

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-317/92-14 and 50-318/92-14
Docket Nos. 50-317 and 50-318
License Nos. DPR-53 and 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: April 27-May 1, 1992

Inspector: Jason C. Jang 5-19-92
Jason C. Jang, Sr. Radiation Specialist, Effluent
Radiation Protection Section (ERPS), Facilities
Radiation Safety and Safeguards Branch (FRS&SB) date

Approved by: Robert J. Bores 5-19-92
Robert J. Bores, Chief, ERPS, FRS&SB, Division
of Radiation Safety and Safeguards (DRSS) date

Areas Inspected: Announced safety inspection of the radioactive liquid and gaseous effluent control programs including: management controls and ability to calculate projected offsite doses to the public.

Results: Within the areas inspected, the licensee had an excellent capability to calculate projected doses to the public prior to release of radioactive liquid and gaseous materials.

DETAILS

1.0 Individuals Contacted

1.1 Licensee Personnel

- * P. Crinigan, General Supervisor - Chemistry
- C. Earls, Chemistry Supervisor
- * R. Franke, Compliance Engineer
- * P. Katz, Technical Support Superintendent
- J. O'Neil, Senior Chemistry Technician
- * J. Szymkowiak, Chemistry Services
- * J. Wood, Quality Audits, Quality Assurance

1.2 NRC/NRC Contractor

- * T. Bohn, NRC Contractor (EG&G Idaho, Inc.)
- * T. Essig, Radiation Protection Branch, NRR, NRC
- * F. Lyon, Resident Inspector
- * P. Wilson, Senior Resident Inspector

* Denotes those individuals present at the exit meeting on May 1, 1992. The inspector also interviewed other licensee employees during this inspection.

2.0 Purpose

The purpose of this inspection was to review the licensee's ability to calculate projected doses to the public from radioactive liquid and gaseous effluent releases during normal operation.

3.0 Program Changes

The inspector reviewed the organization and administration of the radioactive liquid and gaseous effluent control programs and the changes made since the last inspection. The inspector determined that the radioactive effluent controls program had not changed since the last inspection conducted on December 16-20, 1991. The Chemistry Department remains responsible for conducting the radioactive liquid and gaseous effluent control programs.

4.0 Radioactive Liquid and Gaseous Effluent Controls

The inspector reviewed selected radioactive liquid and gaseous discharge permits and associated procedures as part of the examination of the implementation of the

Technical Specification requirements for both units.

Technical Specification (TS) Requirements

- o TS 3/4,11.1, "Liquid Effluents"
- o TS 3/4,11.2, "Gaseous Effluents"
- o TS 3/4,11.4, "Total Dose"
- o TS 6.17, "Offsite Dose Calculation Manual (ODCM)"

Calculations of projected doses to the public are required by the above TS prior to releasing any radioactive materials through liquid or airborne pathways. The inspector reviewed selected radioactive liquid and gaseous discharge permits. The reviewed permits were completed and included the dose projection calculations required by the TS.

5.0 Review of the ODCM

Prior to this inspection, an NRC contractor (EG&G Idaho, Inc.) reviewed the licensee's most recent ODCM and conducted an independent verification of the licensee's offsite dose calculational software using its semiannual radiological effluent report for the second half of 1990. The licensee's report contained the latest revision (Revision 1) to the ODCM as an attachment. The report and ODCM were reviewed to find the site specific parameters and methodology used by the plant to calculate offsite doses. It was found that the licensee uses the methodology specified in NUREG-0133; however, no site specific parameters (dose conversion factors) were listed.

During this inspection, the inspector reviewed a draft upgrade of the ODCM and noted that the site specific parameters were listed. The inspector also noted that the draft upgrade ODCM contained more information (i.e., specific parameters) to conduct better radioactive liquid and gaseous effluent control programs than the existing Revision 1. This new draft ODCM was ready for review and approval by the Plant Operations and Safety Review Committee (POSRC) as required by the TS.

Based on the review of the new draft ODCM, the inspector determined that the licensee will have the methodology to conduct an excellent effluent control programs. The inspector stated that the implementation of the new draft ODCM by the Chemistry Department will be reviewed during a subsequent inspection. No violations or deviations were identified.

6.0 Comparisons of the Project Dose Calculation Program

During this inspection, the inspector performed an independent verification of the licensee's capability for calculating projected doses to the public using radioactive liquid and gaseous discharge permits. The licensee calculated the projected dose to the public prior to discharge of radioactive liquids and/or gases based on the data incorporated into the discharge permits. The inspector also used the same parameters contained in the discharge permits (e.g., dilution factor, total amount of radioactivity released, meteorological data, etc.) to calculate the maximum projected doses to the public for the purpose of intercomparison. The licensee used its computer code and the NRC used the "PCDOSE code". The intercomparison results are listed in Tables 1 and 2.

The PCDOSE code was developed by Idaho National Engineering Laboratory (EG&G Idaho, Inc.) for the U.S. Nuclear Regulatory Commission. The code was designed to calculate the maximum projected radiation dose to an individual and the average dose to the population due to radionuclides released in radioactive liquid and airborne effluent releases from a nuclear power plant. The code was designed for normal operation rather than for emergency situations. The code was developed from the methodology found in both NUREG-0133 and Regulatory Guide 1.109 (Revision 1). The PCDOSE code is to serve as a basis of comparison with similar programs conducted by individual utilities which operate nuclear power plants.

The results of the dose projection comparisons indicated that all of the results were in excellent agreement. The NRC currently does not have specific criteria for comparison; however up to about a 50% difference in projected dose values is acceptable as long as the cause of difference can be identified. The reasons for the difference in the results between the licensee and the NRC dose comparison, listed in Table 1, were mainly due to different references used by the licensee and the NRC for the radioactive decay constants and dose factors. For example, the licensee used ICRP 37 to obtain radioactive decay constants while the NRC used C. Lederer's Table of Isotopes.

Based on the above comparison results and reviews, the inspector determined that the licensee conducted an excellent projected dose calculation program.

7.0 Exit Interview

The inspector met with licensee representatives (denoted in Section 1.1 of this inspection report) at the conclusion of the inspection on May 1, 1992. The inspector summarized the purpose, scope, and findings of the inspection.

Table 1. Dose Projection Comparisons (Release Sources : Plant Vents and Liquid)

Maximum Individual (Infant for Plant Vents and Adult for Liquid Release) Dose (mrem)

	Bone	Liver	Total Body	Thyroid	Kidney	GI-LLI	Releases
Licensee	5.60E-6	6.60E-6	2.92E-6	2.15E-3	7.70E-6	2.70E-7	Plant Vent Batch 1
NRC	5.87E-6	7.00E-6	3.01E-6	2.24E-3	8.18E-6	3.11E-7	
Licensee	1.51E-5	1.75E-5	5.97E-6	3.24E-3	1.44E-5	N/C	Plant Vent Batch 2
NRC	1.42E-5	1.67E-5	4.91E-6	3.31E-3	1.37E-5		
Licensee	1.41E-5	1.67E-5	7.37E-6	5.42E-3	1.95E-5	6.83E-7	Plant Vent Batch 3
NRC	1.43E-5	1.69E-5	7.38E-6	5.50E-3	1.97E-5	6.45E-7	
Licensee	5.68E-4	9.86E-4	7.31E-4	1.48E-3	3.32E-4	N/C	Liquid
NRC	5.95E-4	1.01E-3	7.81E-4	1.37E-3	3.36E-4		
Licensee	1.51E-5	1.76E-5	5.97E-6	3.24E-5	1.45E-5	N/C	Plant Vent Batch 4
NRC	1.42E-5	1.68E-5	4.95E-6	3.34E-5	1.38E-5		

N/C = Not compared due to malfunctioning of the licensee's computer.

Table 2 Noble Gas Dose Projection Comparisons (Release Source: Vent)
Maximum Individual Dose

	Total Body (mrem)	Skin (mrem)	Gamma-Air (mrad)	Beta-Air (mrad)	Releases
Licensee	3.45E-4	7.86E-4	3.90E-4	8.47E-4	Batch 1
NRC	3.45E-4	7.86E-4	3.90E-4	8.47E-4	
Licensee	2.94E-4	5.64E-4	3.28E-4	6.58E-4	Batch 2
NRC	2.94E-4	6.64E-4	3.28E-4	6.58E-4	
Licensee	5.62E-4	1.36E-4	6.63E-4	1.87E-3	Batch 3
NRC	5.62E-4	1.36E-4	6.63E-4	1.87E-3	