U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-317/88-20
50-318/88-20

Docket Nos. 50-317
50-318

License Nos. DPR-53 Category C
DPR-69

Licensee: Baltimore Gas and Electric Company
P.O. Box 1475
Baltimore, Maryland 21203

Facility Name: Calvert Cliffs Nuclear Power Plant, Units 1 and 2

Inspection At: Lusby, Maryland

Inspection Conducted: August 17-19, 1988

Inspectors: A. Weadock 9/6/88
A. Weadock, Radiation Specialist date

R. Loesch 9/7/88
R. Loesch, Radiation Specialist date

Approved by: M. Shanbaky 9/8/88
M. Shanbaky, Chief, Facilities Radiation Protection Section date

Inspection Summary: Inspection conducted on August 17-19, 1988 (Combined Inspection Report Nos. 50-317/88-20, 50-318/88-20).

Areas Inspected: Unannounced, reactive inspection of events associated with a higher than anticipated worker exposure on June 21, 1988. This exposure occurred during routine maintenance in the Unit 1 Auxiliary Building 27 foot elevation valve alley.

Results: One violation was identified: failure to perform an adequate survey (see section 3.3).

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DETAILS

1.0 Persons Contacted

1.1 Licensee Personnel

*A. Anuje	Supervisor, Quality Assurance (QA)
*J. Carroll	General Supervisor, QA
*C. Cruse	Manager, Nuclear Engineering Support
*R. Douglass	Manager, Quality Assurance and Services
*J. Lenhart	Radiological Controls Operations Supv.
*J. Lohr	Assistant General Supervisor, Operations
*N. Millis	Radiation Safety General Supv.
*W. Putnam	Senior QA Auditor
*D. Shaw	Licensing Engineer
*C. Sly	Licensing Engineer
*L. Smialek	Radiation Control and Support Asst. Gen. Supv.
*A. Vogel	Technical Training Supv.

1.2 NRC Personnel

*M. Slosson	NRR Project Manager
*D. Trimble	Senior Resident Inspector

*Attended the exit interview on August 19, 1988.

Other licensee personnel were also contacted during the course of this inspection.

2.0 Purpose

The purpose of this unannounced reactive inspection was to review events associated with the higher than anticipated worker external exposure which occurred on June 21, 1988. This exposure occurred during routine maintenance activities in the Unit 1 Auxiliary Building 27 foot elevation valve alley. No regulatory exposure limits were exceeded during this event.

3.0 Higher Than Anticipated Exposure Event

The inspector evaluated the licensee's identification of and response to the above higher than anticipated exposure event by the following methods:

- discussion with involved personnel,

- tour of the Unit 1 27′ valve alley,

- review of associated radiological surveys, log entries, and Calvert Cliffs Report (CCR),

- review of Special Work Permit (SWP) 88-003, "Inspections and Minor Maintenance in High Radiation Areas",

- review of General Orientation Training lesson plan,

- review of the following procedures:

    o RSP 1-101, "Radiological Surveys",

    o RSP 1-201, "SWP Preparation".

Within the scope of the above review, one violation, concerning a failure to perform an adequate survey, was identified and is discussed below.

3.1 Event Summary

On June 21, 1988, two maintenance workers entered the Unit 1 27′ valve alley, a locked and posted High Radiation Area (HRA), to lubricate reach rod linkage fittings. The workers signed in on Special Work Permit (SWP) No. 88-003, "Inspections and Minor Maintenance in High Radiation Areas." The most recent routine radiological survey for the valve alley, completed on June 9, 1988, indicated general area radiation dose rates of 50 mR/hr at the presumed work location inside the valve alley. The valve alley was also posted as a contaminated area, with the boundary and step-off pad located just inside the locked doorway.

The two workers met with the area Radiation Safety Technician (RST), who performed a brief, "spot check" survey inside the doorway of the valve alley to verify the previous survey readings. The two workers, equipped with their own survey meter, then entered the valve alley and worked for approximately 5 minutes. Anticipated exposure for this work entry was less than 15 millirem. Upon exit, the workers read their pocket dosimeters which indicated they had received 60 and 130 millirem, respectively. The workers notified the area RST.

The RST immediately performed a survey in the valve alley and identified a hot spot reading approximately 50-70 R/hr located on a CVCS valve and adjacent piping in the 13 CVCS ion exchanger discharge line, approximately five feet from the work area. Although not recorded (see section 3.3), survey measurements made in the work area adjacent to one of the chest-level linkage fittings ranged from 800-2000 mR/hr, approximately 15-40 times the assumed dose rates. The RST then posted the valve alley as an exclusion area, restricting all access. Subsequent surveys performed by a Radiation Control supervisor

identified contact dose rates ranging from 30-70 R/hr on the valve and short segment of CVCS piping, with 18 inch dose rates from 3-5 R/hr.

3.2 Licensee Followup

Licensee follow-up actions to the above event included the following:

- Flush of the CVCS valve and piping on July 7, 1988.

- Immediate initiation of an investigation into circumstances leading to the event. The investigation was conducted by a QA auditor with previous health physics experience. The investigation and findings were documented in a Calvert Cliffs Report (CCR) which was submitted to the plant safety review committee (PSORC) on August 4, 1988. The auditor's review included interviews with the maintenance workers, the RST, review of related surveys, and observation of the work area.

- The CCR was not submitted to PSORC until August 4, 1988, approximately six weeks after the incident. At that time, there was disagreement between the CCR investigator and the RC staff as to whether an inadequate survey had been performed. It was not until the Assistant General Supervisor, Radiation Control and Support, interviewed the involved RST during the week of the NRC inspection, that the RC staff concurred with the CCR.

- The licensee's Radiation Safety Technicians were not briefed concerning details of the event until the week of the inspection.

- As of August 19, 1988, the RC staff had not independently interviewed the two maintenance workers concerning the event. NRC interview of the two workers identified significant discrepancies between the accounts of the RST and the workers.

- Followup surveys of the valve alley were not performed by the RC staff until August 15, 1988, several weeks after the valve was flushed.

3.3 NRC Review

10 CFR 20.201, "Surveys", requires the licensee to make such surveys as are necessary to comply with the regulations in 10 CFR 20 and are reasonable to evaluate the extent of radiation hazards that may be present. The inspector determined through interview of the involved RST that the pre-work survey performed on June 21, 1988, was made just inside the doorway to the valve alley, rather than in the area in which the maintenance workers would be working, approximately six feet away. Subsequent measurements identified that area dose rates in the work area were much greater than anticipated and that the presence of a significant radiation hazard (50-70 R/hr hotspot) was unknown at the time work was initiated. Failure to perform an adequate survey of the work area constitutes an apparent violation of 10 CFR 20.201 (50-317/88-20-01).

The inspector noted the licensee's CCR identified the pre-work survey as inadequate, and therefore this violation potentially qualifies for enforcement discretion as a licensee-identified violation as provided for in 10 CFR 2, App. C. Qualification for such discretion requires the apparent violation to meet several conditions, including the requirement that measures to prevent recurrence be completed within a reasonable period of time.

The inspector stated that mitigation of the violation was not appropriate as the QA auditor's findings relative to the inadequate radiological survey were being refuted by the RC group rather than initiating prompt and aggressive action to prevent recurrence.

The licensee stated their immediate corrective actions were directed at posting and access control of the valve alley and hot spot and that these actions were done in a timely fashion. The inspector acknowledged the area was quickly and effectively controlled. The inspector also stated that the poor survey practices exhibited, whether practiced on an individual or a widespread basis, represented a significant concern in radiological work control which should have been quickly addressed and corrected.

The following additional concerns were also identified during this review:

- The use of a broad-scope, routine SWP for work in the valve alley was inappropriate. Licensee procedure RSP 1-201, section 3.6, states that routine SWPs are designed to allow access to controlled areas for activities involving minimal or clearly defined radiological hazards. The inspector noted that the valve alley is an area with the potential for rapid and dramatic changes in area dose rates, based on radwaste operations. The licensee indicated that the use of a routine SWP for this and other HRAs would be evaluated. The licensee also stated that the use of additional controls over work in HRAs (i.e., continuous coverage) was being evaluated.

- The pre-job survey performed by the RST was not documented. As this survey is the subject of one apparent violation, no additional citation against 10 CFR 20.401 (i.e., failure to maintain survey records) is warranted. The inspector noted, however, additional examples of weaknesses in survey documentation practices. Area dose rate measurements in the presumed work location were apparently taken after identification of the hotspot and were stated to the inspector as being 800 and 2000 mR/hr respectively, however, these measurements were not documented. The licensee has also recently implemented the use of a "work ticket" form that accompanies the work party and requires the area technician to document survey measurements on the form. The inspector noted the use of this unproceduralized form is inconsistent; although it was used for similar activities in the valve alley on previous days it was not used on June 21, 1988, for the subject incident.

- NRC interview of the RST and the two workers identified significant inconsistencies concerning the level of the pre-job briefing and the scope of work to be performed. A specific inconsistency of concern is whether it was known that the workers would be climbing pipes in the overhead, an unsurveyed area, to reach two fittings 13 feet off the floor. As of the week of this inspection the licensee had not followed up on this concern.

  The licensee indicated that the investigation into activities surrounding the incident was still continuing and the above concern would be evaluated.

- No formal dose assessment had been performed by the licensee to evaluate whether the worker's dosimetry placement was adequate to monitor exposure to the unanticipated hot spot, and whether adjustments to the recorded dose were necessary. The licensee indicated that the survey of the valve performed by the RC supervisor on June 21, 1988, indicated that the hot spot represented a whole body exposure source to the workers and was adequately monitored by the worker's TLDs. This was due to the consistency in dose rates, and the valve's location and inaccessibility. No follow-up to this initial assessment, however, such as interviewing the workers concerning their location or survey of the valve alley general areas prior to the hotspot flush was performed. The inspector concluded, based on visual inspection of the valve alley that the licensee's dose assessment of 60 and 130 mrem for the two workers was appropriate. The licensee stated that the maintenance workers would be interviewed concerning their movements to determine if the licensee's initial assessment remained valid.

Licensee evaluations and any additional actions addressing the above concerns will be reviewed in a subsequent inspection.

4.0 Exit Meeting

The inspector met with licensee representatives, denoted in Section 1.0 of this report, on August 19, 1988. During this meeting the inspector summarized the purpose, scope and findings of the inspection.