDG. If accident conditions (SIAS) are present concurrent with the loss of voltage, the loss-of-coolant-incident sequencer actuates to load ESF components.

The EDGs are verified to be operable by performing monthly, semi-annual, and refueling interval surveillance testing. To further enhance EDG reliability, the following change to the EDG refueling interval surveillance is being requested.

In general, the EDG trips are designed to prevent damage to the EDG, and therefore minimize EDG out-of-service time. However, the failure modes which would generally result in either high jacket coolant temperature or low jacket coolant pressure are not always indicative of imminent failures; therefore, these trips are bypassed on a SIAS, when the reliability of an emergency power source is most crucial. Currently, Technical Specification 4.8.1.1.2.d.3.c verifies that the high jacket coolant temperature and low jacket coolant pressure trips are bypassed when a SIAS is received.

The crankcase high pressure condition is currently one of the trip signals retained following a SIAS. There have been several inadvertent EDG trips due to high crankcase pressure, resulting from eductor performance problems, in which engine failure was not imminent. The specific problems were corrected with modifications and increased preventive maintenance activities; however, to further improve EDG reliability, we propose modifying Technical Specification 4.8.1.1.2.d.3.c to verify the high crankcase pressure trip is bypassed by a SIAS. The vendor, Fairbanks Morse, concurs with the proposed change to bypass this trip signal on a SIAS.

REQUESTED CHANGE

Change Technical Specification 4.8.1.1.2.d.3.c, associated with EDG testing, as shown on the marked-up pages attached to this transmittal. This change adds the high crankcase pressure trip as one of the EDG trips verified to be bypassed by a SIAS. Verification of the high crankcase pressure trip bypass would be required after the EDGs are modified to ensure the continued operability of the trip bypass.

SAFETY ANALYSIS

The safety function of the EDGs is to provide electrical power for the operation of ESF and safe shutdown equipment when the normal offsite Class 1E power supply is not available

The EDGs must have the capability to (1) start and accelerate a number of large motor loads in rapid succession, and (2) supply power continuously to the equipment needed to safely shut down the plant and to maintain the plant in a safe condition if an extended loss of offsite power occurs. The proposed change will enhance the ability of the EDGs to perform these required functions.

During normal operations, EDG trips are provided to initiate engine shutdown, thereby protecting the EDGs from damage resulting from abnormal engine conditions. Under emergency conditions, EDG reliability is a key accident-mitigating factor; therefore, upon receipt of a SIAS, the EDG control logic blocks two of the normal shutdown signals so that the only signals remaining are those required to prevent rapid destruction of the diesel engine. The purpose of blocking signals is to maximize EDG reliability during emergency operation. Technical Specification 4.8.1.1.2.d.3.c verifies that the EDG trip bypass logic operates as designed.

The purpose of the high crankcase pressure shutdown is to minimize engine degradation from failure modes that may cause high crankcase pressure. The EDG manufacturer, Fairbanks Morse, has identified five failure modes which could result in high crankcase pressure. Any one of these failure modes could occur from a random single failure mechanism. These failure modes are:

1. Broken piston rings
2. Cracked pistons
3. Blower seal failure
4. Liner water seal failure
5. Failed crankcase vacuum system

These failure modes have different outcomes. Although uncommon in the industry, the first four modes of failure could lead to further internal engine component failure, if allowed to go unchecked by an automatic trip, such as the high crankcase pressure trip. In the current configuration, the common effect of these failure modes would be an increase in crankcase pressure and engine shutdown from two-out-of-three crankcase pressure switch logic. However, by the time any of these four failure modes would activate a high crankcase pressure trip, significant damage to the affected engine would have already occurred requiring a lengthy repair process. As such, the EDG out-of-service time is not significantly affected by blocking the high crankcase pressure trip for the first four failure modes. Furthermore, it has been determined that allowing an EDG to operate in a high crankcase pressure condition would not increase the possibility of failure of either of the two unaffected EDGs.

The fifth mode of failure, failed crankcase vacuum system, is the most common and does not lead to engine degradation. At Calvert Cliffs, performance problems with the eductors in the crankcase vacuum system have resulted in several EDG shutdowns during testing. Therefore, in the current configuration, the effect of a crankcase vacuum system failure would be an unnecessary EDG shutdown, resulting in a failure of the EDG to perform its safety-related function. In blocking this trip on a SIAS, the ultimate effect is an increase in the reliability of the affected EDG.

In the event of an engine malfunction in which the EDG crankcase pressure reaches the trip setpoint, operators would be alerted of the condition by annunciation in the Control Room and at the local control panel. Local indication is available to monitor the high crankcase pressure condition. Plant operating procedures instruct the operators to monitor jacket coolant temperature and pressure when an auto start signal (SIAS) is present. A similar precaution will be added for high crankcase pressure conditions. This will ensure the operator has sufficient time to react appropriately to this condition.

The vendor, Fairbanks Morse, concurs with the proposed change to bypass this trip signal. The generic accident management strategies suggested in Generic Letter 88-20 and NUREG/CR-5474 recommended evaluating the benefits of enabling emergency bypass of diesel generator trips in emergencies. The actual plant modification to bypass the high crankcase pressure trip has been reviewed for potential effects on the affected EDG and other plant systems, structures and components and approved in accordance with 10 CFR 50.59, and was determined not to involve an unreviewed safety question.

DETERMINATION OF SIGNIFICANT HAZARDS

The proposed change has been evaluated against the standards in 10 CFR 50.92 and has been determined to not involve a significant hazards consideration, in that operation of the facility in accordance with the proposed amendments:

1. *Would not involve a significant increase in the probability or consequences of an accident previously evaluated.*

   The Calvert Cliffs Emergency Diesel Generators (EDGs) are used to provide electrical power for the operation of Engineered Safety Features (ESF) and safe shutdown equipment for events involving a loss of offsite power. The EDGs are also called upon to automatically start if an accident condition (SIAS) is present. In the event of an automatic start from a SIAS, the EDGs do not assume any load until the preferred, offsite power source is actually lost. On an undervoltage condition on a vital bus, the corresponding EDGs automatically start and load.

   Emergency diesel generator trips are provided to initiate engine shutdown during abnormal diesel-run conditions, thereby protecting the EDGs from any resulting damage. Under emergency conditions, EDG reliability is a key accident-mitigating factor; therefore, upon receipt of a SIAS, the EDG control logic blocks two of the normal shutdown signals so that the only signals remaining are those required to prevent rapid destruction of the diesel engine. High crankcase pressure is typically not an indication of impending rapid diesel engine failure; therefore, this trip will be added to those shutdown signals bypassed on a SIAS. The proposed Technical Specification change adds the high crankcase pressure trip as one of the EDG trips verified to be bypassed by a SIAS. A high crankcase pressure condition on one EDG will not impact either of the two unaffected EDGs, or any other equipment required to mitigate accident consequences, and satisfies the single failure criteria. The manufacturer concurs with the proposed change to bypass this trip on a SIAS. In blocking this trip on a SIAS, the ultimate effect is an increase in the reliability of the effected EDG, and therefore, no increase in the consequences of a previously evaluated accident.

   Additionally, the EDGs are not initiators to any previously evaluated accident. Therefore, blocking the high crankcase pressure trip on a SIAS will not increase the probability of an accident previously evaluated.

   Therefore, the proposed change does not involve a significant increase to the probability or consequences of an accident previously evaluated.

2. *Would not create the possibility of a new or different type of accident from any accident previously evaluated.*

The function of the EDGs is to provide power to ESF and safe shutdown equipment for events involving a loss of offsite power. The proposed change does not represent a significant change in the configuration or operation of the plant; therefore, the EDGs continue to function in an accident mitigation role. The EDGs are not accident precursors, either in the current configuration, or following the modification to block the high crankcase pressure trip.

Therefore, the proposed changes do not create the possibility of a new or different type of accident from any accident previously evaluated.

3. *Would not involve a significant reduction in a margin of safety.*

The margin of safety credited with the EDG function associated with this change is the reliability of the EDGs following an event involving a loss of offsite power. By blocking high crankcase pressure trips on a SIAS, this change increases the likelihood that an EDG will be able to supply power when it is needed most, during a SIAS, because the probability of an unnecessary EDG shutdown is decreased. In effect, the margin of safety associated with this function, EDG reliability, is increased.

Therefore, the proposed change does not involve a significant reduction in the margin of safety.

ENVIRONMENTAL ASSESSMENT

The proposed amendment changes requirements with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or changes to an inspection or surveillance requirement. We have determined that the proposed amendment involves no significant hazards consideration, and that operation with the proposed amendment would result in no significant change in the types or significant increases in the amounts of any effluents that may be released offsite, and in no significant increase in individual or cumulative occupational radiation exposure. Therefore, the proposed amendment is eligible for categorical exclusion as set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment is needed in connection with the approval of the proposed amendment.

SCHEDULE

This change is requested to be approved by February 1, 1995, to allow sufficient time to implement the instrument modifications by the scheduled completion date of February 28, 1996. However, issuance of this amendment is not currently identified as having an impact on outage completion or continued plant operation.

The modification to the EDG circuitry to install the trip bypass will be performed for each EDG during specific maintenance periods assigned to each EDG. All three EDGs will be modified by February 28, 1996, if this amendment is approved by February 1, 1995. If the proposed amendment is not approved by that date, the scheduled completion date for the modifications will need to be revised accordingly. A footnote attached to Surveillance 4.8.1.1.2.d.3.c will state that verification of the high crankcase pressure trip bypass will not be required on a particular EDG until the modification has been completed for that EDG.

SAFETY COMMITTEE REVIEW

These proposed changes to the Technical Specifications and our determination of significant hazards have been reviewed by our Plant Operations and Safety Review Committee and Offsite Safety Review Committee. They have concluded that implementation of these changes will not result in an undue risk to the health and safety of the public.

Should you have any questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

STATE OF MARYLAND :
: TO WIT :
COUNTY OF CALVERT :

I hereby certify that on the 2nd day of August, 1994, before me, the subscriber, a Notary Public of the State of Maryland in and for Calvert County, personally appeared Robert E. Denton, being duly sworn, and states that he is Vice President of the Baltimore Gas and Electric Company, a corporation of the State of Maryland; that he provides the foregoing response for the purposes therein set forth; that the statements made are true and correct to the best of his knowledge, information, and belief; and that he was authorized to provide the response on behalf of said Corporation.

WITNESS my Hand and Notarial Seal: Michelle D. Hall
Notary Public

My Commission Expires: February 2, 1998
Date

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Attachments: (1) Unit 1 Technical Specification Revised Page
(2) Unit 2 Technical Specification Revised Page

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
M. K. Boyle, NRC
D. G. McDonald, Jr., NRC
T. T. Martin, NRC
P. R. Wilson, NRC
R. I. McLean, DNR
J. H. Walter, PSC