DRAFT

ATTACHMENT (1)

10 CFR PART 21 REPORT CONCERNING FAILURE OF MAIN STEAM HEADER RADIATION MONITORS SUPPLIED BY NUCLEAR RESEARCH CORPORATION

Calvert Cliffs Nuclear Power Plant, Units 1 and 2

Docket Nos: 50-317 and 50-318

Post-it Fax Note 7671 | Date 7/14/97 | # of pages ▶ 8
To Mr. Steve Sandin | From R. Gary Gradle
Co./Dept. NRC Operations Center | Co. BGE / Calvert Cliffs
Phone # 301-816-5100 | Phone # 410-495-3738
Fax # 301-816-5151 | Fax #
Event # 32621

(i) ***Name and Address of Individual Making Notification:***

C. H. Cruse, Vice-President, Nuclear Energy Division
Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657

(ii) ***Basic Component Affected:***

Nuclear Research Corporation Extended Range Gamma Scintillation Detector MD-55E(V3)

(iii) ***Firm Supplying Component:***

Nuclear Research Corporation
125 Titus Avenue
Warrington, PA 18976
Contact: Mr. Earl Pollock
Tele: 215-343-5900

(iv) ***Nature of the Defect:***

The Main Steam Header Radiation Monitor detectors are located in the Main Steam Isolation Valve (MSIV) room. The detectors are mounted adjacent to their respective main steam line, close to the containment penetration, upstream of the Main Steam Safety Valves (MSSVs). The Main Steam Header Radiation Monitors are designed to measure potential noble gas releases to the environment in the event of primary-to-secondary steam generator tube leakage concurrent with lifting of the MSSVs, atmospheric dump valves or the exhaust from the turbine-driven auxiliary feedwater pumps. The purpose of the Main Steam Header Radiation Monitors is to

IE19
0/1

DRAFT

detect significant radiological releases and provide meaningful release information for offsite emergency actions.

If a Main Steam Header Radiation Monitor is inoperable, then in accordance with Technical Specification 3.3.3.1, Action Statement (30) and the Emergency Response Plan Implementation Procedures, the preplanned alternate method of monitoring effluent noble gas in the respective main steam header is implemented.

The Unit Nos. 1 and 2 safety-related Main Steam Header Radiation Monitors were recently replaced in accordance with approved modifications. The Unit 1 radiation monitors were tested and declared OPERABLE in early May 1997. The Unit 2 radiation monitors were tested and declared OPERABLE in late May 1997. In early June 1997, the Unit 1 Main Steam Header Radiation Monitors successfully passed their first monthly channel functional surveillance tests required by Technical Specification 3.3.3.1. On June 6, 1997, during performance of their first monthly channel functional test, Unit 2 Main Steam Header Radiation Monitors Nos. 21 and 22 failed to respond during a checksource test, were declared not OPERABLE, and the alternate preplanned monitoring method was implemented. On June 10, 1997, following evaluation of troubleshooting results on the Unit 2 Main Steam Header Radiation Monitor detectors, confirmatory tests performed on the Unit 1 Nos. 11 and 12 Main Steam Header Radiation Monitors revealed that they also failed to respond during a checksource test. These Unit 1 radiation monitors were removed from OPERABLE status, and the alternate preplanned monitoring method was implemented.

DRAFT

ATTACHMENT (1)

10 CFR PART 21 REPORT CONCERNING FAILURE OF MAIN STEAM HEADER RADIATION MONITORS SUPPLIED BY NUCLEAR RESEARCH CORPORATION

Although the inoperability of Nos. 11 and 12 (Nos. 21 and 22) Main Steam Header Radiation Monitors has not affected Unit 1 (Unit 2) operation, the detectors failed to operate as expected over the required temperature range. This defect resulted in the inability of these safety-related components to perform their intended function (i.e., detect significant radiological releases and provide meaningful release information for offsite emergency actions). The Main Steam Header Radiation Monitors are passive monitoring instrumentation that do not interface with any other safety-related equipment. However, these radiation monitors are designated safety-related and are designed to be operational during and following the event. The details of the discovery and nature of the defect are provided below.

Numbers 21 and 22 Main Steam Header Radiation Monitors were replaced per an approved modification during the Unit 2 spring 1997 refueling outage. Following the installation, Engineering Test Procedures were performed which included the performance of checksource tests. The monitors satisfactorily passed all requirements of the Engineering Test Procedures (performed with Unit 2 in MODE 5 and a MSIV room ambient temperature of approximately 90°F) and were placed in an OPERABLE status in late-May 1997.

On June 6, 1997, during the performance of the first monthly channel functional test required by Unit 2 Technical Specifications surveillance requirements, Nos. 21 and 22 Main Steam Header Radiation Monitors failed to respond during the checksource test. The radiation monitor was removed from OPERABLE status and the alternate preplanned monitoring method was implemented. Troubleshooting on No. 21 Main Steam Header Radiation Monitor determined that the checksource was properly aligned with respect to the collimating hole during the

DRAFT

checksource test. However, no response from the detector was noted during subsequent checksource tests. Further troubleshooting found that no response was seen when the checksource was placed directly on the detector. Satisfactory source strength of the checksource was confirmed by placing it directly on a personnel contamination gamma detector. Several checksource tests were then performed on No. 22 Main Steam Header Radiation Monitor and no detector response was noted.

During evaluation of the troubleshooting results above, it was suspected that a generic problem may exist with detector performance. Therefore, on June 10, 1997, confirmatory checksource tests were performed on the similar Unit 1 Nos. 11 and 12 Main Steam Header Radiation Monitors. Both Unit 1 radiation monitors failed to respond to a checksource test, were removed from OPERABLE status, and the alternate preplanned monitoring method was implemented. [Note: The Unit 1 Main Steam Header Radiation Monitors were replaced earlier in 1997 per an approved modification. These new Unit 1 radiation monitors were tested satisfactorily (with Unit 1 operating in MODE 1 and MSIV room ambient temperature approximately 110°F-120°F), in accordance with similar Engineering Test Procedures as those performed on the Unit 2 Main Steam Header Radiation Monitors. The Unit 1 Nos. 11 and 12 Main Steam Header Radiation Monitors were placed in an OPERABLE status in early-May 1997. These Unit 1 radiation monitors satisfactorily completed their first monthly channel functional test required by Technical Specification surveillance requirements earlier in June 1997. The MSIV room ambient temperature was still approximately 110°F-120°F.]

ATTACHMENT (1)

10 CFR PART 21 REPORT CONCERNING FAILURE OF MAIN STEAM HEADER RADIATION MONITORS SUPPLIED BY NUCLEAR RESEARCH CORPORATION

Following confirmation that a generic detector performance problem existed, additional troubleshooting (using No. 21 Main Steam Header Radiation Monitor) determined that the detectors were sensitive to elevated temperatures. With MSIV room ambient temperature measured at approximately 135°F, a contact temperature reading on No. 21 Main Steam Header Radiation Monitor detector measured approximately 155°F. This detector was removed from the Unit 2 MSIV room, allowed to cool to approximately 80°F, and was returned to the MSIV room. A checksource test was immediately performed with satisfactory results. However, subsequent checksource tests, performed at approximately 3 to 5 minute intervals, showed a degrading detector performance.

Checks utilizing secondary calibration button check sources were performed on No. 21 Main Steam Header Radiation Monitor detector after cooling the detector to approximately 80°F, with the detector at a MSIV room ambient temperature of 135°F, and with the detector at approximately 155°F. Degraded detector performance was noted at the elevated temperatures.

Vendor documentation states that this detector should be capable of operating satisfactorily over a temperature range of -22°F to +194°F. Vendor environmental test data appeared to substantiate the published detector operating temperature range. However, based upon the results of the troubleshooting and the vendor specifications, it was concluded that the detectors were not operating as expected over the required temperature range. The cause of the inoperability of the Main Steam Header Radiation Monitors was determined to be inadequate vendor design of the detector temperature compensation circuit. Baltimore Gas and Electric Company (BGE) design specification for the new safety-related Main Steam Header Effluent

Monitors requires that these detectors be able to operate at a continuous temperature of 170°F. In addition, the design specifications state that these radiation monitors shall meet the requirements of Regulatory Guide 1.97, Table 3, Category 2, Type E Variable, "Vent From Steam Generator Safety Relief Valves or Atmospheric Dump Valves," in which a Type E Variable is defined as those variables to be monitored as required for use in determining the magnitude of the release of radioactive materials and continually assessing such releases. The design specifications define the safety classification of the Main Steam Header Radiation Monitors stating, in part, that all safety-related equipment must be manufactured and procured under a 10 CFR Part 50, Appendix B program and that the requirements of 10 CFR Part 21 apply.

(v) *Date on Which Defect Was Identified:*

On June 6, 1997, Issue Reports were written documenting that Nos. 21 and 22 Main Steam Header Radiation Monitors had failed their checksource tests during surveillance testing and were declared not OPERABLE. On June 10, 1997, an Issue Report was written documenting that the Unit 1 Main Steam Header Radiation Monitors had failed the requested checksource tests (and declared not OPERABLE) that were performed due to the generic concern with all the Main Steam Header Radiation Monitors. On July 1, 1997, we submitted a Special Report to the Nuclear Regulatory Commission concerning the inoperability of the Unit 1 and Unit 2 Main Steam Header Radiation Monitors discussed above. The extent of the deviation (i.e., departure from the design specification that the detectors be able to operate at a continuous temperature of 170°F) that resulted in the failed surveillance testing and inoperability of the Main Steam Header

Radiation Monitors, identified the inability of these safety-related components to provide meaningful radiological release information as designed.

(vi) Number and Location of Components:

There are two Nuclear Research Corporation Extended Range Gamma Scintillation Detectors [MD-55E(V3)], one for each main steam line, located in the MSIV room for each unit.

(vii) Corrective Actions:

We have communicated the detector performance problem to the vendor. The detectors and associated pre-amplifiers were returned to the vendor for confirmatory testing and modification, if necessary. The vendor confirmed that the detectors were not operating as expected over the required temperature range and that the originally supplied environmental test data was incomplete. A proposed modification to the detector temperature compensation circuit has been temporarily implemented and is undergoing initial vendor testing.

Baltimore Gas and Electric Company has prescribed additional testing to be performed by the vendor on the proposed modification. Following the completion of this testing and BGE acceptance of the results, formal factory acceptance testing of the modified detectors will occur. Upon satisfactory completion of the factory acceptance testing, BGE acceptance testing per approved Engineering Test Procedures will be performed. We plan to conduct this acceptance testing at Calvert Cliffs with the units operating and the MSIV rooms at elevated temperatures (similar conditions to when the problem with the detector response was first identified). Following successful completion of the site acceptance tests, the Unit 1 and Unit 2 Main Steam

Header Radiation Monitors will be returned to OPERABLE status. The estimated completion date for the return of all Main Steam Header Radiation Monitors to OPERABLE status is August 31, 1997.

An INPO Nuclear NETWORK message will be issued to make other industry personnel aware of this problem.

(viii) Other Advice Related to Purchasers or Licensees:

None.

POWER REACTOR

EVENT NUMBER: 32621

FACILITY: CALVERT CLIFFS REGION: 1
UNIT: [1] [2] [ ] STATE: MD
RX TYPE: [1] CE, [2] CE

NOTIFICATION DATE: 07/14/97
NOTIFICATION TIME: 14:11 [ET]
EVENT DATE: 06/06/97
EVENT TIME: 00:00 [EDT]
LAST UPDATE DATE: 07/14/97

NRC NOTIFIED BY: PETER KATZ
HQ OPS OFFICER: STEVE SANDIN

EMERGENCY CLASS: NOT APPLICABLE
10 CFR SECTION:
CCCC 21.21 UNSPECIFIED PARAGRAPH

NOTIFICATIONS

HERB WILLIAMS RDO

VERN HODGE (VIA FAX) NRR

UNIT	SCRAM CODE	RX CRIT	INIT PWR	INIT RX MODE	CURR PWR	CURR RX MODE
1	N	Y	100	POWER OPERATION	100	POWER OPERATION
2	N	Y	99	POWER OPERATION	99	POWER OPERATION

EVENT TEXT

THE LICENSEE IS MAKING A 10 CFR PART 21 NOTIFICATION.

THE LICENSEE IDENTIFIED THAT THE RECENTLY INSTALLED MAIN STEAM HEADER RADIATION MONITORS, EXTENDED GAMMA SCINTILLATION DETECTORS SUPPLIED BY NUCLEAR RESEARCH CORPORATION, MODEL #MD-55E(V3), FAILED A CHECK SOURCE VERIFICATION UNDER NORMAL OPERATING CONDITIONS WITH AMBIENT TEMPERATURES BETWEEN 110 AND 120°F. THE DESIGN SPECIFICATION REQUIRES OPERATION UP TO 170°F WHICH WAS WITHIN THE VENDOR SUPPLIED OPERATING RANGE OF -22 TO 194°F. THE PROBLEM APPEARS TO BE RELATED TO THE TEMPERATURE COMPENSATION. THE DETECTORS WERE DECLARED INOPERABLE AND REMOVED FOR REPAIR AT THE VENDOR'S FACILITY. THIS PLACES BOTH UNITS IN TECHNICAL SPECIFICATION 3.3.3.1, ACTION STATEMENT (30), AND IN THE EMERGENCY RESPONSE PLAN IMPLEMENTATION PROCEDURES WHICH ALLOWS AN ALTERNATE METHOD OF MONITORING EFFLUENT NOBLE GAS IN THE RESPECTIVE MAIN STEAM HEADER.

THE LICENSEE PLANS TO INFORM THE NRC RESIDENT INSPECTOR.