BALTIMORE
GAS AND
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1650 CALVERT CLIFFS PARKWAY • LUSBY, MARYLAND 20657-4702

ROBERT E. DENTON
VICE PRESIDENT
NUCLEAR ENERGY
(410) 260-4455

September 3, 1993

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
Operator Examination Report Nos. 50-317/93-11 and 50-318/93-11 (OL);
Reply to Unresolved Item Nos. 50-317/93-11-01 and 50-318/93-11-01;

REFERENCES:

(a) Letter from Mr. L. H. Bettenhausen (NRC), to Mr. R. E. Denton (BG&E), dated June 2, 1993, Operator Examination Report Nos. 50-317/93-11 and 50-318/93-11 (OL)

(b) Letter from Mr. A. E. Lundvall, Jr. (BG&E) to Mr. D. G. Eisenhut (NRC), dated November 20, 1979. Follow-up Actions Resulting from TMI-2 Incident (Lessons Learned Short Term)

(c) Letter from Mr. R. W. Reid (NRC) to Mr. A. E. Lundvall, Jr. (BG&E), dated April 7, 1980, NRC Evaluation of the Implementation of Category "A" Lessons Learned Requirements

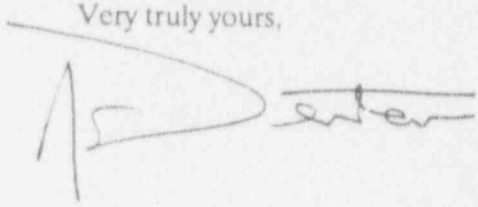
(d) Letter from Mr. D. M. Crutchfield (NRC) to Mr. R. W. Wells (CEOG), dated November 6, 1986, Supplement 3 to Safety Evaluation for CEN-152, "Combustion Engineering Emergency Procedure Guidelines"

(e) Letter from Mr. J. A. Tiernan (BG&E) to Document Control Desk (NRC), dated August 9, 1988, Regulatory Guide 1.97 Review Update

Reference (a) transmitted the results of the operator examinations administered at Calvert Cliffs Nuclear Power Plant from April 26 - 30, 1993. Two unresolved items (50-317/93-11-01 and 50-318/93-11-01) were identified as a result of observations made during the simulator portion of the operating examination. Our response is provided in Attachment (1).

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

Very truly yours,



RED/NH/nh/dlm

Attachment: As Stated

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

ATTACHMENT (1)

REPLY TO UNRESOLVED ITEM NOS. 50-317/93-11-01 and 50-318/93-11-01
LOSS OF NON-VITAL INSTRUMENTATION BUS 1(2)Y10

From April 26 - 30, 1993, the Nuclear Regulatory Commission (NRC) administered examinations to Baltimore Gas and Electric Company (BG&E) employees who had applied for licenses to operate the Calvert Cliffs Nuclear Power Plant, Units 1 and 2. Two unresolved items were identified as a result of observations made during the simulator portion of the operating examination. Specifically, the scenario involved a loss of offsite power (LOOP) in combination with No. 12 emergency diesel generator (EDG), the swing diesel, being out of service for maintenance. Consequently, on the LOOP with No. 12 EDG unavailable, power was lost to the No. 14 vital AC bus. On loss of power to this vital bus, power was lost on non-vital instrumentation bus 1Y10. This non-vital bus does not have battery backup and, therefore, remained de-energized for the remainder of the scenario. The loss of power on 1Y10 resulted in loss of control of the pressurizer heaters from the Control Room (Unresolved Item [URI] 50-317/93-11-01 and 50-318/93-11-01) and in a loss of all containment temperature indication (URI 50-317/93-11-02 and 50-318/93-11-02).

In the discussion that follows, only 1Y10, the Unit 1 non-vital instrumentation bus, is mentioned. However, the following concerns also apply to its equivalent Unit 2 bus, 2Y10.

URI 93-11-01 - LOSS OF PRESSURIZER BACKUP HEATER CONTROL

NRC Concern

The scenario described above was administered to two crews. On the LOOP, and in accordance with their training, both crews ordered the field operator to re-close the breakers which supply power to the backup heaters off the No. 11 vital AC bus, as these breakers had opened on an undervoltage condition. When notified that power was available to the backup heaters, both crews attempted to energize the heaters in order to regain Reactor Coolant System (RCS) pressure control. However, neither crew was able to energize the heaters. Upon realizing that the backup heaters could not be energized, the crews assumed that the heaters were unavailable for use and did not take any further actions to try and restore the heaters to operation.

It was apparent to the examiner that neither crew understood why the heaters could not be energized despite the availability of power to them, and that existing procedures did not provide adequate guidance for this situation. It was determined that there are only two ways to regain control of the heaters. One way is to re-energize 1Y10. The Emergency Operating Procedures (EOPs) will eventually bring this about, but in the interim, the operators will not have control of the heaters from the Control Room. The other option is to take control of the heaters at the remote shutdown panel (1C43), as noted in Abnormal Operating Procedure (AOP)-7I. However, under the conditions set forth in the scenario, this AOP would not be invoked due to entry into the EOPs. Even if the AOP was used, it would still be some time before the operators arrive at the step that calls for operation of the heaters from 1C43.

The NRC has the following concerns with respect to this issue:

1. *Training provided to the operators on this design feature, its impact on heater control if 1Y10 is lost, and alternate operator actions necessary should this occur, were weak. Preferential removal of No. 11 EDG during training scenarios appears to have limited BG&E's ability to identify this problem and appears to be a direct contributor to this training deficiency.*

2. *Given the inability to control pressurizer heaters, and consequently RCS pressure under this specific condition, it appears that the current heater control design may not meet the intent of*

ATTACHMENT (1)

REPLY TO UNRESOLVED ITEM NOS. 50-317/93-11-01 and 50-318/93-11-01
LOSS OF NON-VITAL INSTRUMENTATION BUS 1(2)Y10

NUREG-0737, "Clarification of TMI Action Plan Requirements," Item II.E.3.1, "Emergency Power Supply for Pressurizer Heaters;" Positions (2), (3) and (4), and Clarification (4).

BG&E Response

1. Training has been strengthened to identify actions which may be taken to regain control of the backup heaters if power to 1Y10 is lost. The lesson plans for RCS Instrumentation (Control Room Operator Training Program), and EOP-2, Loss of Offsite Power (Senior Reactor Operator Training Program) have been revised to reflect that on a loss of 1Y10, Nos. 11 and 13 backup heater banks can be operated from the auxiliary shutdown panel, 1C43. Additionally, simulator lesson plans have been revised to address a LOOP with the No. 12 EDG out-of-service. This change lessens the preferential removal of No. 11 EDG during training scenarios, and strengthens the operators' ability to mitigate the effects of a loss of instrument power and a loss of vital 4 KV bus using AOP-7I.

2. Item II.E.3.1, Positions (2) and (3) require that procedures and training be established to make the operators aware of when and how to connect the heaters to the emergency busses to be consistent with the timely initiation and maintenance of natural circulation. Our emergency procedures are structured to meet the requirements of NUREG-0737, Item I.C.1, Guidance for the Evaluation and Development of Procedures for Transients and Accidents, which required licensees to reanalyze transients and accidents and prepare Technical Guidelines to identify operator tasks, and information and control needs necessary to mitigate the consequences of these transients and accidents. In response to Item I.C.1, CEN-152, Combustion Engineering Emergency Procedure Guidelines, was prepared by the Combustion Engineering Owners Group, and approved by the NRC on November 5, 1986, per Reference (d). Calvert Cliffs' emergency procedures are consistent with the guidance provided in CEN-152. The procedure is structured such that, after verifying that a Loss of Offsite Power has occurred, plant conditions will be stabilized prior to attempting to restore power. Finally, the need for plant cooldown is evaluated. A procedure change request has been initiated to identify that pressurizer heaters are lost when 1Y10 is deenergized, and to provide direction for pressurizer heater control in the event that 1Y10 is deenergized. This change, reinforced by the training changes described above, will ensure that operators are aware of this design feature and its potential effect on control of the heaters.

   Item II.E.3.1, Position (4), states, "pressurizer heater motive and control power interfaces with the emergency busses shall be accomplished through devices that have been qualified in accordance with safety-grade requirements." In response to Item II.E.3.1, two banks of pressurizer backup heaters were repowered from non-safety-related to safety-related diesel-backed busses. The requirement to provide safety grade interfaces between the emergency busses and the pressurizer heater motive power is met by the safety-related Class 1E 480 volt power circuit breakers. These circuit breakers provide protection for the Class 1E busses in the event of a failure of the non-safety-related pressurizer heaters. Similarly, safety-related Class 1E fuses provide protection such that the safety-related busses remain functional in the event of failure of the control circuit. Therefore, we feel the backup pressurizer heaters control circuitry meets the intent of Item II.E.3.1 of NUREG-0737, Position (4).

   In Reference (b), BG&E notified the NRC of modifications to our pressurizer heater power supply which would be implemented to meet the requirements of NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations." We noted that the load center breakers supplying two banks of pressurizer backup heaters will be

closed manually from the switchgear rooms when required after diesel generator load sequencing is complete. As noted in Reference (a), the NRC found our methodology for providing backup heater capacity acceptable in its safety evaluation issued April 17, 1980, Reference (c). It is our understanding that the intent of NUREG-0737, "Clarification of TMI Action Plan Requirements," Item II.E.3.1, was to ensure the availability of the pressurizer heaters when offsite power is not available. Although we did not specifically take exception to Clarification (4), which requires that the change-over of power to the heaters be accomplished in the Control Room, we feel our design meets the intent of NUREG-0737, by ensuring the breakers can be closed manually if the normal power supply to these heaters is lost. The delay in energizing pressurizer heaters may delay plant cooldown via natural circulation; however, adequate condensate inventory is maintained such that any delay is not considered safety significant. Therefore, no additional design changes are deemed necessary.

Summary of Actions Taken

Training lesson plans have been strengthened to ensure operators are aware of the effects of losing power to the No. 14 vital AC bus, and methods of regaining control of power to the backup pressurizer heaters. As noted in Reference (a), EOP-2 eventually provides for re-energization of 1Y10; however, this action will not be taken until RCS pressure is to be stabilized. Therefore, a procedure change request has been initiated to identify that pressurizer heaters are lost when 1Y10 is deenergized, and to provide direction for pressurizer heater control in the event that 1Y10 is deenergized. These procedure and training changes will provide adequate assurance that operators are aware of this design feature and its potential effect on control of the heaters, thereby ensuring that control of the heaters is regained in a timely manner.

In neither simulator scenario did the lack of pressurizer heaters impede natural circulation. In the worst case scenario, the delay in energizing pressurizer heaters may have delayed plant cooldown using natural circulation. However, adequate condensate inventory is maintained such that any delay would not have challenged our ability to recover from this particular scenario. Therefore, we feel the safety significance of this issue is low. No design changes are required.

URI 93-11-02 - LOSS OF CONTAINMENT TEMPERATURE INDICATION

NRC Concern

While running the above scenario, the examiners noted that both Control Room containment temperature indicators, TI-5309 and TI-5311, lost indication. Review of the electrical schematics showed that both of these indicators receive power from 1Y10 and fail low on loss of power to that bus. The examiner observed that loss of containment temperature indication did not adversely affect the crews' verification of the containment safety function, as backup indications (containment humidity and pressure) were available to aid in the assessment of that safety function. While loss of containment temperature indication appeared to have no immediate impact on EOP implementation, the examiner identified the following training and procedural concerns:

1. *EOP-2, 3, 4, 7 and 8 all contain the following note: "S/G pressure, pressurizer pressure, and containment temperature affect the level indication for the S/Gs and pressurizer. Attachments (8) and (9) contain corrected S/G and pressurizer levels for various S/G pressures, pressurizer pressures and containment temperatures." The examiner questioned how the intent of this note could be carried out if containment temperature was unavailable.*

2. *The training department has provided minimal training on the use of Attachments (8) and (9). Current training does not discuss the alternate actions the operators should take if containment temperature indication is lost.*

3. *There are no backup containment temperature indicators. Baltimore Gas and Electric Company's Regulatory Guide 1.97 submittal states that containment temperature indication is a Type D, Category 2 variable. However, if containment temperature must be relied upon in the EOPs to correct pressurizer and steam generator level indications under certain circumstances, then it is not clear whether or not the containment temperature indication should be treated as a Type A, Category 1 variable, similar to the steam generator and pressurizer level indications.*

BG&E Response

1. Attachments (8) and (9) inform the operators that corrected steam generator and pressurizer levels may be determined using three variables, including containment temperature. Although containment temperature is normally read directly from TI-5309 and TI-5311, this variable may also be approximated analytically, if containment indication is unavailable. Changes to the lesson plans as described below will provide the operators with an alternate method of approximating the containment temperature, and estimating the steam generator and pressurizer levels, if containment temperature instrumentation is unavailable.

2. The lesson plans for EOP-2, 3, 4 and 7 and RCS Instrumentation have been revised to clarify the use of Attachments (8) and (9). (This clarification was not incorporated into EOP-8, as the modified simulator scenario for the AOPs and EOP-8 described in the response to URI 93-11-01, above, will provide adequate opportunity for the operators to become familiar with the actions necessary to compensate for the loss of containment temperature indication.) The clarification allows steam generator and pressurizer level correction based on the conservative assumption that the containment is under saturated conditions. The clarification states:

> A loss of Instrument Bus 1Y10 will result in a loss of Control Room Containment Temperature indicators TI-5309 and TI-5311. These indicators are used to correct steam generator and/or pressurizer level when using Attachment (8) and (9) of the EOPs. If these indicators are unavailable, then steam tables may be used to convert containment pressure to temperature (assuming saturated conditions).

By clarifying the use of Attachments (8) and (9) when Instrument Bus 1Y10 is lost, we feel confident that the operators will be adequately trained on the alternate actions to be taken if containment temperature indication is lost. The enhanced simulator training described in URI 93-11-01, Item II.1, above, will provide practical training on correcting steam generator and pressurizer levels, in this scenario.

3. As noted in Reference (a), BG&E's Regulatory Guide 1.97 submittal, Reference (e), identified containment temperature indication as a Type D, Category 2 variable. Reference (e) also noted that we have one instrument loop for this variable, and that installation is in accordance with BG&E's criteria for non-safety-related instruments. This lack of redundancy infers that this instrument is not vital in the mitigation of an accident, and in fact, the primary purpose of containment temperature indication is to enable the operators

to monitor the effectiveness of the Containment Spray System and containment air coolers. This use of containment temperature indication agrees with the guidance provided in Regulatory Guide 1.97, which describes Type D variables as those variables that provide information to indicate the operation of individual safety systems and other systems important to safety. While containment temperature is necessary in estimating the actual steam generator and pressurizer levels, alternate means exist to approximate the containment temperature if this instrumentation is lost. One such means is converting containment pressure to temperature (assuming saturated conditions), as described above. Therefore, we do not feel that reclassifying containment temperature indication as a Type A, Category 1 variable is appropriate.

Summary of Actions Taken

Emergency Operating Procedure Attachments (8) and (9) inform the operators that corrected steam generator and pressurizer levels may be determined using three variables, including containment temperature. If containment temperature indicators TI-5309 and TI-5311 are unavailable, this variable may be conservatively approximated by converting containment pressure to temperature, assuming saturated conditions. The lesson plans for the appropriate emergency procedures have been revised to ensure the operators are trained on this alternate method of approximating containment temperature. These training changes provide adequate assurance that steam generator and pressurizer levels may still be approximated if containment temperature indication is unavailable; therefore, the safety significance of this issue is not considered substantial. No design changes or procedure changes are required.