

CENTRAL FILES

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23209

NOVEMBER 3, 1980

Mr. James P. O'Reilly, Director
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Serial No. 878
PSE&C/RHW, III:bmt
Docket Nos. 50-280
50-281
50-338
50-339
License Nos. DPR-32
DPR-37
NPF-4
NPF-7

DISTRIBUTION SERVICES BRANCH SERVICES

FIELD DISTRIBUTION SERVICES BRANCH SERVICES

Dear Mr. O'Reilly:

I.E. BULLETIN NO. 80-11, INTERIM REPORT
SURRY POWER STATION - UNITS 1 & 2
NORTH ANNA POWER STATION - UNITS 1 & 2

This letter provides an interim report on the masonry wall reevaluation program required by I.E. Bulletin No. 80-11. The purpose of the letter is to update the response provided in our 60 day reports of July 7, 1980, Serial No. 434/050880, to submit the reevaluation criteria being used to evaluate the masonry walls including justification of the criteria, and to inform you of our progress and schedule for completing the reevaluation program.

The 60 day reports submitted by our letter of July 7, 1980 addressed items 1, 2a, and 3 of the Bulletin and provided a partial response for item 2b. The enclosure and attachments A, B, and C to this letter update our previous response and provide the additional information required by item 2b of the Bulletin with the exception of the final results from the reevaluation program which is still in progress.

Our letter of October 24, 1980, Serial No. 868, requested an extension of the Bulletin deadline to complete the reevaluation program by the end of July, 1981. Analysis has been completed for 41 of the 89 masonry walls at Surry and 13 of the 65 walls at North Anna. All these walls meet our initial conservative acceptance criteria. The remaining walls which did not meet our initial conservative acceptance criteria are being analyzed using more refined analytical techniques which are still conservative and incorporate refined boundary conditions, equipment loading determination and the aid of computer analysis. Our current schedule estimates that analysis will be completed for at least five walls each month with the majority of the analysis being completed during the later part of the requested extension period.

The present available results of the reevaluation program indicate that safety of the plants will not be jeopardized by continued analysis of the masonry walls during plant operation. If, however, during the remainder of the reevaluation program the operability of any safety related system is shown to be in jeopardy by the results of the analysis, the applicable technical specifications action statement will be met.

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VIRGINIA ELECTRIC AND POWER COMPANY TO

Mr. O'Reilly

It is the intent of this letter, with the 60 day responses previously provided, to adequately address all areas of IE Bulletin 80-11. Final results of the reevaluation program will be submitted upon completion of the program. Should you require additional information, please contact us.

Very truly yours,



B. R. Sylvia
Manager-Nuclear
Operations and Maintenance

Enclosure
Attachments A, B, and C

cc: Mr. Victor Stello, Director
Office of Inspection & Enforcement

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation

COMMONWEALTH OF VIRGINIA)
) S. S.
CITY OF RICHMOND)

Before me, a Notary Public, in and for the City and Commonwealth aforesaid, today personally appeared B. R. Sylvia, who being duly sworn, made oath and said (1) that he is Manager-Nuclear Operations and Maintenance, of the Virginia Electric and Power Company, (2) that he is duly authorized to execute and file the foregoing response in behalf of that Company, and (3) that the statements in the response are true to the best of his knowledge and belief.

Given under my hand and notarial seal this 3rd day of November,
1980.

My Commission expires January 19, 1982.

Evelyn C. Yaros
Notary Public

(I was commissioned as Evelyn Cherry

(SEAL)

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ENCLOSURE

VEPCO letter to NRC dated November 3, 1980, Serial No. 878

This enclosure updates the information on IE Bulletin 80-11 provided in the 60 day reports and provides additional information required to be submitted within 180 days of the the date of the Bulletin for Surry and North Anna Power Stations. The 60 day reports addressed items 1, 2a, and 3 of the Bulletin and provided a partial response for item 2b. The information provided herein completes the response to the Bulletin items with the exception of the final results from the reevaluation program which is still in progress. This information will be submitted in the final report upon completion of the reevaluation program. For clarity, the item numbers below correspond to the items of IE Bulletin 80-11.

1. Item 1 of the Bulletin requires the identification of all masonry walls which are in proximity to or have attachments for safety-related piping or equipment such that wall failure could affect a safety-related system. It further requires the description of systems and equipment, both safety and non-safety-related, associated with these masonry walls. This information was provided in our 60 day report.

Since the submittal of this report an "as-built" verification program has been conducted to provide the necessary details for analysis of the walls in the reevaluation program. This as-built verification program has been completed.

During this program some of the wall identification numbers were changed and the physical limits of some walls were redefined by subdividing or combining wall sections in order to facilitate analysis. On-going work associated with the steam generator replacements at Surry and TMI modifications for both stations required the removal of some existing walls. Also, based on the as-built details obtained, some walls previously defined as being within the scope of the Bulletin were found to have no safety-related equipment within the proximity of the wall and were deleted from the reevaluation program.

Four additional walls at North Anna which were not included in the 60 day report, were identified by the field forces during the as-built program. All other additions reflect wall redesignations during the as-built program to better reflect existing wall conditions in the analysis of the reevaluation program. These changes to the reevaluation scope alter the information provided in the appendices of the 60 day reports in that the scope of the reevaluation program has been reduced from 91 to 89 walls for Surry and from 67 to 65 walls for North Anna. In order to provide you with the latest information, Attachments A and B to this letter update the information provided in the 60 day reports. Attachment A updates the information provided for Surry and Attachment B updates the information provided for North Anna.

2. Item 2 of the Bulletin requires a reevaluation of the design adequacy of the walls identified in item 1 to determine whether the masonry walls will perform their intended function under all postulated loads and load combinations. The information required as part of this evaluation program is addressed in the subitems below:

- a. The prioritized program for reevaluation of masonry walls described in the 60 day reports is still in affect. Those walls located in critical plant areas and with a high probability of striking a significant amount of safety-related equipment if wall failure results are given the highest priority for reevaluation. As stated in Vepco's letter to the NRC dated October 24, 1980, Serial No. 868, the current schedule is to complete all analyses by the end of July 1981. Following the multi-level analyses program described in item 2b (iii) below it was projected that analyses will be completed on at least 5 walls each month with the majority of the analysis being completed during the later part of the requested extension period. During the course of the reevaluation if the operability of any safety-related system is found to be jeopardized the applicable technical specifications action statement will be met.

- b. Item 2b requires that a written report be submitted upon completion of the reevaluation program. Subitems (i) and (ii) were addressed in the 60 day reports and are updated below.

Subitem (iii) below addresses the details of the reevaluation program and includes the justification for the reevaluation criteria submitted in Attachment C. Results of the reevaluation program will be submitted upon completion of the program.

- (i) Concrete masonry walls at Surry and North Anna have been used primarily to provide barriers for shielding, fire protection, and personnel separation. Those walls utilized in the construction of seismic Class I structures are not designed, nor intended to act as bearing walls or for transmitting building shear forces. Additional information describing details of wall functions, configurations, materials, and reinforcement was provided in the 60 day reports.

- (ii) Construction practices employed in the construction of the masonry walls were addressed in the 60 day reports.

(iii) Reevaluation of the masonry block walls is being performed based on the "Criteria for Reevaluation of Concrete Masonry Walls" submitted as Attachment C to this letter. In order to expedite completion of the analyses the reevaluation program is structured in the multi-level format utilizing conservative assumptions, simplified analysis techniques and conservative acceptance criteria. In the initial phases of analysis, the walls are analyzed using the most conservative criteria and simplified analytical techniques to screen those walls where more complex analyses is not warranted. Where additional analysis is warranted more exact analysis techniques, which are still conservative, are applied to incorporate refined boundary conditions, more precise loading definition, and computer aided analysis.

Item 2b (iii) requires justification of the criteria used, an evaluation of all loads and load combinations, and a description of the mechanism for transferring local loads into the masonry walls. The development of the reevaluation criteria was based on a review of existing test data and published literature. The basis of the acceptance criteria, as described in Attachment C is, in part, the allowable stresses specified in the American Concrete Institute's

ACI 531-79 "Building Code Requirements for Concrete Masonry Structures". The review of the test data and literature substantiates our use of these allowable stresses. The review also included research of acceptable damping percentages, analysis techniques, in plane effects, arch action and local stress values. This research forms the remainder of the basis for the reevaluation criteria.

The reevaluation criteria considers loads from both safety and non-safety-related attachments as well as relative interstory displacements between building elevations where applicable. All applicable loads and load combinations specified in the Surry and North Anna FSAR's for concrete design have been included in the reevaluation. A review of the walls determined that the walls are not subjected to tornado missiles or depressurization, pipe whip or jet impingement loads. The global review of the walls includes seismic inertia loads, interstory displacement loads for both in plane and out of plane effects, equipment loads and wind loads where applicable.

The local review includes discontinuities such as openings and the mechanism for local load transfer into the walls. This includes a review of potential local block pull out as well as possible overstress within individual blocks due to attached equipment. Multiwythe walls were also reviewed to ensure the integrity of the collar joint. Calculated shear and tension stresses across the collar joints were compared against allowable values that were conservatively chosen to account for potential small areas of voids or other discontinuities.

3. As described in item 2b (iii), the use of allowable stresses as specified in ACI 531-79 and applied to the reevaluation criteria is substantial. Based on the review of existing test data and the conservative assumptions applied in the reevaluation criteria it is believed that additional confirmatory testing is not necessary to justify the acceptance criteria being applied.

ATTACHMENT A
VERCO LETTER TO NRC DATED
NOVEMBER 3, 1980, SERIAL NO 878

SURRY POWER STATION

REVIEW OF MASONRY WALLS

AN ACCOUNTING OF WALLS
SINCE THE 60 DAY REPORT

OCTOBER 29, 1980

SURRY POWER STATION

SUMMARY OF

PRESENT WALLS

SURRY POWER STATIONCLASS I - MASONRY WALLS

WALL NO.	DWG. NO.	AREA	COMMENTS
AB-15-0-1	1144B-FC-24D	Aux blag	
AB-15-0-2			
AB-15-0-3			
AB-15-0-4			
2C-47-A-20	1154B-FM-1A	pressurizer (2-RC-E-2)	
AB-45-10-3	1144B-FA-24A	around filters	
AB-45-10-4		around filters	
AB-45-10-5			
AB-45-10-6			
AB-45-10-7			
AB-45-10-8			
AB-45-10-9			
AB-45-10-11		around filters	Additional walls & bends. Found by field after 60 day report.
AB-45-10-12			
AB-45-10-13			
AB-45-10-14			
AB-45-10-15			
AB-45-10-16			
AB-45-10-17			
AB-45-10-18			

CLASS I - MASONRY WALLS CONTINUED

WALL NO.	DWG. NO.	AREA	COMMENTS
AB-45-10-22	1144B-FA-24A	filters	added by field
SB-9-6-1	1144B-FA-1E	Battery room unit 1	
SB-9-6-2		↓	
SB-9-6-3			
SB-9-6-4		↓	
SB-9-6-5		Cable vault	
SB-9-6-6		near switchgear room	
SB-9-6-7		↓	
SB-9-6-8		↓	
SB-9-6-10		around stairs in switchgear room	
SB-9-6-11		↓	
SB-9-6-12		↓	
SB-9-6-13		Battery room unit 2	
SB-9-6-14		↓	
SB-9-6-15		↓	not in today report. Added because of full hgt. openings in SB-9-6-2, 3, 14.
SB-9-6-16		Battery room unit 1	
SB-9-6-17		↓	↓
SB-27-0-1		Control room	
SB-27-0-2		↓	
SB-27-0-3		computer room unit	
SB-27-0-4	↓	Control room	

CLASS I - MASONRY WALLS CONTINUED

WALL NO.	DVG. NO.	AREA	COMMENTS
SB-27-0-6	1144B-FA-1E ↓	Stairs near Air cond. unit 2	
SB-27-0-7		↓	
SB-27-0-8		Air cond. rm unit 2	
SB-27-0-10		Computer room unit 2	
SB-27-0-14		Area outside office, near control room	

SURRY POWER STATIONCLASS II - MASONRY WALLS

WALL NO.	DWG. NO.	AREA	COMMENTS
AB-15-0-5	1144B-FC-24D	Aux bldg	not in today report. Added by field.
AB-45-10-2	1144B-FA-24A	near the E & H lines In service next to Aux	
AB-45-10-21	↓		
AB-27-6-1	1144B-FA-24A	gaseous waste disposal room	
AB-27-6-2	↓		
AB-27-6-3	↓		
AB-27-6-6	↓		
AB-27-6-7	↓		
AB-27-6-8	↓		
AB-27-6-11	↓	Cont. val. pump area	
AB-27-6-12	↓		
AB-27-6-13	↓		
AB-27-6-14	↓		
AB-27-6-15	↓		
AB-27-6-16	↓		
AB-27-6-17	↓		
AB-27-6-18	↓		
AB-27-6-19	↓	Drumming room	
AB-27-6-20	↓	↓	

CLASS II - MASONRY WALLS - CONTINUED

WALL NO.	DWG. NO.	AREA	COMMENTS
AB-27-L-32	1144B-FA-24A	gaseous waste drumming area	Added by field. Additional walls & BUILDING SUPPORTS
AB-27-L-33			
AB-27-L-34			
AB-27-L-35			
AB-27-L-36		gaseous waste	
AB-27-L-37			
AB-27-L-38			
AB-27-L-39			
AB-2-0-2	1144B-FC-24A	Aux Bldg	
AB-2-0-8	1144B-FC-24B		
AB-2-0-10			
AB-2-0-11			
AB-2-0-12			
AB-2-0-13			
AB-2-0-14			
AB-2-0-15			
AB-2-0-18	1144B-FC-24B		
AB-2-0-22	1144B-FM-5A		Added later by field-separate pieces of bends.
AB-2-0-23	"		"
FB-45-10-1	1144B-FA-27A		
FB-45-10-2	1144B-FA-24A		
FB-45-10-3			
FB-45-10-4			
FB-45-10-5			Added later by field. Additional BLDG supports found in FB-45-10-1,2,3 "

SURRY POWER STATIONCLASS III - MASONRY WALLS

WALL NO.	DWG. NO.	AREA	COMMENTS
K-47-4-10	1144B-FM-1A	N ₂ & H ₂ AREA	
IC-47-4-11	↓		
AB-13-0-7	1144B-FC-2AC		
AB-13-0-8	↓		
AP-13-0-15	↓		
SB-27-0-9	1144B-FA-1E		changed to class III from Class I
SB-27-0-12	↓		↓
SB-27-0-13			
SB-27-0-15			
SB-27-0-16			
SB-27-0-17	↓		added by field after 60 day report
AB-27-6-4	1144C-FA-24A		
AB-27-6-5	↓		
AB-27-6-21	1144B-FA-24A		changed to class III from Class II
AB-27-6-22	↓		
AB-27-6-23			
AB-27-6-24			
AB-27-6-25			
AB-27-6-26			
AB-27-6-27	↓		
AB-27-6-28			
AB-27-6-29			
AB-27-6-30			
AB-27-6-31	↓		
AB-27-6-40		Drumming room area	Added by field, Additional walls & BLDG SUPPORTS
AB-27-6-41		↓	↓
AB-35-6-1	1144B-FC-2ABB		
AB-35-6-2	↓		

CLASS III - MASONRY WALLS CONTINUED

WALL NO.	DWG. NO.	AREA	COMMENTS
AB-2-0-1	1144B-FC-24A		
AB-2-0-3			
AB-2-0-4			
AB-2-0-5			
AB-2-0-6			
AB-2-0-7	↓		
AB-2-0-9	1144B-FC-24B		
AB-2-0-16	1144B-FM-5A		
AB-2-0-17	↓		
AB-2-0-19	1144B-FC-24B		
AB-2-0-20			Area later by field-separate pieces of bends
AB-2-0-21	↓		↓
FB-27-6-1	1144B-FA-27A		
FB-27-6-2	↓		
FB-74-0-1	1144B-FA-27B		
FB-80-8-1	1144B-FA-27B		
PH-27-0-1	1144B-FA-36B		
PH-27-0-2			
PH-27-0-3			
PH-27-0-4	↓		

Note: AB-45-10-1 was double labeled, it never existed.

SURRY POWER STATION

SUMMARY OF

DELETED WALLS

SURRY POWER STATIONCLASS I - MASONRY WALLS DELETED

WALL NO	DWG. NO.	AREA	COMMENTS
1C-47-4-1	11448-FM-1A		to be replaced by conc. panels
-2			
-3			
-4			
-5			
-6			
-7			
-8			
-9	↓		↓
2C-47-4-12	11548-FM-1A	steam gen. (2-RL-E-1A)	replaced by reinforced conc.
-13		↓	
-14		↓	
-15		steam gen. (2-RL-E-1B)	
-16		↓	
-17		↓	
-18		steam gen (2-RL-E-1C)	
-19	↓	↓	↓
SB-9-6-9	11448-FA-1E		deleted. Analyzed as part of SB-9-6-B

CLASS I - MASONRY WALLS DELETED - CONT.

WALL NO	DWG NO	AREA	COMMENTS
SB-27-0-5	11448-FA-1E	control room	deleted from 60 day report
SB-27-0-11			part of SB-27-0-4
SB-27-0-12			deleted from 60 day report
SB-27-0-13			Analyzed as part of
SB-27-0-15			SB-27-0-10
SB-27-0-16			deleted from class I
			is now class III

CLASS II - MASONRY WALLS DELETED

WALL NO	DWG NO	AREA	COMMENTS
AB-27-6-9	11448-FA-24A		deleted, Analyzed as part of
AB-27-6-10			AB-27-6-36, 37, 38
AB-27-6-21			deleted, Analyzed as part of
			AB-27-6-36, 37, 38
			deleted from class II
			is now class III

SURRY POWER STATION

COMPARISON: 60 DAY REPORT VS. NUMBER OF WALLS
BEING ANALYZED AS A RESULT OF
IE-BULLETIN 80-11.

	CLASS I	CLASS II	CLASS III
NO. IN LOG OF 60 DAY REPORT	58	33	37
NO. OF WALLS ADDED	+12	+13	+11
NO OF WALLS DELETED	-24	- 3	0
TOTAL NO OF WALLS-	<u>46</u>	<u>43</u>	<u>48</u>

ATTACHMENT B
VEPCO LETTER TO NRC DATED
NOVEMBER 3, 1980, SERIAL No 878

NORTH ANNA POWER STATION

REVIEW OF MASONRY WALLS

AN ACCOUNTING OF WALLS
SINCE THE 60 DAY REPORT

OCTOBER 29, 1980

NORTH ANNA POWER STATION

SUMMARY OF

PRESENT WALLS

NORTH ANNA POWER STATIONCLASS I - MASONRY WALLS

WALL NO.	DWG NO	AREA	COMMENTS
AB-244-15	11715-FC-24A-7	AUX. BLDG	
AB-244-16	↓	↓	
AB-259-1	11715-FC-24G-5	AUX. BLDG	
AB-259-1A	↓	↓	
AB-259-1B	↓	↓	
AB-259-2	↓	↓	
AB-259-2A	↓	↓	
AB-259-2B	↓	↓	
AB-259-12	↓	↓	ADDED - WAS PREVIOUSLY CONSIDERED PART OF AB-259-1
AB-291-2	11715-FA-24A-9	FIREWALL BETWEEN AUX BLDG & FUEL BLDG	ADDED TO CLASS I - PREVIOUSLY DESIGNATED CLASS II
AB-291-2A	↓	↓	ADDED TO CLASS I - PREVIOUSLY DESIGNATED CLASS II
AB-291-25	↓	↓	ADDED - WAS PREVIOUSLY CONSIDERED PART OF AB-291-2
AB-291-26	↓	↓	ADDED - WAS PREVIOUSLY CONSIDERED PART OF AB-291-2A
SB-254-1	11715-FA-1E-9	A.C. ROOM #1	
SB-254-4	↓	SWITCHGEAR ROOM	
SB-254-5	↓	A.C. ROOM #2	
SB-254-6	↓	SWITCHGEAR ROOM	

CLASS I - MASONRY WALLS - CONTINUED

WALL NO.	DWG. NO.	AREA	COMMENTS
SB-254-7	11715-FA-1E-9	SWITCHGEAR ROOM	
SB-254-8	↓	↓	ADDED - DISCOVERED BY FIELD PERSONNEL
SB-271-1	11715-FA-K-24	CONTROL ROOM AREA	
SB-271-2	↓	↓	
SB-271-4	↓	↓	
SB-271-6	↓	↓	
SB-271-7	↓	↓	
SB-271-8	↓	↓	
SB-271-8A	↓	↓	
SB-271-9	↓	↓	
SB-271-14	↓	↓	ADDED - DISCOVERED BY FIELD PERSONNEL
SB-271-14A	↓	↓	ADDED - DISCOVERED BY FIELD PERSONNEL
SB-271-14B	↓	↓	ADDED - DISCOVERED BY FIELD PERSONNEL

NORTH ANNA POWER STATIONCLASS II - MASONRY WALLS

WALL NO.	DWG. NO.	AREA	COMMENTS
AB-244-2	11715-FC-24A-7	AUX. BLDG.	
AB-244-2A	↓	↓	
AB-244-4			
AB-244-4A			
AB-244-5			
AB-244-10			
AB-244-14	↓	↓	
AB-259-8	11715-FC-24G-5	AUX BLDG	
AB-259-8A	↓	↓	
AB-259-9			
AB-259-9A			
AB-259-11			
AB-259-11A	↓	↓	
AB-291-1	11715-FA-24A-9	FIREWALL BETWEEN AUX BLDG & FUEL BLDG.	
AB-291-1A	↓	↓	

NORTH ANNA POWER STATIONCLASS II - MASONRY WALLS

WALL NO.	DWG. NO.	AREA	COMMENTS
AB-244-2	11715-FC-24A-7	AUX. BLDG.	
AB-244-2A	↓	↓	
AB-244-4			
AB-244-4A			
AB-244-5			
AB-244-10			
AB-244-14	↓	↓	
AB-259-8	11715-FC-24G-5	AUX BLDG	
AB-259-8A	↓	↓	
AB-259-9			
AB-259-9A			
AB-259-11			
AB-259-11A	↓	↓	
AB-291-1	11715-FA-24A-9	FIREWALL BETWEEN AUX BLDG & FUEL BLDG.	
AB-291-1A	↓	↓	

CLASS II - MASONRY WALLS - CONTINUED

WALL NO.	DWG. NO.	AREA	COMMENTS
AB-291-3	11715-FA-24A-9	FILTER ROOM	
AB-291-3A			
AB-291-4			
AB-291-8			
AB-291-9			
AB-291-13			
AB-291-16			
AB-291-16A			
AB-291-17			
AB-291-17A			
AB-291-18			
AB-291-18A			
AB-291-19			
AB-291-19A			
AB-291-22		↓	ADDED - PREVIOUSLY CONSIDERED PART OF AB-291-4
AB-291-23		FIREWALL BETWEEN AUX. BLDG & FUEL BLDG.	ADDED - PREVIOUSLY CONSIDERED PART OF AB-291-1
AB-291-24		↓	ADDED - PREVIOUSLY CONSIDERED PART OF AB-291-1A
FB-249-1	11715-FC-27B-8	FUEL BLDG PIPE TUNNELS	
FB-249-2		↓	
MSV-256-4	11715-FC-19A-7	MSVH-UNIT 1	

NORTH ANNA POWER STATIONCLASS III - MASONRY WALLS

WALL NO.	DWG. NO.	AREA	COMMENTS
AB-244-1	11715-FC-24A-7	AUX. BLDG.	
AB-244-3			
AB-244-6			
AB-244-7			
AB-244-8			
AB-244-9			
AB-244-11			
AB-244-12			
AB-259-3	11715-FC-24G-5	AUX BLDG	
AB-259-4			
AB-259-5			
AB-259-6			
AB-259-7			
AB-259-10			
AB-259-10A			
AB-274-1	11715-FC-24P-11	AUX BLDG	
AB-274-2			
AB-274-3			

CLASS III - MASONRY WALLS CONTINUED

WALL NO.	DWG NO.	AREA	COMMENTS.
AB-274-4	11715-FC-24P-11	AUX. BLDG	ADDED TO CLASS III - PREVIOUSLY DESIGNATED CLASS II
AB-274-5			
AB-274-7			
AB-274-8			
AB-274-9			ADDED - PREVIOUSLY CONSIDERED PART OF AB-274-4
AB-274-10			ADDED - PREVIOUSLY CONSIDERED PART OF AB-274-4
AB-291-5	11715-FA-24A-9	FILTER ROOM	
AB-291-6			
AB-291-7			
AB-291-10			
AB-291-11			
AB-291-12			
AB-291-14		7 ³ B LINE ELEV. ATOR STAIRWELL	
AB-291-15			
AB-291-20			
AB-291-20A			
AB-291-20B			
AB-291-21			ADDED - WAS OMITTED FROM LOG (APPEARS ON DWG)
SB-271-11	11715-FA-K-24	TOILET	
SB-271-12			
SB-271-13			

CLASS III - MASONRY WALLS - CONTINUED

WALL NO.	DWG. NO	AREA	COMMENTS
SB-274-1	11715-FA-1C-24	SER. BLDG	
SB-274-2	↓	↓	
SB-274-3	↓	HOT. STOR.	
FB-291-1	11715-FA-27A-7	WASTE SOLIDIFI- CATION BLDG.	
FB-318-1	11715-FA-27A-7	FUEL BLDG 11'4" LINE WALLS	
FB-318-1A	↓	↓	
FB-18-1B	↓	↓	
FB-318-1C	↓	↓	
FB-325-1	11715-FA-27B-9	FUEL BLDG 11'4" LINE WALL	
MSV-256-1	12050-FC-19A-8	MSVH-UNIT 2	
IRC-216-1	11715-FC-16A-15	RC-UNIT 1	
IRC-216-2	↓	RC-UNIT 1 (IODINE FILTER)	
ZRC-216-1	12050-FC-16A-15	RC-UNIT 2	
ZRC-216-2	↓	RC-UNIT 2	

CLASS III - MASONRY WALLS - CONTINUED

WALL NO.	DWG NO.	AREA	COMMENTS
IS-265-1	11715-FC-9C-13	INTAKE STRUCTURE FIRE PUMP HOUSE	
IS-265-2	↓	↓	
IS-265-2A			
IS-265-3			
IS-265-4			

NORTH ANNA POWER STATION

SUMMARY OF

DELETED WALLS

W

NORTH ANNA POWER STATIONCLASS I - MASONRY WALLS DELETED

WALL NO.	DWG NO.	AREA	COMMENTS
SB-254-2	11715-FA-1E-9	SWITCHGEAR ROOM	DELETED - IS PART OF SB-254-4
SB-254-3	↓	↓	DELETED - IS PART OF SB-254-4
SB-271-3	11715-FA-1C-24	CONTROL ROOM	DELETED - IS PART OF SB-271-8A
SB-271-5	↓	↓	DELETED - IS PART OF SB-271-1
SB-271-9A	↓	↓	DELETED - IS PART OF SB-271-1
SB-271-9B	↓	↓	DELETED - NOT A BLOCK WALL
SB-271-10	↓	↓	DELETED - IS PART OF SB-271-8A

CLASS II - MASONRY WALLS DELETED

WALL NO.	DWG NO.	AREA	COMMENTS
AB-259-8B	11715-FC-24G-5	AUX BLDG	DELETED - IS PART OF AB-259-8A
AB-259-8C	↓	↓	DELETED - IS PART OF AB-259-8A
AB-274-4	11715-FC-24P-11	AUX. BLDG	DELETED FROM CLASS II IS NOW CLASS III
AB-291-2	11715-FA-24A-9	FILTER ROOM	DELETED FROM CLASS II IS NOW CLASS I
AB-291-2A	↓	↓	DELETED FROM CLASS II IS NOW CLASS I
AB-291-13A	↓	↓	DELETED - NOT A BLOCK WALL
MSV-256-3	11715-FC-19A-7	MSVH-UNIT 1	DELETED - WALL TO BE REMOVED

NORTH ANNA POWER STATIONCLASS III - MASONRY WALLS DELETED

WALL NO.	DWG NO.	AREA	COMMENTS
MSV-256-Z	12050-FC-19A-8	MSVH - UNIT 2	DELETED - WALL TO BE REMOVED

NORTH ANNA POWER STATION

P. 11

COMPARISON 60 DAY REPORT VS. NUMBER OF WALLS
BEING ANALYZED AS A RESULT OF
IE-BULLETIN 80-11

	CLASS I	CLASS II	CLASS III
NO. IN LOG OF 60 DAY REPORT	28	39	55
NO. OF WALLS ADDED	+9	+3	+4
NO. OF WALLS DELETED	-7	-7	-1
	<hr/>	<hr/>	<hr/>
TOTAL NO. OF WALLS	30	35	58

NORTH ANNA POWER STATIONMISC. ITEMS REGARDING NORTH ANNA
MASONRY WALLS

AB-274-6 IT IS NOT A BLOCK WALL. THIS
WAS DISCOVERED PRIOR TO 60-DAY
REPORT THEREFORE WAS OMITTED
FROM THE LOG, BUT MISTAKENLY
APPEARED ON DWG NO. 11715-FC-24P-11.
THIS ERROR HAS BEEN CORRECTED.

FB-291-3 IT IS NOT A BLOCK WALL, THIS
WAS DISCOVERED PRIOR TO 60-DAY
REPORT THEREFORE WAS OMITTED
FROM THE LOG, BUT MISTAKENLY
APPEARED ON DWG. NO 11715-FA-45A-3.
THIS ERROR HAS BEEN CORRECTED.

October 1980

ATTACHMENT C
VEPCO LETTER TO NRC DATED NOVEMBER 3., 1980
SERIAL NO. 878

CRITERIA FOR REEVALUATION
OF
CONCRETE MASONRY WALLS
SURRY POWER STATION UNITS 1 & 2
NORTH ANNA POWER STATION UNITS 1 & 2
VIRGINIA ELECTRIC AND POWER COMPANY

STONE & WEBSTER ENGINEERING CORPORATION
BOSTON, MASSACHUSETTS

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CRITERIA FOR REEVALUATION
OF CONCRETE MASONRY WALLS

1.0 INTRODUCTION

1.1 Purpose

This document establishes design requirements and criteria for use in reevaluating the structural adequacy of concrete masonry walls as required by the Nuclear Regulatory Commission (NRC) I&E Bulletin 80-11, Masonry Wall Design, dated May 8, 1980.

1.2 Scope

The reevaluation as covered by this document pertains to existing masonry walls in the operating plants. These walls are not used as major load-bearing walls and not included as part of the overall building shear wall system. Primary purposes of these walls are to provide radiation shielding, fire protection, and act as personnel barriers.

Reevaluation of the masonry walls shall include local transfer effects. The local transfer of equipment loads into the masonry wall panel, as well as the global response of wall, will be reevaluated for all loads and load combinations defined herein; however, the review of anchor bolts and supporting systems is not considered to be within the scope of this reevaluation.

2.0 LOAD AND LOADING CONDITIONS

2.1 Loads

The reevaluation will include all relevant loads specified in the station FSAR for concrete design. A survey of all the masonry walls under consideration concluded that they are not subjected to loads from tornado, missile, pipe whip, or jet impingement. Thermal and pressure differential loads, where applicable, being carried by the wall or transmitted by supports anchored to the masonry walls will be included in the reevaluation.

Inertial loads due to Operating Basis Earthquake (OBE) and Design Basis Earthquake (DBE), as defined by the station FSAR, will be used and applied as described in Section 4.1.

Masonry wall damping values for unreinforced walls will be a maximum of 2 percent of critical damping for severe environmental (OBE) case and 4 percent for extreme environmental (DBE) case.

2.2 Load Combination

The reevaluation of masonry walls will consider the following load combinations:

<u>Load Category</u>	<u>Load Factors</u>							
	D	L	W	P	T _o	T _a	E	E'
Severe Environmental Load Case I	1.0	1.0		1.0	1.0		1.0	
Severe Environmental Load Case II	1.0	1.0	1.0					
Extreme Environmental Load Case	1.0	1.0		1.0		1.0		1.0

where D = gravity load of masonry walls and attachments
 L = live load where applicable
 P = pressure differential load
 W = wind load, where applicable
 T_o = thermal load from attachment associated with plant operating conditions
 T_a = thermal load from attachment associated with accidental conditions
 E = OBE loads including attachments
 E' = DBE loads including attachments

3.0 MATERIAL PROPERTIES

Material properties will be taken as the minimum specified for the masonry, mortar, grout, and steel in the project specifications and contract documents.

Testing for material properties in situ may be employed to define actual properties to be used in lieu of the values specified. Such testing will follow procedures defined in American Concrete Institute (ACI), "Building Code Requirements for Concrete Masonry Structures" (ACI 531-79).

4.0 ANALYSIS PROCEDURES

Masonry walls shall be reevaluated for earthquake on the basis of determining the effects of: (1) inertial loads, (2) equipment loads, and (3) interstory displacement effects. Initial analysis shall assume an elastic (uncracked) section, ignoring the effects of horizontal joint reinforcement. Further analysis, utilizing the reinforcing steel and ultimate strength of the wall, will be performed as appropriate.

The resultant of the combination of the various types of statistically independent seismic loads will be determined by SRSS.

4.1 Elastic (uncracked) Section

The reevaluation analysis shall be performed assuming elastic behavior, comparing the results against the acceptance criteria defined in Section 5.0.

4.1.1 Frequency - Fundamental frequencies of the masonry walls shall be calculated based on elastic plate or beam theory. To account for variations in material properties and assumed boundary conditions the seismic response of masonry walls will be calculated using amplified response spectra which has had its peak broadened.

- 4.1.2 Inertial Loads - Transverse loads will be calculated using the acceleration of the appropriate dampened amplified response spectrum in a simplified dynamic analysis using the fundamental modes.

More refined analysis may be used in some cases.

- 4.1.3 Equipment Loads - Equipment loads will be calculated based on a load distributed uniformly over part or all of the area of wall, depending on the arrangement of the supports. The resultant may be applied as a single concentrated load or a line load, as appropriate.

Equipment support loads imposed on the walls will be determined on the basis of a simplified dynamic analysis based on fundamental modes, as described in the FSAR.

- 4.1.4 Interstory Displacement - Relative interstory displacements between building elevations from the seismic analysis of the structure will be imposed on the wall panel, where required and its effects accounted for in the reevaluation analysis.

4.2 Ultimate Strength of Unreinforced Section

If the elastic out-of-plane moments cause higher than allowable stresses, the ultimate strength of an unreinforced wall section may be calculated using arch action analysis, see Figure 1.

The procedure for this analysis will be to postulate a crack perpendicular to the span of the wall, occurring at the point of maximum calculated elastic moment. The wall capacity will be calculated based on the moment $P(u)$ $r(u)$ (see Figure 1) where:

$P(u)$ = compressive force developed at cracked boundaries

$r(u)$ = moment arm between two compressive forces

Maximum compressive and shear stresses at the cracked section in the wall shall be in accordance with the acceptance criteria defined in Section 5.0.

No Category 1 pipe support (large or small bore) is fastened to the masonry wall.

4.3 Ultimate Strength of Reinforced Section

If the elastic out-of-plane moments cause higher than allowable stress and joint reinforcement consisting of 3/16 in or greater, truss type reinforcing exists; the ultimate strength of one-way reinforced wall sections can be calculated using classical techniques for reinforced concrete masonry.

Maximum stresses in the panel will be in accordance with the acceptance criteria defined in Section 5.0. All masonry walls qualified on the basis of this ultimate strength criteria will have positive restraint against out-of-plane translation at the side supports.

5.0 ACCEPTANCE CRITERIA

5.1 Permissible Stress

Permissible stresses for masonry construction will be based on the American Concrete Institute "Building Code Requirements for Concrete Masonry Structures" (ACI 531-79). A one-third increase of the permissible stress values in Chapter 10, ACI 531 will be taken in consideration of severe environmental loads (OBE). For extreme environmental loads (DBE), the permissible stresses will be increased a factor of 1.67.

The permissible collar joint stress for either shear or tension shall be taken as 8 and 12 psi, for severe and extreme environmental loads, respectively, with no additional increase permitted.

Other applicable codes (i.e., AISC "Specification for the Design Fabrication and Erection of Structural Steel for Buildings") are as referenced in the FSAR and shall be used in the reevaluation program, as necessary.

Permissible stresses represent levels of stress for which significant damage to the wall will not occur.

5.2 In-Plane Effects

The walls considered by this procedure are not lateral load-carrying walls. In addition, because of the complex interaction between masonry walls and confining primary structural elements, in-plane stresses cannot be properly described. As a result, strain or displacement is a more meaningful index of in-plane performance.

The in-plane shear strain defined by

$$\epsilon = \frac{\Delta T - \Delta B}{H}$$

where

ΔT = displacement* at the top of the wall

ΔB = displacement* at the bottom of the wall
*from the building displacement profile, inches

H = height of wall, inches

shall be limited to 0.001 inch/inch, for walls which are confined at least top and bottom, or on three sides by concrete or steel primary structural elements. All other walls (unconfined) shall be limited to in-plane shear strain of 0.0001 inch/inch.

5.3 Proximity Envelope

The initial proximity envelope was conservatively assumed to be the space enclosed by a rectangle of height equal to the elevation of the blocks and a width on either side of the wall also equal to the height of blocks.

A proximity envelope for failure of the masonry wall may be further defined on the basis of plastic hinge formation and boundary conditions.

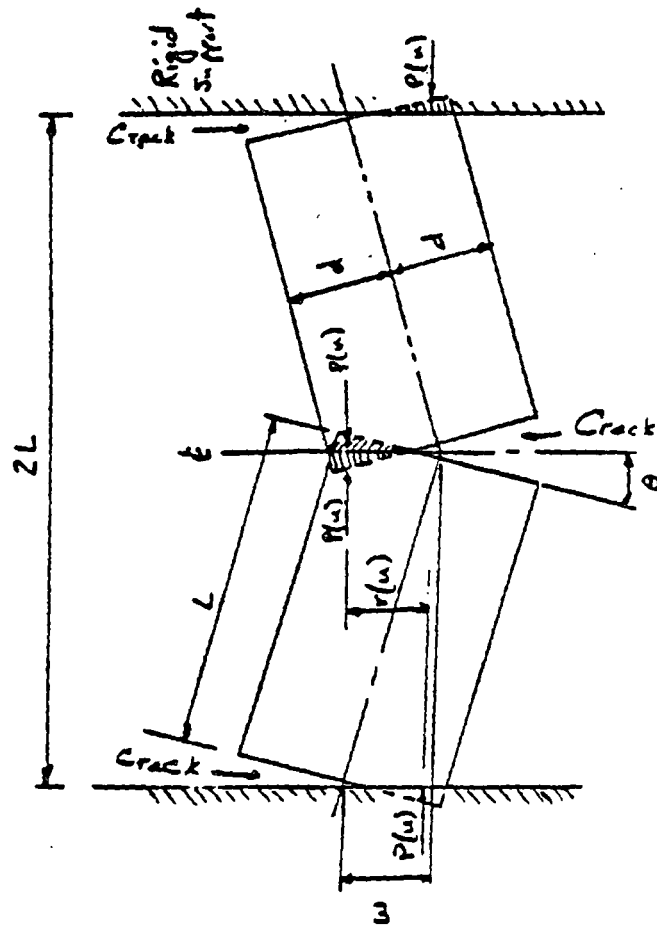


Fig. 1
Ultimate Wall Capacity