# U.S. NUCLEAR REGULATORY COMMISSION REGION I

Report Nos.	50-317/86-01 50-318/86-01			
Docket Nos.	50-317 50-318			
License Nos.	DPR-53 DPR-69	Priority	Cat	tegory <u>C</u>
Licensee: B P B	altimore Gas an . O. Box 1475 altimore, Maryl	and 21203		
Facility Nam	e: <u>Calvert Cli</u>	ffs Nuclear Power Pla	nt, Units 1 ar	nd 2
Inspection A	t: <u>Gaithersbur</u>	g and Lusby, Maryland		
Inspection C	onducted: Janu	ary 13-17, 1986		
Inspector:	A. A. Varela,	Lead Reactor Engineer		2-12-86 date
NRC Contract	Personnel: M. T.	E. Nitzel, EG&G, Ida L. Bridges, EG&G, Id	ho, Inc. aho, Inc.	
Approved by:	J. J. Wiggins Processes Se	, Chilef, Materials an ction, EB, DRS	d	2-14/86 date
Inspection S	ummary: Inspec Nos. 50	tion on January 13-17 -317/86-01 and 50-318	, 1986 (Report /86-01).	-

<u>Areas Inspected</u>: Special, announced inspection by a region-based inspector and two NRC contractor personnel at the Gaithersburg office of the A-E and at the licensee plant site. The inspection concerned licensee actions in response to the NRC/IE Bulletin 80-11, Masonry Wall Design This included verification of actions undertaken and work performed in surveys of the as-built walls, engineering analyses and calculations to qualify the walls and, in modifications precipitated by the bulletin. The inspectors also verified the licensee's quality control and quality assurance activities related to the above. The inspection involved 49 inspector hours at the A-E's office, 42 at the plant site and 12 inspector hours of in office review.

Results: No violation was identified.

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# DETAILS

# 1. Persons Contacted

## Baltimore Gas and Electric Company (BG&E)

- \*A. Anuje, Supervisor Quality Assurance
- \*M. Bowman, General Supervisor Tech Services
- \*S. Cowne, Licensing Engineer
- \*M. Gahan, Senior Engineer
- \*J. Lippold, Manager, Nuclear Engineering Services Department
- B. S. Montgomery, Licensing
- \*G. O'Connell, Associate Engineer
- L. Salyards, Principal Engineer-Licensing
- A. Thornton, General Supervisor, Plant and Project Engineering
- \*G. Wasson, Supervisor, Quality Assurance
- \*M. Gahan, Senior Engineer
- D. Ward, Principal Engineer

### Bechtel Power Corporation (BC)

- J. Brothers, Chief, Quality Engineer
- \*S. Close, Civil Group Supervisor
- M. J. Kaplow, Project Quality Engineer
- D. Stowart, Project Engineer
- \*M. H. Williams, Resident Engineer

\*denotes attendees at Exit Interview

#### 2. Inspection Purpose and Scope

The purpose of this inspection was to review with cognizant and responsible licensee and A-E representatives at Bechtel Engineering office and the plant the completeness of their responses to NRC/IE Bulletin 80-11, Masonry Wall Design. The scope of the inspection included a review of engineering design and quality assurance documentation relating to inspection, testing, analysis and modifications satisfying requirements and licensee commitments with respect to the bulletin. A walkdown inspection of the plant verified repairs and/or modifications relating to the bulletin.

#### 3. Review Criteria

The latest revision of the bulletin was used to define required actions by the utility. In addition, Temporary Instruction (TI) 2515/37 was used to further define inspection requirements. Applicable sections of the Code of Federal Regulations (10 CFR 50) were also used.

# Review of Licensee Responses

The inspection team reviewed bulletin responses available from NRC files prior to the inspection. Any items of noncompliance or those requiring further discussion were noted as items to be addressed while at the corporate office or plant site. Questions relating to licensee bulletin responses were forwarded to BG&E in advance of the inspection as preliminary agenda for discussion.

The inspection team reviewed additional material provided by the licensee during the inspection. This material consisted of additional procedures governing the inspection and modification of masonry walls, personnel training records for those persons involved in plant survey activities, calculations for the required reanalysis, field survey packages, modification work packages and QC records of same. The pertinent documents described above for IEB 80-11 are listed in Tables 1 and 2.

#### Findings:

No violations or significant unresolved items resulted from the reviews described above.

# 5. Verification Walkdown Inspection

A physical inspection of certain masonry walls subject to bulletin action was conducted. The walls included in this sample were chosen by the inspection team. The purpose of this walkdown was to verify samples of inspections and/or modifications required by the bulletin. The walls shown in Table 3 were examined.

#### Findings:

No violations were identified. However, one unresolved item resulted from the plant walkdown. Further details regarding this item are given below.

On January 16, 1986, 11 masonry block walls were field inspected by the inspection team. The results of this effort indicated that field conditions appeared consistent with those indicated in the licensee's surveys and analyses except for two walls in one area. Wall T at elevation 45 ft. in the Unit 1 auxiliary building was found to have boundary conditions deviating from those used in the analysis. Relative motion between the wall and ceiling beam was observed and the mortar joint between the wall and the ceiling beam appeared cracked for its entire length. At some points this joint contained voids such that, obing of the interior of the wall could be accomplished. Wall U at t is same elevation is adjacent to wall T. Wall U also showed evidence of the wall T assumed a simple support at the wall to ceiling beam location. The reanalysis for wall U assumed a fixed support at this location. Consequently, it was the conclusion of the inspection team that the actual boundary conditions deviated

from those assumed in the reanalysis for wail T and U. Subsequent effort by the licensee's personnel disclosed that no steel dowels or other connection could be found in wall T. On January 17,1986, the inspection team field verified walls EE and CC in Unit 2 which correspond to walls T and U in Unit 1. Walls EE and CC did not show any evidence of relative motion at the wall to ceiling beam joint. It was concluded that these walls probably did contain a positive connection and the reanalysis was, therefore, acceptable. Based upon the reviews discussed above, the inspection team concluded that the deviating conditions found in walls T and U were an isolated case.

## 6. Licensee Response To Above Concern

The licensee acknowledged the findings discussed above. Licensee representatives stated at the exit interview a proposal to study available options for remedial actions for the walls T and U and to submit a letter to the NRC inspector by January 24, 1986 to provide results of preliminary analyses and subsequent corrective action plans. This letter was received at the NRC regional office and is herewith described as the licensee's formal response to the unresolved item:

To formulate a comprehensive plan of action leading to the resolution of this concern, a detailed review of the boundary conditions, geometric properties, and assumptions made to perform the original evaluation of these walls, was undertaken.

The licensee's review indicated the approach used in the evaluation, conservatively neglected the stiffening effect afforded by the steel framed concrete landings connected to the walls at elevations 51'4", 57'-0" and 63'-4".

Thus, the original evaluation considerably underestimated the capacity of the walls, since the boundary conditions assumed, yielded conservations above those outlined in its response to the IEB of June 12, 1985.

In light of the apparent margins available in the design of the walls in question, the licensee did not believe that a safety implication existed. However, in order to effect a comprehensive approach to the resolution of the inspector's question and document the safety margins, the following options were being considered:

- Quantify all available margins by reperforming detailed analysis of the walls. The analysis would consider plate action of the walls, the support afforded by the stair landings and the as-built condition of the walls.
- Restore the conservations inherent in the original evaluation by providing lateral support at the top of the walls. This option would involve the addition of steel shapes at the top of the walls to transfer lateral loads to the concrete floor slab.

3. Depending on the accessibility of certain portions of the walls, a combination of options 1 and 2 would also be considered.

Upon completion of this work, the licensee agreed to submit a report summarizing the options used and outlining the results. This report should be completed by April 1, 1856.

The licensee believed that the problems with walls T and U were not generic. Several reasons support this conclusion:

- A. The mirror-image wall in Unit 2, "EE", which sees similar operating conditions, appears to be in excellent shape.
- B. Numerous walls viewed during the licensee walkdowns typically show high quality workmanship.
- C. The walkdown survey package for Wall "T" was the only one representing a concern.

The inspector considered the above described response acceptable. NRC followup action on the work and review of the report will be undertaken during a subsequent inspection. However, pending the results of the licensee's analysis this area would be considered unresolved, (UNR 50-317/86-01).

# 7. Review of Licensee Administrative Controls and Quality Assurance

In determining the adequacy of administrative controls for assuring quality work, the inspector examined records of BG&E surveillances of wall as-built surveys, audits of BC engineering design, wall modification packages and surveillance of the wall modifications. The inspector also verified the qualifications of personnel engaged in the above and evaluated their effectiveness to assure quality in the items covered. Additionally, the inspector verified the availability and retrievability of pertinent documents, and reviewed procedures that established those requirements. Based on this examination and review, the inspector ascertained that BG&E's administrative controls were adequate. Where surveillance and audit findings were observed, their follow-up corrective action and close-out were formally accepted by QA.

## 8. Conclusion

Based on the above observations, the inspector concluded that BG&E's responses to IEBU 80-11 and its commitment to resolve the related technical item identified in paragraph 5 were considered satisfactory. NRC/IE BU 80-11 is therefore considered closed.

# 9. Definition of Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable, violations, or deviations relative to the bulletin requirements. An unresolved item identified during this inspection is discussed in paragraph 5.

# 10. Exit Meeting

The NRC inspector conducted an exit meeting with licensee representatives and A/E personnel (denoted in paragraph 1). The NRC inspector summarized the inspection findings and the licensee acknowledged these comments. At no time during he inspection was written material, other than that described in paragraph 4, provided to licensee personnel.

# Table 1 - ENGINEERING DOCUMENTATION REVIEWED

Document	Description				
	Bechtel Power Corporation (Bechtel) internal memorandum regarding required notification of the civil/structures group for any future masonry wall modifications.				
	Training records for personnel involved in field surveys of masonry walls.				
C-4200.C	Bechtel inspection checklists and masonry wall survey forms for the following individual walls:				
	A elev. 27' D elev. 27' R elev. 27' UU elev. 27' D elev. 69' E elev. 69' R elev. 69' Y elev. 45' M elev. 45' U elev. 45' U elev. 45' U elev. 45' J elev10' A elev. 5' F elev. 5' E elev. 5' E elev. 45' Z elev. 69'				
FCR 80-1024	Facility Change Request (FCR) forms and work package documen- tation regarding modifications made to wall ZZ at eleva- tion 69 ft.				
C-4200.1	Bechtel civil staff verification report for the "BLOCKWALLS" computer program.				
	D. J. Brogdon (Bechtel) letter to J. B. Brothers (Bethtel) regarding construction practices used in masonry block walls at Calvert Cliffs Units 1 and 2.				
	K. S. Sibley (Bechtel) letter to J. C. Ventura (Bechtel) regarding construction practices used in masonry block walls at Calvert Cliffs Units 1 and 2.				

Calc. No.	Wall	Elev. (ft.)	Field Inspection
C-4205.ZZ	ZZ	69	Yes
C-4204.T	T	45	Yes
C-4204.F	F	45	Yes
C-4205.D	D	69	Yes
C-4204.M	М	45	No
C-4204.U	U	45	No
C-4205.E	E	69	Yes
C-4205.R	R	69	Yes
C-4205.X	Х	69	Yes
C-4205.EE	EE	45	Yes

Table 2 - Calculation Packages Reviewed

NOTE: The calculation packages above included the original reanalysis calculations based on elastic methods and inelastic methods if they were used. Any revisions to the calculations were also included in the packages and were reviewed.

# Table 3 - MASONRY WALLS FIELD VERIFIED

Wall	Elevation (ft.)	Location	
A	27	Aux. Bldg.	
D	27	Aux. Bidg.	
R	27	Aux. Bldg.	
F	45	Aux. Bldg.	
T	45	Aux. Bldg.	
U	45	Aux. Bldg.	
EE	45	Aux. Bldg.	
CC	45	Aux. Bldg.	
D	69	Aux, Bldg.	
E	69	Aux. Bldg.	
R	69	Aux. Bldg.	
Х	69	Aux. Bldg.	
ZZ	69	Aux. Bldg.	