

January 22, 1985

Docket Nos. 50-317  
and 50-318

*DL Roll*

Mr. A. E. Lundvall, Jr.  
Vice President - Supply  
Baltimore Gas & Electric Company  
P. O. Box 1475  
Baltimore, Maryland 21203

Dear Mr. Lundvall:

We have reviewed your letters dated March 10 and October 14, 1983 and April 10, 1984 in response to our Generic Letter No. 82-28, "Inadequate Core Cooling Instrumentation (ICCI) System" dated December 10, 1982. Our evaluation, contained herein, concludes that additional information is required so that we can complete our review of the ICCI. Enclosure 1 contains this request for additional information.

With regard to the implementation of the reactor vessel level monitoring system (RVLMS), we will require the submittal of the implementation letter report described in Enclosure 2 in order that we can complete our review.

Within 30 days following receipt of this letter, please inform us of your proposed submittal date for the information requested in Enclosure 1 and the RVLMS implementation letter described in Enclosure 2.

This request for information affects fewer than 10 respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

James R. Miller, Chief  
Operating Reactors Branch No. 3  
Division of Licensing

Enclosures:  
As stated

cc w/enclosures:

See next page

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ENCLOSURE 1  
REQUEST FOR ADDITIONAL INFORMATION  
BALTIMORE GAS AND ELECTRIC COMPANY PROPOSED  
INADEQUATE CORE COOLING INSTRUMENTATION SYSTEM FOR  
CLAVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2

1. Describe the status of the RVLMS installation including a schedule for completion of installation and calibration and the description of the final display system for RVLMS.
2. Provide the completion schedule and detailed plans for upgrading the core exit thermocouple system with respect to conformance with the design requirements of NUREG-0737 Item II.F.2. Identify and justify any deviation.
3. Provide an evaluation of the final SMM with respect to NUREG-0737 Appendix B design requirements and detailed plans for upgrading the SMM to incorporate CET inputs. Identify and justify any upgraded deviation.
4. Provide an over-all schedule for implementation of the final upgraded ICCI system and the upgraded ICC emergency procedure using CEN-152 Revision 2 guidelines.

## EVALUATION OF BALTIMORE GAS AND ELECTRIC COMPANY

RESPONSE TO U.S. NRC GENERIC LETTER NO. 82-28

"INADEQUATE CORE COOLING INSTRUMENTATION SYSTEM"

DECEMBER 10, 1982

NUREG-0737 ITEM II.F.2 FOR CALVERT CLIFFS NUCLEAR POWER PLANT,  
UNITS 1 AND 2

In response to the U.S. NRC Generic Letter No. 82-28 "Inadequate Core Cooling Instrumentation (ICCI) System" dated December 10, 1982, Baltimore Gas and Electric Company (BG&E) has proposed a system for detecting and monitoring inadequate core cooling (ICC) conditions including subcooling margin monitor (SMM), core exit thermocouples (CET) and reactor vessel level monitoring system (RVLMS) for Calvert Cliffs Nuclear Power Plant, Units 1 and 2 which have a Combustion Engineering Steam Supply System. The staff in conjunction with its contractor, Oak Ridge National Laboratory (ORNL), has reviewed the BG&E submittals dated March 10, 1983, October 14, 1983, and April 10, 1984 describing the proposed system.

Reactor Coolant Inventory Tracking System (ITS)

The RVLMS proposed is a differential temperature measurement concept in accordance with the generic Combustion Engineering (CE) heated junction thermocouple (HJTC) system proposal except for the control room display. The BG&E RVLMS includes a qualified light array in the control room for each HJTC channel to indicate the HJTC sensor being covered or uncovered, whereas the generic CE-HJTC would provide a digital display for each channel. Class 1E trend recorders are also provided for vessel inventory tracking capability. BG&E considers the control board mounted Class 1E display as a backup display with the primary display design being developed as part of the plant's safety parameter display system (SPDS). Calvert Cliffs procedures will be modified to include material associated with the use of RVLMS/HJTC prior to the system being declared operable. Based on our review we find that the licensee's proposal to use the generic CE HJTC system is acceptable. However, we will require that BG&E provide the implementation

letter report described in Enclosure 2 in order that we can complete our review for approval of the RVLMS implementation. The milestones relating to implementation of the system, as provided in Enclosure 2, should be incorporated into the Calvert Cliffs Nuclear Power Plant schedule and provided for staff review.

#### Core Exit Thermocouples (CET)

The Calvert Cliffs core exit thermocouple monitoring system will utilize existing thermocouples associated with the incore instrumentation system. BG&E is conducting additional engineering reviews to evaluate potential modifications for the principal components of the core exit thermocouple monitoring system since conformance to the NUREG-0737 design requirements for the incore instrumentation system and associated cabling, connectors and control room display instrumentation may require significant plant modifications.

The Calvert Cliffs incore instruments currently utilize Gulton connectors at the cable-to-incare instrument guide tube flange termination points. These connectors were originally supplied under the NSSS scope of supply as safety-related components; however, qualification for post-accident service would be required for use in the core exit thermocouple monitoring system. An alternative would be to replace the Gulton connectors with a type that is already qualified.

BG&E has determined that the incore instrument cables and containment electrical penetrations are qualifiable for post-accident, in-containment applications. Formal qualification of these components will be accomplished under their ongoing environmental qualification program.

Core exit thermocouple signals are currently processed by the plant computer and displayed in tabular form on the control room printers. To satisfy the system performance and quality criteria contained in NUREG-0737, the existing Calvert Cliffs core exit thermocouple signal processing and display system must be re-designed. BG&E is procuring a new main-frame computer system for installation at Calvert Cliffs which will replace the existing plant computers. Associated with the plant computer replacement project is the installation of a safety parameter display system (SPDS) utilizing the human factored CRT display. The preliminary schedule for completing these upgrades (data collection, processing, and display) is during the 1985/1986 refueling outage.

Based on our review, the commitments to upgrade the core exit thermocouple monitoring system to meet the NUREG-0737 Item II.F.2 design requirements are acceptable; however, the final detailed description should be provided for staff review.

#### Subcooling Margin Monitor (SMM)

The subcooled margin monitor consists of temperature and pressure sensors, associated cabling and connectors located inside containment, and redundant dedicated digital subcooled margin calculators and continuous digital displays located outside containment. The subcooled margin monitors were installed utilizing existing reactor coolant system instrumentation channels. The subcooled margin monitor has been incorporated into the emergency operating procedures at Calvert Cliffs and operator training has been completed under the revised procedures. The temperature inputs are from RTDs (2 cold leg and 2 hot leg) ranging from 212°F to 705°F and the pressure inputs are from two pressurizer pressure sensors ranging from 15 to 3208 psia. These inputs are from safety-related sensors. Based on our review, we have found that there are no CET inputs to SMM, and no indication of procedure upgrade in response to the CEN-152 Revision 2. The staff concern is described in Enclosure 1.

Conclusion

Based on our review of the licensee response to Generic Letter No. 82-28, we have concluded that the proposed use of the generic CE approach to RVLMS is acceptable. However, some concerns described in Enclosure 1 should be resolved before we can conclude that the design of the ICCI system conforms to NUREG-0737 design requirements.

With regard to the implementation of RVLMS, the licensee should provide the implementation letter report described in Enclosure 2 in order that we can complete our review for approval of the RVLMS implementation.

MILESTONES FOR IMPLEMENTATION OF  
INADEQUATE CORE COOLING INSTRUMENTATION

Enclosure 2

1. Submit final design description (by licensee) (complete the documentation requirements of NUREG-0737, Item II.F.2, including all plant-specific information items identified in applicable NRC evaluation reports for generic approved systems).
  2. Approval of emergency operating procedure (EOP) technical guidelines - (by NRC).  
Note: This EOP technical guideline which incorporates the selected system must be based on the intended uses of that system as described in approved generic EOP technical guidelines relevant to the selected system.
  3. Inventory Tracking Systems (ITS) installation complete (by licensee).
  4. ITS functional testing and calibration complete (by licensee).
  5. Prepare revisions to plant operating procedures and emergency procedures based on approved EOP guidelines (by licensee).
  6. Implementation letter\* report to NRC (by licensee).
  7. Perform procedure walk-through to complete task analysis portion of ICC system design (by licensee).
  8. Turn on system for operator training and familiarization.
  9. Approval of plant-specific installation (by NRC).
  10. Implement modified operating procedures and emergency procedures (by licensee).
- System Fully Operational -

\*Implementation Letter Report Content

- (1) Notification that the system installation, functional testing, and calibration is complete and test results are available for inspection.
- (2) Summary of licensee conclusions based on test results, e.g.:
  - (a) the system performs in accordance with design expectations and within design error tolerances; or
  - (b) description of deviations from design performance specifications and basis for concluding that the deviations are acceptable.
- (3) Description of any deviations of the as-built system from previous design descriptions with any appropriate explanation.
- (4) Request for modification of Technical Specifications to include all ICC instrumentation for accident monitoring.
- (5) Request for NRC approval of the plant-specific installation.
- (6) Confirm that the EOPs used for operator training will conform to the technical content of NRC approved EOP guidelines (generic or plant specific).