U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-317/85-14
50-318/85-12

Docket Nos. 50-317
50-318

License Nos. DPR-53 Priority --- 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: Calvert Cliffs site,
BG&E Corporate Office and BG&E Electrical Test Department Lab

Inspection Conducted: June 10-14, 1985

Inspectors: Richard K. Struckmeyer 7-19-85
R. K. Struckmeyer, Radiation Specialist date

J. R. McFadden 7-19-85
R. McFadden, Radiation Specialist date

Approved by: M. Shanbaky 7/26/85
M. Shanbaky, Chief date
PWR Radiation Protection Section

Inspection Summary: Inspection on June 10-14, 1985, (Combined Inspection Report Nos. 50-317/85-14 and 50-318/85-12)

Areas Inspected: Routine, unannounced inspection of the radiological environmental monitoring program including: management controls; audits; quality assurance program for analytical measurements; and implementation of the radiological environmental monitoring program. The inspection involved 64 onsite inspector hours by two region based inspectors.

Results: Within the areas inspected, no violations were identified.

DETAILS

1. Individuals Contacted

L. Bartal, Senior Radiological Chemist, Chemical Engineering & Test (BG&E)
**E. Bauereis, Senior Biologist (BG&E)
A. Benson, Laboratory Testman (BG&E)
*P. Crinigan, General Supervisor-Chemistry (Calvert Cliffs)
**G. Fuhrman, Director, Environmental Programs (BG&E)
**M. Gavrilas, Senior Chemist (BG&E)
W. Gunter, Senior Engineering Technician (BG&E)
T. Jones, Control Room Supervisor (Calvert Cliffs)
W. Putnam, Senior QA Auditor (Calvert Cliffs)
E. Reichert, Principal Engineer, Chemical Engineering & Test (BG&E)
M. Roberson, General Supervisor - QA Audits (Calvert Cliffs)
*L. Russell, Plant Superintendent (Calvert Cliffs)
M. Wieland, Environmental Technician (BG&E)

*Denotes those present at the exit interview on June 12, 1985, at the Calvert Cliffs site.
**Denotes those present at the exit interview on June 14, 1985, at the BG&E Corporate Office.

2. Licensee Action on Previous Inspection Findings

(Open) Inspector Followup Item (317/84-09-04; 318/84-09-04): Adequacy of revisions to procedures for air filtration system testing. The inspector reviewed the licensee's log of air filtration system tests and noted that the licensee uses this log to ascertain which tests were performed to meet Technical Specification requirements. The inspector also reviewed Surveillance Test Procedure M-541-0, Rev. 4, "Control Room Post LOCI Filter Test (Charcoal)," and noted that a provision had been added for verification of visual inspection of the filters. The licensee's actions concerning these areas are satisfactory. However, the licensee had not taken action concerning fan operation when there are two fans in the same filter train; nor for stating the circumstances under which a flow distribution test is required.

3. Management Controls

The inspector reviewed the licensee's management controls for the Radiological Environmental Monitoring Program (REMP), including assignment of responsibility, program audits, and corrective actions for identified inadequacies and problem areas in the program.

a. Assignment of Responsibility

The inspector reviewed the organization and administration of the REMP. Primary responsibility for the program is held by the Environmental Programs section in the Electric Engineering Department. The manager of Electric Engineering reports to the Vice President, Engineering and Construction.

The collection and analysis of environmental samples are performed by various personnel within the Chemical Engineering and Test section. This section is part of the Electric Test Department, whose manager reports to the Vice President, Electric Interconnection and Operations. The Chemical Engineering and Test section has assumed responsibility for all sample analyses, including those formerly held by contractor laboratories. However, certain analyses formerly performed by a contractor, such as Sr-89 and Sr-90 in water samples, are no longer required by Technical Specifications.

Plant operations are separated from the administration of REMP activities. The Plant Superintendent reports through the Manager, Nuclear Power Department, to the Vice President, Supply. The organization described here conforms to the Calvert Cliffs Technical Specifications.

b. Licensee Audits

The inspectors reviewed the following audits of the environmental program: "Quality Assurance Audit of Off-site Environmental Monitoring Activities" (QA File No.: QAG 61-83-21) dated August 10, 1983; and "Quality Assurance Audit of Electric Engineering and Electric Test Departments Environmental Monitoring Activities" (QA File No.: QAG 61-84-19) dated August 20, 1984.

No findings or recommendations were identified in either audit.

4. Licensee Program for Quality Control of Analytical Measurements

The inspectors reviewed the licensee's program for quality control of analytical measurements for the radiological analysis of environmental media. All environmental radiological analyses with the exception of radiostrontium in fish bone were performed by the Chemical Engineering & Test Section Laboratory of the Electrical Test Department. Analysis for radiostrontium in fish bone is no longer required under revised environmental technical specifications effective March 1, 1985. The licensee participates in the U. S. Environmental Protection Agency Crosscheck Program for radiological analyses of environmental media. A licensee representative stated that intercomparisons of radioanalytical results were also made with the State of Maryland.

The licensee performs gamma spectroscopic analyses in its laboratory, using a NaI (Tl) detector and one of two available Ge(Li) detectors. The licensee stated that these instruments are checked for proper operation at the time of use by observing the FWHM and total response for naturally occurring radionuclides, primarily K-40, in samples being analyzed. The inspector stated that the use of control charts would provide a more precise method of quality control for these instruments. The licensee stated that it would establish control charts for FWHM and for detector response and utilize these for any instrument in use for gamma spectroscopy. This will be reviewed in a future inspection (317/85-14-01; 318/85-12-01).

The licensee has previously established and maintains control charts for its low background beta counter and its liquid scintillation counter.

The inspectors reviewed the licensee's quality control for its environmental TLD monitoring system. The licensee regularly participates in the International Environmental Dosimeter Intercomparison Project, sponsored by DOE, NRC, and EPA. The results of the 1984 intercomparison indicated close agreement between the licensee's results and the actual dose delivered, as reported by the project's sponsors.

The licensee's Technical Specifications, Section 4.12 (surveillance requirements for Radiological Environmental Monitoring), contain a table listing detection capabilities for environmental sample analysis. A footnote to this table states that the "required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13." This regulatory guide endorses, with a few modifications, the requirements and recommendations for performance specifications, testing procedures, field procedures, and reporting procedures that are included in ANSI N545-1975.

Section 7.2 of ANSI N545-1975 permits the requirements of Section 4 of the standard to be satisfied by reference to prior documents, such as test results by vendors. During this inspection, the licensee produced copies of some vendor data pertaining to portions of the performance specifications (e.g., uniformity and reproducibility) and some of its own data pertaining to other portions (e.g., length of field cycle and self-irradiation).

The licensee stated that some test data either were not available or not applicable to its TLD system. In addition, the licensee had no documentation available at the time of this inspection to demonstrate whether its system meets the ANSI N545 criterion (Section 3.3) for the overall measurement error, i.e., within 30%. The inspector stated that the licensee should document the performance of each test required by ANSI N545-1975, including the overall measurement error. The adequacy of the licensee's TLD system for environmental radiation measurement is considered

unresolved pending the completion of its evaluation of the performance tests required by ANSI N545-1975, and subsequent review by the NRC (317/85-14-02; 317/85-12-02).

5. Implementation of the Environmental Radiological Monitoring Program

a. Direct Observation

The inspectors examined selected air sampling and TLD monitoring stations, the intake and outfall composite water sampling stations, and the onsite garden plot stations. The inspectors determined that the examined stations were located as required by the revised Environmental Technical Specifications effective March 1, 1985, and that the air and water sampling stations were operational at the time of the inspection.

The inspectors also toured the radioanalytical laboratory of the BG&E Chemical Engineering and Test Section and reviewed the sample logbook, calibration records for air samplers and counting instruments, and the laboratory procedures for sample processing, sample analysis, and data evaluation.

b. Review of Annual Reports

The inspectors reviewed annual reports for 1983 and 1984. It was determined that the licensee has conformed with the Environmental Technical Specifications in terms of sampling frequencies, measurements, reporting schedules, and analytical sensitivities.

c. Thermoluminescent Dosimeters (TLDs)

The U.S. Nuclear Regulatory Commission (NRC) Direct Radiation Monitoring Network is operated by the NRC (Region I) to provide continuous measurement of the ambient radiation levels around commercial nuclear power plants throughout the United States. Each site is monitored by arranging approximately 30 to 50 thermoluminescent dosimeter (TLD) stations in two concentric rings extending to about five miles from the power plant. The monitoring results are published in NUREG-0837 quarterly.

One of the purposes of this program is to serve as a basis of comparison with similar programs conducted by individual utilities which operate nuclear power plants. Therefore, several NRC TLDs are co-located with licensee TLDs.

The NRC environmental TLD program uses the Panasonic Model UD801 thermoluminescent dosimeter, containing two elements of $Li_2 B_4 O_7$: Cu and two elements of $CaSO_4$:Tm. The Calvert Cliffs environmental TLDs are pencil type glass bulb dosimeters, containing $CaSO_4$:Tm as the active material.

During this inspection the monitoring results of co-located TLDs were compared and the results are listed in Table 2. Table 1 describes the NRC TLD locations around the Calvert Cliffs Nuclear Power Plant.

All NRC exposures are normalized to a 90-day quarter and reported in units of milliroentgens (mR), and uncertainties are the total uncertainty (random and systematic uncertainties). The licensee reports monitoring results only with random uncertainty. Both the NRC and the licensee random uncertainties are equivalent to ±1 standard deviation.

Most of the licensee's monitoring results (17 of 22 comparisons) are slightly higher than the NRC's results as shown in Table 2, but results are generally in good agreement. It must be emphasized that the co-located TLDs are not necessarily monitoring the same station; two-tenths of a mile apart is not unusual.

6. Meteorological Monitoring

The inspectors examined the primary meteorological tower and the associated instrumentation, including the readout systems at the tower site and in the control room.

The primary tower instrumentation is read out via strip chart recorders at the tower site, and via a MIDAS computer system in the control room. The latter system was not operational at the time of the inspection; however, meteorological data were available in the control room via the strip chart recorders for the backup meteorological instrumentation. The inspectors noted that the data on these strip charts agreed with the data recorded by the primary meteorological strip charts at the tower site, and that both of these appeared to be accurately recording the ambient conditions.

The inspectors noted that a procedure was available in the control room for dose assessment in the event of an unplanned release. This procedure contained instructions stating how meteorological data should be obtained, including the situation in which the primary meteorological instrumentation data is unavailable, as was observed at the time of this inspection.

The inspectors also reviewed selected records of calibrations of the meteorological instruments, and found that these had been performed on a semiannual basis as required by Technical Specifications. It was noted that the licensee performs its own calibrations, with the exception of the anemometers, which are calibrated by the National Bureau of Standards (NBS) under contract. The inspectors noted that NBS had not specifically certified the starting speed for anemometers calibrated under this contract.

Although not specifically required by Technical Specifications, Regulatory Guide 1.23 states that the starting speed should be less than 1 mph. The calibration records list several data points ranging from a low wind speed to a high wind speed. The available records did not indicate whether the lowest recorded wind speed is equivalent to the starting speed of the anemometer being calibrated. The following chart indicates the lowest recorded speed for four anemometers calibrated on April 25, 1984.

Anemometer Serial Number	Lowest Recorded Wind Speed (mph)
642	1.0
641	1.2
1107	2.0
1160	3.3

These anemometers were recalibrated on April 1, 1985, at which time the lowest recorded wind speeds were below 1 mph for all four instruments.

The licensee stated that in the future it would ensure that its anemometers will meet the RG 1.23 recommended starting speed of <1 mph at the time of calibration, and that this will be documented in the calibration records. This will be reviewed in a future inspection (317/85-14-03; 318/85-12-03).

7. Unresolved Item

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. An unresolved item disclosed during this inspection is discussed in Paragraph 4.

8. Exit Interview

On June 12 and 14, 1985, the inspectors met with licensee representatives denoted in Paragraph 1 at the Calvert Cliffs site in Lusby, Maryland, and at the licensee's facilities in Baltimore, Maryland, respectively. During these meetings, the inspectors summarized the purpose, scope, and findings of this inspection. At no time during this inspection was written material provided to the licensee by the inspector.

TABLE 1. Co-located TLD Stations

NRC Station	Location	Nearest Licensee Station	Location*
1	W, 275°, 1.5 mi.	19	WSW, 1.7 mi.
6	NW, 324°, 4.7 mi.	26	NW, 5.1 mi.**
12	WSW, 243°, 1.3 mi.	25	WSW, 1.4 mi.
14	SSW, 208°, 1.8 mi.	20	SSW, 1.9 mi.
20	SE, 139°, 4.7 mi.	22	SE, 4.5 mi.
24	S, 190°, 7.8 mi.	27	S, 8.0 mi.

* Licensee does not report azimuth.
** These stations are 0.4 mile apart.

TABLE 2. Environmental TLD Monitoring Results, 1984

(mR/std. quarter ± random uncertainty; total uncertainty)*

Station Number		Monitoring Period			
NRC No.	Licensee No.	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
1		10.7±0.3;1.6	**	9.6±0.3;1.4	14.7±0.8;3.7
	19	12.3±0.2	11.9±0.2	12.1±0.2	12.2±0.2
6		11.0±0.3;1.7	13.5±0.5;2.5	9.9±0.3;1.5	14.1±0.8;3.6
	26	12.0±0.3	12.2±0.3	12.5±0.2	12.7±0.2
12		13.3±0.4;2.0	**	11.0±0.3;1.7	12.3±0.8;3.5
	25	13.7±0.2	13.8±0.1	14.9±0.3	14.2±0.1
14		10.4±0.3;1.6	9.8±0.4;2.0	8.4±0.2;1.3	10.3±0.7;3.3
	20	12.2±0.3	11.6±0.3	11.1±0.1	11.5±0.05
20		9.8±0.3;1.4	12.3±0.5;2.3	8.3±0.2;1.3	12.0±0.8;3.5
	22	11.6±0.2	11.8±0.3	12.0±0.1	11.4±0.2
24		10.1±0.3;1.6	10.4±0.5;2.1	8.9±0.3;1.4	10.7±0.8;3.4
	27	11.4±0.2	10.8±0.2	11.0±0.1	11.4±0.2

*Licensee's results as reported in this table are the averages of four dosimeters per location; the licensee reports only random uncertainty.
**Missing or damaged dosimeter.