

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-317/80-07

Docket No. 50-317

License No. DPR-53 Priority \_\_\_\_\_ Category C

Licensee: Baltimore Gas and Electric Company  
Gas and Electric Building - Charles Center  
Baltimore, Maryland 21203

Facility Name: Calvert Cliffs, Unit No. 1

Investigation at: Lusby, Maryland

Investigation conducted: April 29-May 1, 1980

Investigators: J. P. Durr, Reactor Inspector

J. A. Serabian  
J. A. Serabian, Radiation Specialist

5/21/80  
date signed

5-19-80  
date signed

\_\_\_\_\_  
date signed

\_\_\_\_\_  
date signed

Approved by: L. E. Tripp, Chief, Engineering Support  
Section No. 1, RC&ES Branch

5/23/80  
date signed

Investigation Summary:

Investigation on April 29-May 1, 1980 (Report No. 50-317/80-07)

Areas Investigated: Unannounced investigation of allegations relating to the pipe support activities performed to comply with NRC Bulletin 79-02 and radiation safety procedures. The investigation involved 16 investigator-hours on site by one Regional based NRC investigator. Portions of the allegations were investigated through several telephone contacts with licensee and contractor representatives. Findings in these areas were substantiated by documentation obtained at the site by the Senior Resident Inspector.

Results: None of the allegations were substantiated and no items of noncompliance were identified.

## I. Background

### a. Reason for Investigation

Three NRC representatives interviewed the alleged on April 4, 1980. This interview was the last of a series that took place to accurately establish the alleged's concerns. The NRC representatives were selected for their expertise in the technical areas previously addressed by the alleged. The allegations concern radiation safety and pipe support design/repair practices at the Calvert Cliffs, Unit No. 1 facility.

### b. Identification of Organizations

1. Baltimore Gas and Electric Company  
Baltimore, Maryland

The NRC license holder for Calvert Cliffs Units Nos. 1 and 2.

2. Bechtel - Gaithersburg  
Gaithersburg, Maryland

Contracted to Baltimore Gas and Electric Company for architect-engineering services.

3. Catalytic, Inc.  
Philadelphia, Pennsylvania

Contracted to Baltimore Gas and Electric Company for maintenance-repair services.

## II. Summary of Findings

### Allegations and Investigation Conclusions

#### Allegation No. 1

"The designated crew chief for pipe support verification was inexperienced and unqualified."

The task assigned to the alleged and his designated "crew chief" did not demand a high level of technical skill. The job involved preliminary estimates of pipe support location, accessibility, and anchor bolt type. The alleged and his crew chief would have been under direct engineering supervision.

The allegation was not substantiated.

#### Allegation No. 2

The strength values used for concrete on Hanger Repair Procedures were assumed, not based on engineering knowledge.

The strength values used for concrete on Hanger Repair Procedures were obtained from the licensee's architect-engineer. Although the supplied values were not entirely correct, the error did not degrade system integrity.

The allegation was not substantiated.

#### Allegation No. 3

The torque values used to install pipe support anchor bolts were not based on established data.

The investigation determined that pipe support anchor bolt torque values were based on actual test data.

This allegation was not substantiated.

#### Allegation No. 4

Weld symbol "J-28" was used arbitrarily to specify weld sizes on pipe supports.

Weld symbol "J-28" does not specify weld size but joint geometry.

This allegation was not substantiated.

Allegation No. 5

The pipe support location verification program was not performed by taking field measurements due to a lack of ladders and scaffolding.

NRC inspection observations and a BG&E Audit Report do not support the allegation.

This allegation was not substantiated.

Allegation No. 6

The alleged was concerned he may have been exposed to a significant contamination hazard.

The entry into the controlled area was authorized by a Special Work Permit which prohibited access to contaminated areas. Very low levels of radiation were noted on the personnel dosimetry of the individuals. Also, the radiological surveys of the subject areas were low.

This allegation was not substantiated.

Allegation No. 7

A contaminated blueprint was removed from the controlled area.

An interview with the person who removed the blueprint, a review of the type and location of the survey meter used, and examination of the Rad-Chem contaminated materials log disclosed that the blueprint could not have been contaminated.

This allegation was not substantiated.

Allegation No. 8

The radiation protection instructions were inadequate for the alleged's entry into the Auxiliary Building.

The radiation instruction was adequate based on the alleged's completion of required training, he acknowledged and signed the Weekly Dosimeter Log, and he was accompanied while in the controlled area.

This allegation was not substantiated.

Allegation No. 9

The alleged was instructed to record zero mrem in the dosimeter log when he recalled a value greater than zero but less than 10 mrem. Was there any significance to this reading?

Area surveys, the total "stay-time," and the accompanying personnel's dosimetry reading indicate that the exposure value would have been less than 10 mrem. There is no health hazard connected with this exposure.

This allegation could not be substantiated.

### III. Details

#### A. Introduction

The allegor had telephone discussions with representatives of the NRC Region I office during August 1979, and subsequently met with NRC representatives on September 4, 1979. These discussions were of a general nature regarding the concrete expansion anchor bolts described in NRC Bulletins No. 79-02 and 79-14. By letter dated September 7, 1979, the allegor was provided copies of the bulletins and the associated responses for review and requested to provide any allegations of construction activities in writing. No response was received by the Region I office and following telephone discussions with the allegor during December 1979, January and March 1980, a meeting was held on March 17, 1980.

This investigation was initiated based on information received during an interview with the allegor on April 4, 1980. In the previous meetings, the allegor was not specific or addressed technical information beyond the NRC representatives' area of expertise. For this final interview, the NRC representatives were selected for their knowledge and experience in the areas previously addressed by the allegor.

Every effort was made to identify all of the allegors concerns that relate to the safe operation of a nuclear facility and the health and safety of the public.

#### B. Scope of the Investigation

The allegor addressed concerns in essentially two areas appropriate to the NRC's purview. These were radiation safety and pipe support design/repair activities.

#### C. Persons Contacted

##### Baltimore Gas and Electric Company

- A. Kaupa, Radiation Safety and Chemistry Engineer
- E. Reimer, Plant Health Physicist
- B. Rudell, Performance Engineer
- \*L. Russell, Chief Engineer
- \*T. Syndor, General Supervisor, Operations Quality Assurance

##### Catalytic, Inc.

- P. Creagor, Project Manager

##### Bechtel

- M. Williams, Resident Engineer

\*Denotes persons present at exit interview.

#### D. Investigation of Allegations

##### Allegation No. 1

The alleged worked for Catalytic, Inc., and was assigned to do pipe support location verification. His designated "crew chief" was inexperienced and unqualified to do the assigned work.

##### NRC Investigation

The NRC issued Bulletin 79-02, "Pipe Support Base Plate Design Using Concrete Expansion Anchor Bolts," which required extensive design analysis and installation evaluation and testing. Baltimore Gas and Electric Company (BG&E) responded by contracting Bechtel to do the associated architect-engineering work and Catalytic, Inc. to provide construction/repair services. The alleged was hired by Catalytic to complete a preliminary "Hanger/Support Verification Sheet."

The "Hanger/Support Verification Sheet" was designed to physically locate the hanger, evaluate accessibility, and identify the type of fasteners. This would prevent a work repair crew from spending a great deal of time locating hangers selected for repair or test. This kind of activity can be learned easily by someone with limited piping skills. The activity does not affect testing or repair. The activity was supervised by a BG&E engineer.

##### NRC Conclusion

The allegation was not substantiated. The alleged activity and the qualification of the involved "crew chief" does not have any impact on the safe operation of the facility.

##### Allegation No. 2

The alleged worked with "HRP" drawings (pipe supports). The strength values used for concrete on the drawings were assumed, not verified. He felt there was no basis for the value used. The "HRP" drawings were in the series 4900-5600.

##### NRC Investigation

It was determined by the investigator that "HRPs" are, in fact, "Hanger Repair Procedures." These are detailed, written procedures providing instructions for evaluation of hanger status, anchor bolt replacement, testing, and inspection. The only drawings associated with "HRPs" are the "Drawing Change Notice" and the "As Built" hanger drawings. Neither of these drawings specify concrete strength values.

Therefore, it is assumed that the allegor was referring to the "HRP" itself. In the title block of HRP #06, "Hanger Repair, is a space designated "Assume \_\_\_\_\_ PSI Concrete." This information was filled in by a Catalytic engineer based on specific instructions from BG&L engineers. This value would determine the actual torque applied to each anchor bolt for preload. The values used by the Catalytic engineer were received from Bechtel via BG&E on a speed letter, dated May 3, 1979. This is before the allegor arrived on site, circa late July 1979.

The values for concrete strength were broadly defined as 4000 psi for elevations -15', -5', and +5' and 3000 psi for elevation 27' and above. However, it was determined that this information was not totally accurate. The strength value for some floors and walls was, in fact, 4000 psi above the 27' elevation. It was further determined that, although some floors and walls were stronger, the error did not degrade the installation.

#### NRC Conclusion

This allegation could not be substantiated. There is no evidence to indicate that arbitrary values were used for concrete strength values. They were based on engineering judgments made by the architect-engineer group.

#### Allegation No. 3

The torque values used to install pipe support anchor bolts were not based on established data. They were extrapolated from lower values. The interrelation between concrete, bolt torque, embedment depth, and bolt size was not considered.

#### NRC Investigation

The NRC, in Bulletin 79-02, directed licenses to establish concrete anchor bolt torque versus tension relationships for the site specific concrete used. BG&E contracted the Law Engineering and Testing Company (LETCO) to perform these torque versus tension tests. A report, W-9-2444, was issued on June 27, 1979, describing the tests and providing torque versus tension curves. The tests were witnessed, in part, by NRC inspectors on June 18-21, 1979 (reference IE Inspection Report(50-317/79-09)). The tests were performed on a range of bolt sizes, from various manufacturers, and at the manufacturer's specified minimum embedment depth.

A comparison of the LETCO report and Civil Standard CS-5 disclosed that the torque values used by the licensee were equal to or more conservative than those established by testing. The Civil Standard specified an anchor bolt embedment depth consistent with the manufacturer's recommendations. In addition, anchor bolt size and minimum embedment depth is specified on the controlling "Drawing Change Notice" which is supplied by the architect-engineer.

NRC Conclusion

This allegation was not substantiated.

Allegation No. 4

Weld symbol "J-28" was specified to be used on hanger drawings (HRPs). The allegor wasn't sure, but he thinks the "J-28" correlates to a specific weld size, such as 1/8". He feels that his supervisor arbitrarily selected this value for use on the "HRP" drawings instead of selecting it from an engineering table.

NRC Investigation

It was determined that the weld symbol "J-28" denotes the weld joint geometry to be made, in this case, a fillet weld. The "J-28" is a numerical designation for a drawing which generally describes how to measure a fillet weld. It is part of a document titled, "Welding Program, WPP 6.020, Weld Joint Geometries." This information was entered on a "Weld Authorization Traveler" by the allegor's supervisor. The symbol does not specify the type and size of the weld. The type and size of all welds are specified on the "Drawing Change Notice" which is supplied by the engineer.

NRC Conclusion

This allegation was not substantiated.

Allegation No. 5

The allegor suspects that the hanger location verification program was not done by taking field measurements but by visual estimates. This is based on the lack of ladders, scaffolding, and other equipment required to climb into the higher elevations.

NRC Investigation

As discussed in "Allegation No. 1," the task for which the allegor was hired for was a preliminary evaluation of the pipe support work to be performed. It would have been his responsibility to determine the need for scaffolding and ladders.

In addition, NRC Bulletin 79-14, "Seismic Analysis for As-Built Safety-Related Piping Systems," required licensees to verify design input information. This was accomplished by physical measurement of pipe support configuration and location. The investigator informally interviewed a BG&E Auditor, who personally observed this activity (reference: BG&E, Q.A. File: QAG 60 - Bechtel - 79 Program 9, dated: 10/15-31/79)

Further, the NRC observed the presence of the necessary scaffolding during the inspection of Bulletin 79-02 activities on June 18-21, 1979.

#### NRC Conclusion

This allegation was not substantiated.

#### Allegation No. 6

The alleger was concerned that he may have been exposed to a significant contamination hazard on his entry into the Auxiliary Building on August 9, 1979.

#### NRC Investigation

The entry to the Auxiliary Building was made under Special Work Permit (SWP) No. 79-482A, "Perform Inspection of Anchor Bolts and Hanger Bolts in All Areas of U-2 Auxiliary Building Excluding High Radiation Areas."

The Weekly Dosimeter Log indicated that the maximum recorded radiation exposure to individuals in the work party was nine mrem. Two individuals recorded exposures of zero.

Radiological surveys of the areas covered by SWP No. 79-482A indicate that radiation levels ranged from 0.01 mr/hr to 20 mr/hr and contamination levels were all less than the specified limits, i.e., less than 1000 dpm/100 cm<sup>2</sup> in the areas where the work party passed. The individual who carried the blueprint indicated that contaminated areas were not entered.

#### NRC Conclusions

This allegation was not substantiated.

Based on review of the SWP, Weekly Dosimeter Log, and radiological surveys of the SWP job area of the work party, there is no indication that a significant contamination hazard existed.

#### Allegation No. 7

A blueprint taken into the controlled area was checked with a survey meter upon departure. It appeared that the blueprint read 100 mrem or some significant amount of contamination.

### NRC Investigation

The radiation (survey) meter for contamination monitoring at the point of egress was a count rate meter which reads out in counts per minute (cpm), not mrem. The radiation background in the monitoring area is about 100-150 cpm. The monitor reads 500 cpm full scale.

The health physics (Rad-Chem) monitoring log book does not indicate that a blueprint was found to be contaminated on the date in question.

The individual who carried the blueprint stated that he monitored the print on egress and no indication of contamination was noted.

### NRC Conclusions

This allegation was not substantiated.

Based upon the statement of the individual who carried the blueprint, a review of the type and location of the survey meter, and the Rad-Chem contaminated materials log, it is not possible that a survey of the blueprint showed 100 mrem. The instrument reading was 100 cpm rather than 100 mrem; such a reading indicates that there was probably no contamination at all.

### Allegation No. 8

The allegor felt that the radiation protection instructions provided to individuals for the foregoing entry into radiation areas was inadequate.

### NRC Investigation

Training records indicate that the concerned individual received a Basic Radiation Protection Orientation. Also, the individual initialed the Weekly Dosimeter Log which attests that the individual making the entry read and understood the SWP under which entry was made. (Although this statement is not on the Weekly Dosimeter Log, a licensee representative stated that this is station procedure and is covered during the orientation course.)

The concerned individual was instructed that while he was in the radiological controlled area, he was to follow the instructions of his supervisor.

NRC Conclusion

This allegation was not substantiated.

Based on the fact that the individual completed the Basic Radiation Protection Orientation Course, the individual initialed the Weekly Dosimeter Log, and the fact that the individual was known to have been instructed to follow his supervisor's actions, the radiation protection instructions appear to have been adequate for the entry to the Unit 2 Auxiliary Building on August 9, 1979, under SWP No. 79-482A.

Allegation No. 9

The allegor reported that he had been told to enter zero mrem on the dosimeter log and asked if there was any significance to this instruction from a supervisor when the pocket dosimeter indicated a value of something less than 10 mrem.

NRC Investigation

The licensee was unable to either verify or explain why an individual may have been instructed to enter a lower value on signing out. There was no health significance to reporting zero mrem when less than ten had been received. It is most likely that the individual had an exposure of less than ten millirem.

A licensee representative stated that the pocket dosimeters are re-set prior to each individuals entry to the controlled area. Drifting of the pocket dosimeter hairline may have occurred after the dosimeter was re-set and removed from the dosimeter charger.

From the Weekly Dosimeter Log entries and the TLD badge report, the radiation dose rates measured in the area, combined with the individual's residence time (40 minutes), a pocket dosimeter indication of zero mrem exposure would be possible. The information gathered was also consistent with an exposure of less than 10 mrem which the individual reported seeing on his pocket dosimeter.

NRC Conclusion

This allegation could not be substantiated. There was no health significance to reporting zero mrem when less than ten had been indicated by the pocket dosimeter.

E. Exit Interview

The investigator met with members of the licensee's staff (denoted in Paragraph C) at the conclusion of the investigation on May 1, 1980. He summarized the scope and findings of the investigation. Additional information was exchanged telephonically on April 10, 16, 17, 23, 24, 25 and May 5, 6, and 7.