

# INDIANA & MICHIGAN ELECTRIC COMPANY

P. O. BOX 18  
BOWLING GREEN STATION  
NEW YORK, N. Y. 10004

May 17, 1982  
AEP:NRC:0418D

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2  
Docket Nos. 50-315 and 50-316  
License Nos. DPR-58 and DPR-74  
NRC IE BULLETIN 80-11; MASONRY WALL DESIGN

Mr. James G. Keppler, Regional Administrator  
U. S. Nuclear Regulatory Commission  
Office of Inspection and Enforcement  
Region III  
799 Roosevelt Road  
Glen Ellyn, Illinois 60137

REFERENCE: IE Inspection Report 50-315/82-02; 50-316/82-02

Dear Mr. Keppler:

This letter and its attachments are in response to the Inspection Report referenced above and supplements the information submitted to your office earlier in our letters AEP:NRC:0418, 0418A, 0418B and 0418C. An extension up to May 14, 1982 to send this report was granted to us by Mr. D. W. Hayes of your staff. Attachment (1) summarizes Indiana & Michigan Electric Company's responses to the items as noted in the NRC Bulletin 80-11 and Attachments (2) through (6) give the other pertinent details as follows:

## ATTACHMENTS

1. I&M Electric Company's responses to IE Bulletin 80-11, "Masonry Wall Design".
2. Masonry Wall Survey Summary Tables.
3. Criteria/Commentary for the reevaluation of concrete masonry walls as per NRC IE Bulletin 80-11.
4. Masonry Wall Analysis Summary Tables.
5. AEP Architectural Wall Specification No. DCCA-139-QCS.
6. Drawings showing (a) Masonry Wall Location (b) Standard Masonry Wall Details.

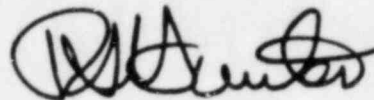
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(Drawings too large to reproduce - sent to  
DPR with original)

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This document has been prepared following Corporate Procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

A handwritten signature in dark ink, appearing to read 'R. S. Hunter', written in a cursive style.

R. S. Hunter  
Vice President

RSH/os

cc: John E. Dolan - Columbus \*  
R. W. Jurgensen \*  
W. G. Smith, Jr. - Bridgman  
R. C. Callen \*  
G. Charnoff \*  
Joe Williams, Jr. \*  
NRC Resident Inspector at Cook Plant - Bridgman

\* Without Attachments

I&M ELECTRIC COMPANY'S RESPONSES TO IE BULLETIN 80-11,  
"MASONRY WALL DESIGN"

ATTACHMENT 1  
AEP:NRC:0418D

The following responses address the items noted in the NRC Bulletin 80-11 and are in the same order as given in that bulletin.

Item 1

Response

A design drawing review was made to identify all masonry block walls at D. C. Cook Nuclear Plant that are in buildings containing safety-related components, and to determine which of these masonry block walls are in the proximity to or have attachments from safety-related piping or equipment.

Unique wall numbers were assigned to each masonry block wall identified. One hundred forty-four (144) masonry block walls were identified, of which one hundred twenty-three (123) were in proximity to safety-related items and were classified as safety-related walls. The remaining twenty-one (21) walls were not in proximity to safety related items and were, therefore, classified as non-safety related walls.

Subsequent to the design drawing review, a plant survey was initiated to verify the existence of and the locations of these identified masonry block walls as well as any other masonry block walls which may not have been shown on the design drawings. The plant survey verified the classifications of the walls by verifying the proximity or non-proximity and/or attachments of safety related items to the walls.

Additionally, the plant survey verified or determined the location, size, and identification of all openings, penetrations, safety-related items and non-safety related items attached to and/or penetrating the safety related walls and the locations of those high energy pipes which could affect the safety-related walls.

Sketches were prepared, by the survey teams, of the locations and identifications of each item attached to and/or penetrating a safety-related masonry block wall for any item not previously shown and identified on the design drawings.

The plant survey which started on August 18, 1980 and was completed on March 30, 1981 verified the total number of masonry block walls at the D. C. Cook Nuclear Plant and the number of the walls which were safety-related as follows:

|   |             |
|---|-------------|
| Total number of masonry block walls in buildings<br>with safety-related items | =144        |
| Number of walls which are safety-related                                      | =123        |
| Number of walls which are non-safety related                                  | <u>= 21</u> |
|   | 144         |



A list of the walls, their functions and the safety related items in proximity to the walls are provided in Attachment 2. The drawings showing the locations of the numbered masonry block walls are provided in a package included as Attachment 6.

Item 2

Response

A re-evaluation of the one hundred twenty-three (123) walls which were identified to be in the proximity to or have attachments from safety-related piping or equipment has been completed.

The re-evaluation determined that all but thirty-four (34) of the block walls passed the design allowables given in Section 5.0 of Attachment 3. Additional supports have been added to brace these thirty-four (34) walls. The Masonry Wall Analyses Summary Tables are given in Attachment 4.

As stated in the response to Item 3, the design allowables are justifiable; therefore no testing program is planned.

Item 2(a)

Response

All safety-related masonry block walls were considered to be of priority 1 and were re-evaluated accordingly.

Item 2(b)

Response

- i) The second column in Attachment 2 gives the function of each masonry wall. The fourth, fifth, and sixth columns in Attachment 4 give the wall height, width, and thickness, respectively. The seventh & eighth columns indicate whether the wall is of single wythe or multiple wythe construction. The masonry walls were constructed to standard details as shown in Attachment 6. Any exceptions to Attachment 6 are noted for the appropriate walls in the comment column of Attachment 4. Section 4.0 of Attachment 3 gives the strengths of the materials which were used to construct the masonry walls at D. C. Cook Nuclear Plant.
- ii) Generally accepted construction practices were employed during erection of the masonry walls at D. C. Cook Nuclear Plant. AEP Architectural Specification DCC-A139-QCS, Attachment 5, was followed.
- iii) The criteria used for re-evaluation are given in Attachment 3.

As stated in Attachment 3, ACI 531-79, Building Code Requirement for Concrete Masonry Structures, was used in the re-evaluation.

- (a) Section 3.2 of Attachment 3 gives the load combinations used for the re-evaluation. These load combinations are consistent with the D. C. Cook Plant FSAR. The load from differential floor displacement is resisted by reinforced concrete walls. The masonry walls do not support the upper slabs and were designed not to require structural contact with the upper slab. The effects of potential cracking of the masonry walls under dynamic loads were taken into account as described in subsection 6.1.1 of Attachment 3.
- (b) A check was made for local failure (e.g., punching shear or block pullout) due to seismic force acting on attachments to the masonry wall. There are no pipe support reactions applied to any of the masonry block walls. No check was made for composite behavior of multi-wythe walls since composite behavior was not considered in the re-evaluation of the masonry block wall. Multi-wythe walls are considered as multiples of single wythe walls.

Item 3

Response

Since the re-evaluation process and structural analysis are based on conservative requirements and assumptions, no test program is required.

MASONRY WALL SURVEY SUMMARY TABLES

ATTACHMENT 2  
AEP:NRC:0418D

MASONRY WALL SURVEY  
SUMMARY SHEET  
D.C. COOK NUCLEAR PLANT

LEGEND: THRU = THROUGH WALL  
EXTING = EXTINGUISHER

PNL = PANEL

ATTACHMENT 2  
NRC - BULLETIN 80-11  
RFC-DC-12-2526

SHEET 1 OF 28

F. GORDON

| NO. | UNIQUE WALL NO.    | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL   |  |
|-----|--------------------|-----------------------|---|--|
|     |                    |                       | SAFETY RELATED  | NON-SAFETY RELATED                                     |
| 1   | AUXILIARY BUILDING |                       |   |  |
|     | 12-4025 - W1       | PARTITION / SHIELDING | (PROXIMITY) CONT. SPRAY PUMP.<br>CCW, CTS & SI PIPING SYSTEMS.<br>CLASS IE ELECT. TERM. BOXES &<br>CDT'S. (ESS), HVAC DUCT, IPA<br>& IPI INSTRUMENTATIONS,  | (PROXIMITY) DR. PIPING SYSTEM.<br>IFI INSTRUMENTATION. |
| 2   |                    |                       |   |  |
|     | 12-4025 - W2       | PARTITION / SHIELDING | (PROXIMITY) CONT. SPRAY PUMP.<br>CCW, CTS & SI PIPING SYSTEMS.<br>CLASS IE ELECT. TERM. BOXES &<br>CDT'S. (ESS), HVAC DUCT, IPA<br>& IPI INSTRU'S           | (PROXIMITY) DR. PIPING SYSTEM.                         |
| 3   |                    |                       |   |  |
|     | 12-4025 - W3       | PARTITION / SHIELDING | (PROXIMITY) RESIDUAL HEAT REM-<br>OVAL PUMP, CCW, RH & SI PIPING<br>SYSTEMS, CLASS IE ELECT. TERM.<br>BOX & CDT'S. (ESS), HVAC DUCT, IFC<br>& IPA INSTRU'S. | (PROXIMITY) DR. PIPING SYSTEM.<br>IPX & IPI INSTRU'S.  |
| 4   |                    |                       |   |  |
|     | 12-4025 - W4       | PARTITION / SHIELDING | (PROXIMITY) RESIDUAL HEAT REMOVAL PUMP,<br>CCW, RH & SI PIPING SYSTEMS, CLASS<br>IE ELECT. TERM. BOX & CDT'S. (ESS),<br>HVAC DUCT, IPI, IPA & IFC INSTRU'S  | (PROXIMITY) DR. PIPING SYSTEM.<br>IPX INSTRU.          |

MASONRY WALL SURVEY  
SUMMARY SHEET  
D.C. COOK NUCLEAR PLANT

ATTACHMENT 2  
NRC - BULLETIN 80-11  
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F. Savoy

| NO. | UNIQUE WALL NO.    | FUNCTION             | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL   |   |
|-----|--------------------|----------------------|---|---|
|     |                    |                      | SAFETY RELATED  | NON-SAFETY RELATED  |
|     | AUXILIARY BUILDING |                      |   |   |
| 5   | 12-4025-W9         | SHIELDING / BLOCKOUT | (PROXIMITY) SI PIPING SYSTEM, CLASS IE ELECT, CABLE TRAYS (ESS), IFI INSTRU.              | (PROXIMITY) ELECT. TERM. BOX (BOP), CFI & TUBES INSTRU'S. |
| 6   | 12-4025-W10        | SHIELDING / BLOCKOUT | (PROXIMITY) SAFETY INJ. PUMP, CCW & SI PIPING SYSTEMS, CLASS IE ELECT. CABLE TRAYS (ESS). | (PROXIMITY) PA PIPING SYSTEM, TUBES INSTRU.               |
| 7   | 12-4025-W11        | SHIELDING / BLOCKOUT | (PROXIMITY) CCW PIPING SYSTEM, CLASS IE ELECT. CABLE TRAYS (ESS).                         | (PROXIMITY) DW, PA & PW PIPING SYSTEMS. TUBES INSTRU.     |
| 8   | 12-4025-W12        | SHIELDING / BLOCKOUT | (PROXIMITY) CCW PIPING SYSTEM, CLASS IE ELECT. CABLE TRAYS (ESS).                         | (PROXIMITY) DW, PA & PW PIPING SYSTEMS, TUBES INSTRU.     |
| 9   | 12-4025-W13        | SHIELDING / BLOCKOUT | (PROXIMITY) SI PIPING SYSTEM, IFI INSTRU.   | (PROXIMITY) CFI & TUBES INSTRU'S.                         |
| 10  | 12-4025-W14        | SHIELDING / BLOCKOUT | (PROXIMITY) CCW PIPING SYSTEM,  | (PROXIMITY) CFI & TUBES INSTRU'S.                         |

MASONRY WALL SURVEY  
SUMMARY SHEET  
D.C. COOK NUCLEAR PLANT

ATTACHMENT 2  
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F. Gomez

| NO. | UNIQUE WALL NO.    | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL   |  |
|-----|--------------------|-----------------------|---|--|
|     |                    |                       | SAFETY RELATED  | NON-SAFETY RELATED   |
| 11  | AUXILIARY BUILDING |                       |   |  |
|     | 12-4025-W15        | SHIELDING / BLOCKOUT  | (PROXIMITY) CCW PIPING SYSTEM, CLASS 1E ELECT. CABLE TRAYS (ESS).   | (PROXIMITY) DW, PA & PW PIPING SYSTEMS. ELECT. TERM. BOX (BOP). TUBE INSTRU.                                   |
|     |                    |                       |   |  |
|     |                    |                       |   |  |
| 12  | 12-4025-W16        | SHIELDING / BLOCKOUT  | (PROXIMITY) CCW PIPING SYSTEM, CLASS 1E ELECT. CABLE TRAYS (ESS).   | (PROXIMITY) DW, PA & PW PIPING SYSTEMS. CFI INSTR. (ATTACHED) INSTRU. TUBE AND FIRE EQUIP.                     |
| 13  | 12-4025-W21        | PARTITION / SHIELDING | (PROXIMITY) CONT. SPRAY PUMP. CCW, CTS & SI PIPING SYSTEMS. CLASS 1E ELECT. TERM. BOXES & CDT'S (ESS). HVAC DUCT. IPI & IPA INSTRU'S. | (PROXIMITY) DR PIPING SYSTEM, IPI INSTRU. (ATTACHED) <sup>LS</sup> SUPPORT FOR REACH ROD FOR 1"Ø DRAIN PIPING. |
| 14  | 12-4025-W22        | PARTITION / SHIELDING | (PROXIMITY) CONT. SPRAY PUMP. CCW, CTS & SI PIPING SYSTEMS. CLASS 1E ELECT. TERM. BOXES & CDT'S (ESS). HVAC DUCT. IPA & IPI INSTRU'S. | (PROXIMITY) DR PIPING SYSTEM.  |

MASONRY WALL SURVEY  
SUMMARY SHEET  
D.C. COOK NUCLEAR PLANT

ATTACHMENT 2  
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F. G. G. S.

| NO. | UNIQUE WALL NO.                       | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL   |   |
|-----|---------------------------------------|-----------------------|---|---|
|     |                                       |                       | SAFETY RELATED  | NON-SAFETY RELATED  |
| 15  | AUXILIARY BUILDING<br>12 - 4025 - W23 | PARTITION / SHIELDING | (PROXIMITY) RESIDUAL HEAT REMOVAL PUMP, CCW, RH & SI PIPING SYSTEMS, CLASS IE ELECT. TERM. BOX & CDT'S (ESS), HVAC DUCT, IFC & IPA INSTRU'S.      | (PROXIMITY) DR PIPING SYSTEM. IPX & IP1 INSTRU'S. (ATTACHED) L <sup>S</sup> SUPPORT FOR REACH ROD FOR DRAIN PIPING.   |
| 16  | 12 - 4025 - W24                       | PARTITION / SHIELDING | (PROXIMITY) RESIDUAL HEAT REMOVAL PUMP, CCW, RH & SI PIPING SYSTEMS, CLASS IE ELECT. TERM. BOX & CDT'S (ESS), HVAC DUCT, IPI, IPA & IFC INSTRU'S. | (PROXIMITY) DR PIPING SYSTEM. IPX INSTRU. (ATTACHED) L <sup>S</sup> SUPPORT FOR REACH ROD FOR 3/4" Ø DRAIN PIPING.  |
| 17  | 12 - 4025 - W25                       | SHIELDING             | (PROXIMITY) CS PIPING SYSTEM.   | (PROXIMITY) WD PIPING SYSTEM. HVAC DUCT, DPI & TUBES INSTRU'S.  |
| 18  | 12 4025 - W26                         | SHIELDING             | (PROXIMITY) BORIC ACID EVAP. SUMP PUMP, C & CS PIPING SYSTEMS, CLASS IE ELECT. TERM. BOX & CDT'S (ESS).   | (PROXIMITY) DR, N & PA PIPING SYSTEMS, ELECT. TERM. BOXES & CDT'S (BOP), HVAC DUCT, QPI & TUBES INSTRU. (ATTACHED) L <sup>S</sup> SUPPORT 3/4" Ø PA PIPING AND INSTRU. TUBES. |



MASONRY WALL SURVEY  
SUMMARY SHEET  
D.C. COOK NUCLEAR PLANT

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F. G. G. S.

| NO. | UNIQUE WALL NO.    | FUNCTION             | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL  |   |
|-----|--------------------|----------------------|--|---|
|     |                    |                      | SAFETY RELATED   | NON-SAFETY RELATED  |
|     | AUXILIARY BUILDING |                      |  |   |
| 19  | 12-4025-W27        | SHIELDING            | (PROXIMITY) DIRT SUMP TANK, CS PIPING SYSTEM. CLASS IE ELECT. CABLE TRAYS (ESS).   | (PROXIMITY) WD & DR PIPING SYSTEMS. ELECT. TERM. BOX (BOP). QPA, QPI, QPS, QTS, RPI & TUBES INSTRU'S. (ATTACHED) IE TO LEAD WALL. |
| 20  | 12-4025-W28        | SHIELDING            | NONE   | (PROXIMITY) PW & WD PIPING SYSTEMS. HVAC DUCT, DPI INSTRU.  |
| 21  | 12-4026-W1         | SHIELDING / BLOCKOUT | (PROXIMITY) RECIP. CHARGING PUMP. CCW & CS PIPING SYSTEMS. CLASS IE ELECT. CDT'S. (ESS), HVAC DUCT.                          | (PROXIMITY) AUX, DW, FP, PA, PW & WD PIPING SYSTEMS. HVAC DUCTS. QPI INSTRU'S.  |
| 22  | 12-4026-W2         | SHIELDING / BLOCKOUT | (PROXIMITY) CENTRIF. CHARGING PUMP. CCW & CS PIPING SYSTEMS. CLASS IE ELECT. TERM. BOX & CDT'S (ESS), HVAC DUCT, CFA INSTRU. | (PROXIMITY) AUX, DW, FP, N, PA, PW & WD PIPING SYSTEMS. HVAC DUCTS. QPI & QPX INSTRU'S.   |
| 23  | 12-4026-W3         | SHIELDING / BLOCKOUT | (PROXIMITY) CENTRIF. CHARGING PUMP. CCW & CS PIPING SYSTEMS. CLASS IE ELECT. CDT'S (ESS), HVAC DUCT, CFA INSTRU.             | (PROXIMITY) AUX, DW, FP, N, PA, PW & WD PIPING SYSTEMS. HVAC DUCTS. QPI & QPX INSTRU'S.   |



MASONRY WALL SURVEY  
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D.C. COCK NUCLEAR PLANT

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F. GORDON

| NO. | UNIQUE WALL NO.    | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL  |  |
|-----|--------------------|-----------------------|--|--|
|     |                    |                       | SAFETY RELATED   | NON-SAFETY RELATED   |
|     | AUXILIARY BUILDING |                       |  |  |
| 24  | 12- 4026 - W4      | SHIELDING / BLOCKOUT  | (PROXIMITY) RECIP. CHARGING PUMP, CS PIPING SYSTEM, HVAC DUCT.   | (PROXIMITY) PW PIPING SYSTEM, QPI INSTRU.  |
| 25  | 12- 4026 - W5      | SHIELDING / BLOCKOUT  | (PROXIMITY) CENTRIF. CHARGING PUMP, CCW & CS PIPING SYSTEMS, CLASS IE ELECT. TERM. BOXES, CDT'S & PULL BOXES (ESS), HVAC DUCT, CFA INSTRU. | (PROXIMITY) CFI & QPI INSTRU'S.  |
| 26  | 12- 4026 - W6      | SHIELDING / BLOCK OUT | (PROXIMITY) CENTRIF. CHARGING PUMP, CCW, CS & SI PIPING SYSTEMS, CLASS IE ELECT. CDT'S & PULL BOXES (ESS), HVAC DUCT, CFA INSTRU.          | (PROXIMITY) AUX & FP PIPING SYSTEMS, ELECT. PULL BOX (BOP), QPI & QPX INSTRU'S.            |
| 27  | 12- 4026 - W7      | SHIELDING             | (PROXIMITY) REFUELING WATER PURIF. FILTER, CCW PIPING SYSTEM.  | (PROXIMITY) FP, PA & SF PIPING SYSTEMS, HVAC DUCT, RPI INSTRU'S, 2-3"φ SF PIPES (THROUGH). |
| 28  | 12- 4026 - W8      | SHIELDING             | (PROXIMITY) SAFETY INJ. PUMP, C, CCW & SI PIPING SYSTEMS, CLASS IE ELECT. PULL BOX & CDT'S (ESS) HVAC DUCT, TFI & IPI INSTRU'S.            | (PROXIMITY) HVAC DUCT.   |

MASONRY WALL SURVEY  
SUMMARY SHEET  
D.C. COOK NUCLEAR PLANT

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SHEET 7 OF 28

F. GOWS

| NO. | UNIQUE WALL NO.           | FUNCTION  | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL   |  |
|-----|---------------------------|-----------|---|--|
|     |                           |           | SAFETY RELATED  | NON-SAFETY RELATED   |
|     | <u>AUXILIARY BUILDING</u> |           |   |  |
| 29  | 12-4026-W9                | SHIELDING | (PROXIMITY) SAFETY INJ. PUMP C, CCW & SI PIPING SYSTEMS. CLASS IE ELECT. PULL BOX. HVAC DUCT, CFI, IFI & IPI INSTRU'S.                                    | (PROXIMITY) HVAC DUCT.   |
| 30  | 12-4026-W10               | SHIELDING | (PROXIMITY) SAFETY INJ. PUMP. CCW & SI PIPING SYSTEMS. CLASS IE ELECT. TERM. BOXES & CDT'S (ESS), HVAC DUCT, CFA, IFI & IPI INSTRU'S.                     | (PROXIMITY) HVAC DUCT.   |
| 31  | 12-4026-W11               | SHIELDING | (PROXIMITY) SAFETY INJ. PUMP, CCW & SI PIPING SYSTEMS. CLASS IE ELECT. TERM. & PULL BOXES, CDT'S & CABLE TRAYS (ESS), HVAC DUCT. CFA, IFI & IPI INSTRU'S. | (PROXIMITY) HVAC DUCT.   |
| 32  | 12-4026-W12               | PARTITION | (PROXIMITY) CS PIPING SYSTEM. CLASS IE ELECT. CDT'S (ESS)   | (PROXIMITY) H & PW PIPING SYSTEMS. HVAC DUCT. QFI INSTRU'S. (ATTACHED) LS & FE FOR SUPPORT QFI INSTRU'S. |

MASONRY WALL SURVEY  
SUMMARY SHEET  
D.C. COOK NUCLEAR PLANT

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F. G. 105

| NO. | UNIQUE WALL NO.    | FUNCTION            | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL   |   |
|-----|--------------------|---------------------|---|---|
|     |                    |                     | SAFETY RELATED  | NON-SAFETY RELATED  |
| 33  | AUXILIARY BUILDING |                     |   |   |
|     | 12-4026-W13        | SHIELDING           | (PROXIMITY) C & CCW PIPING SYSTEMS. ELECT. VALVE CONT. CENT. (ESS).   | (PROXIMITY) N, PW & WD PIPING SYSTEMS. HVAC DUCT. ARV, CRV, CFI, QFI, QLC, QTC, QTI & QRV INSTRU'S. ELECT. TERM & BOX (BOP).        |
| 34  | 12-4026-W14        | SHIELDING           | (PROXIMITY) BORIC ACID EVAP. C, CCW & CS PIPING SYSTEMS. CLASS IE ELECT. CDT'S (ESS).   | (PROXIMITY) AUX, DW, N, PA & PW PIPING SYSTEMS. HVAC DUCT. CFI & QRV INSTRU'S. ELECT. PULL BOXES & CDT'S (BOP), (THRU.) 4"Ø SLEEVE. |
| 35  | 12-4026-W15        | SHIELDING           | (PROXIMITY) C & CS PIPING SYSTEMS, CLASS IE ELECT. TERM. & PULL BOXES, CDT'S (ESS).   | (PROXIMITY) AUX & WD PIPING SYSTEMS, HVAC DUCT. RPC INSTRU'S.   |
| 36  | 12-4026-W16        | SHIELDING           | (PROXIMITY) GAS DECAY TANKS, C & CCW PIPING SYSTEMS. CLASS IE ELECT. CABLE TRAYS & CDT'S (ESS).   | (PROXIMITY) DR, DW, N, PA, PW & WD PIPING SYSTEMS, HVAC DUCTS, RLS INSTRU.  |
| 37  | 12-4026-W17        | SHIELDING, BLOCKOUT | (PROXIMITY) BORIC ACID TANKS & PUMPS, CCW & CS PIPING SYSTEMS, CLASS IE ELECT. TERM. BOX, CDT'S & DIST. PNB (ESS), API, QLA, QPA, QPI & QTC INSTRU'S. | (PROXIMITY) AUX, FP, N & PW PIPING SYSTEMS. HVAC DUCTS.   |

MASONRY WALL SURVEY  
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D.C. COOK NUCLEAR PLANT

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F. G. W. G.

| NO. | UNIQUE WALL NO.                   | FUNCTION  | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL  |   |
|-----|-----------------------------------|-----------|--|---|
|     |                                   |           | SAFETY RELATED   | NON-SAFETY RELATED  |
| 38  | AUXILIARY BUILDING<br>12-4026-W18 | SHIELDING | (PROXIMITY) GAS DECAY TANKS, CCW<br>PIPING SYSTEM, CLASS IE ELECT.<br>CDT'S (ESS).   | (PROXIMITY) AUX, DW, N, PW & WD<br>PIPING SYSTEMS. HVAC DUCTS.  |
| 39  | 12-4026-W19                       | SHIELDING | (PROXIMITY) C & CS PIPING SYSTEMS,<br>CLASS IE ELECT. TERM, PULL BOXES<br>& CDT'S (ESS).   | (PROXIMITY) PW & WD PIPING<br>SYSTEMS. HVAC DUCT, RPC<br>& RRV INSTRU'S.  |
| 40  | 12-4026-W20                       | SHIELDING | (PROXIMITY) BORIC ACID EVAP. CCW &<br>CS PIPING SYSTEMS. CLASS IE ELECT.<br>TERM. BOXES CDT'S & VALVE CONT<br>CENT. (ESS). ARV, CRV, QFT, QLC, QRV<br>& QTI INSTRU'S, (ATTACHED) CDT. (ESS). | (PROXIMITY) AUX, DW, N, PA & PW PIPING<br>SYSTEMS. HVAC DUCTS, API INSTRU.<br>ELECT. CABLE TRAYS & CDT'S (BOP)<br>(ATTACHED) 1/2" SUPPORT 8" $\phi$ AUX,<br>PIPE. |
| 41  | 12-4026-W21                       | SHIELDING | (PROXIMITY) CCW, PIPING SYSTEM.<br>CLASS IE ELECT. CABLE TRAY, CDT'S<br>& VALVE CONT. CENT. (ESS).   | (PROXIMITY) N & PW PIPING SYSTEMS.<br>HVAC DUCT.  |
| 42  | 12-4026-W22                       | PARTITION | (PROXIMITY) CS PIPING SYSTEM. CLASS<br>IE ELECT. TERM. BOX & CDT'S (ESS).  | (PROXIMITY) PW & WD PIPING SYSTEMS.<br>HVAC DUCT, QFT INSTRU'S,<br>(ATTACHED) 1/2" & 1" SUPPORT INSTRU'S.   |

MASONRY WALL SURVEY  
SUMMARY SHEET  
D.C. COOK NUCLEAR PLANT

ATTACHMENT 2  
NRC - BULLETIN 80-11  
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SHEET 10 OF 28

F. G. 10/85

| NO. | UNIQUE WALL NO.    | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL                     |   |
|-----|--------------------|-----------------------|---|---|
|     |                    |                       | SAFETY RELATED  | NON-SAFETY RELATED  |
|     | AUXILIARY BUILDING |                       |   |   |
| 43  | 12-4026-W23        | PARTITION             | (PROXIMITY) QFA, QFI & QPI AND TUBING INSTRU'S.                   | (PROXIMITY) HVAC DUCTS.   |
| 44  | 12-4026-W24        | PARTITION             | (PROXIMITY) CS PIPING SYSTEM. QFA, QFI & QPI AND TUBING INSTRU'S. | (PROXIMITY) WD PIPING SYSTEM.   |
| 45  | 12-4027-W1         | SHIELDING             | NONE  | (PROXIMITY) HVAC DUCTS.   |
| 46  | 12-4027-W2         | SHIELDING / PARTITION | NONE  | (PROXIMITY) WASTE EVAP. BOTTOM STORAGE TANK, DW & WD PIPING SYSTEMS. HVAC DUCT. RLS INSTRU.   |
| 47  | 12-4027-W3         | SHIELDING / PARTITION | NONE  | (PROXIMITY) WASTE EVAP. BOTTOM STORAGE TANK. HVAC DUCT.   |
| 48  | 12-4027-W4         | SHIELDING / PARTITION | NONE  | (PROXIMITY) WASTE EVAP BOT. STORAGE TANK, DW & PW PIPING SYSTEMS. HVAC DUCT.  |
| 49  | 12-4027-W5         | SHIELDING / PARTITION | NONE  | (PROXIMITY) RESIN STORAGE TANK. DW, N, PA, PW & WD PIPING SYSTEMS. HVAC DUCTS. RLA & RFI INSTRU'S. (ATTACHMENT) 15 SUPPORT INSTRU. TUBES. |



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F. Garas

| NO. | UNIQUE WALL NO.           | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL                                   |  |
|-----|---------------------------|-----------------------|---|--|
|     |                           |                       | SAFETY RELATED  | NON-SAFETY RELATED   |
|     | <u>AUXILIARY BUILDING</u> |                       |   |  |
| 50  | 12-4027-W6                | SHIELDING PARTITION   | (PROXIMITY) C & CCW PIPING SYSTEM -S.   | (PROXIMITY) AUX, DR, DW, N, PW & WD PIPING SYSTEMS. CRV, GRV, RFC, RLC, RPC, RRV & RTI INSTRU'S. |
| 51  | 12-4027-W7                | SHIELDING             | NONE  | (PROXIMITY) AUX, DW & WD PIPING SYSTEMS. HVAC DUCT.  |
| 52  | 12-4027-W8                | SHIELDING / PARTITION | (PROXIMITY) C & CCW PIPING SYSTEMS.   | (PROXIMITY) AUX, DR, DW, FP, PA, PW & WD PIPING SYSTEMS. ARV & RRV INSTRU'S.                     |
| 53  | 12-4027-W9                | SHIELDING             | NONE  | (PROXIMITY) AUX, DW, FP, PA & PW PIPING SYSTEMS, HVAC DUCTS, CRV, & RRV INSTRU'S.                |
| 54  | 12-4027-W10               | SHIELDING / PARTITION | (PROXIMITY) C & CCW PIPING SYSTEMS. CLASS 1E TERM. BOXES & CDT'S (ESS).         | (PROXIMITY) AUX, DR, PW & WD PIPING SYSTEMS. ELECT. CDT'S (BOP). HVAC DUCT, CRV & RRV INSTRU'S.  |
| 55  | 12-4027-W11               | SHIELDING             | (PROXIMITY) CCW PIPING SYSTEM. CLASS 1E ELECT. TERM & PULL BOXES & CDT'S (ESS). | (PROXIMITY) WD PIPING SYSTEM. HVAC DUCT.   |

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F. GAVES

| NO. | UNIQUE WALL NO.    | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL       |  |
|-----|--------------------|-----------------------|---|--|
|     |                    |                       | SAFETY RELATED                                      | NON-SAFETY RELATED   |
|     | AUXILIARY BUILDING |                       |   |  |
| 56  | 12-4027-W12        | SHIELDING             | (PROXIMITY) CLASS 1E ELECT. CDT'S (ESS)             | (PROXIMITY) WD PIPING SYSTEM, HVAC DUCT.   |
| 57  | 12-4027-W13        | SHIELDING             | NONE  | (PROXIMITY) SPENT FUEL FILTER, DR & SF PIPING SYSTEMS.                                   |
| 58  | 12-4027-W14        | SHIELDING / PARTITION | NONE  | (PROXIMITY) SPENT FUEL FILTER, DR & SF PIPING SYSTEMS, RPL INSTRU'S.                     |
| 59  | 12-4027-W15        | SHIELDING / PARTITION | NONE  | (PROXIMITY) SPENT FUEL FILTER, DR & SF PIPING SYSTEMS.                                   |
| 60  | 12-4027-W16        | PARTITION             | NONE  | (PROXIMITY) HVAC DUCTS, (ATTACHED) 1/4" $\phi$ TUBING.                                   |
| 61  | 12-4027-W17        | PARTITION             | NONE  | (PROXIMITY) HVAC DUCTS.  |
| 62  | 12-4027-W18        | SHIELDING             | NONE  | (PROXIMITY) WD PIPING SYSTEM, (ATTACHED) $\bar{P}$ SUPPORT FOR REACH ROD FOR EXIT, STEM. |
| 63  | 12-4027-W19        | SHIELDING             | (PROXIMITY) CLASS 1E ELECT. TERM. BOX & CDT'S (ESS) | (PROXIMITY) WD PIPING SYSTEM, HVAC DUCT.   |

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F.G. 10/83

| NO. | UNIQUE WALL NO.                   | FUNCTION  | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL  |   |
|-----|-----------------------------------|-----------|--|---|
|     |                                   |           | SAFETY RELATED   | NON-SAFETY RELATED  |
| 64  | AUXILIARY BUILDING<br>12-4027-W20 | SHIELDING | NONE   | (PROXIMITY) HVAC DUCT   |
| 65  | 12-4028-W1                        | SHIELDING | NONE   | (PROXIMITY) BD, DW, WD & CS PIPING SYSTEMS. RPI & DPI INSTRU'S.   |
| 66  | 12-4028-W2                        | SHIELDING | (PROXIMITY) BORIC ACID INJ. TANK, C & SI PIPING SYSTEMS. CLASS IE ELECT. TERM. BOXES, CDT'S, PANEL, CONDULETS & CABLE TRAYS (ESS), XSO, IPA & ITC INSTRU'S. (ATTACHED) ELECT. TERM. BOX & CDT'S (ESS). | (PROXIMITY) BD & DW PIPING SYSTEMS. HVAC DUCT. (THRU.) IRV INSTRU'S. (ATTACHED) ELECT. SAFETY SWITCH, WELD RECEPT. & CDT. (BOP), FIRE EXTING'S.                 |
| 67  | 12-4028-W3                        | SHIELDING | (PROXIMITY) VOLUME CONTROL TANK, CCW, CS & ESW PIPING SYSTEMS. CLASS IE ELECT. PULL BOXES & CDT'S (ESS) QLC, QPC, QRY, WFI & XSO INSTRU'S.   | (PROXIMITY) DW, FP, N, PA, PW & WD PIPING SYSTEMS. HVAC DUCT, EPT & PRV INSTRU'S. (ATTACHED) [ FOR 3/8" TUBING INSTR. AIR FOR CONTROL & INSTR. DEPT. AUX. SHOP. |
| 68  | 12-4028-W4                        | SHIELDING | (PROXIMITY) WASTE GAS COMPRESSOR & COMPRESSOR MOISTURE SEPARATOR, CCW PIPING SYSTEM.   | (PROXIMITY) WD PIPING SYSTEM. HVAC DUCTS. DPS, RLC, RRY & XSO INSTRU'S.   |



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F. GUYOS

| NO. | UNIQUE WALL NO.                   | FUNCTION  | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL   |  |
|-----|-----------------------------------|-----------|---|--|
|     |                                   |           | SAFETY RELATED  | NON-SAFETY RELATED   |
| 69  | AUXILIARY BUILDING<br>12- 4028-W5 | SHIELDING | (PROXIMITY) WASTE GAS COMPR. & COMPR. MOISTURE SEPARATOR. CCW PIPING SYSTEM.  | (PROXIMITY) WD PIPING SYSTEM. HVAC DUCT. RRV & XSO INSTRUS.  |
| 70  | 12- 4028-W6                       | SHIELDING | (PROXIMITY) CCW, CS & ESW PIPING SYSTEMS. CLASS IE ELECT. PULL BOXES & CDT'S (ESS).   | (PROXIMITY) CONCENTRATE HOLDING TANK. NSW PIPING SYSTEM. ELECT. CDT. (BOP), HVAC DUCT. QLA, QTA, XPA, XRV INSTRUS. |
| 71  | 12- 4028-W7                       | SHIELDING | NONE  | (PROXIMITY) BD PIPING SYSTEM. DPI INSTRU.  |
| 72  | 12- 4028-W8                       | SHIELDING | (PROXIMITY) BORIC ACID INJ. TANK & BORON INJ. TANK. CS & SI PIPING SYSTEMS. CLASS IE ELECT. TERM. BOXES CDT'S & CABLE TRAYS (ESS), IRV & XSO INSTRUS.     | (PROXIMITY) BD & DW PIPING SYSTEMS. ELECT. CABLE TRAYS (BOP), HVAC DUCT.   |
| 73  | 12- 4028-W9                       | SHIELDING | (PROXIMITY) VOL. CONTROL TANK. CCW, CS & ESW PIPING SYSTEMS. CLASS IE ELECT. TERM. & PULL BOXES, CDT'S & CABLE TRAYS (ESS), GRV, PRV, QLC, QPC, QRV & XSO | (PROXIMITY) DP, FP, N, PH & DW PIPING SYSTEMS. HVAC DUCT. EPT INSTRU.  |

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F. Garvey

| NO. | UNIQUE WALL NO.                   | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL   |  |
|-----|-----------------------------------|-----------------------|---|--|
|     |                                   |                       | SAFETY RELATED  | NON-SAFETY RELATED   |
| 74  | AUXILIARY BUILDING<br>12-4028-W10 | SHIELDING / PARTITION | (PROXIMITY) COMPONENT COOLING & HEAT EXCHANGER, CCW, CS & ESW PIPING SYSTEMS, CPI & CEI INSTRU'S. | (PROXIMITY) QPI INSTRU.  |
| 75  | 12-4028-W11                       | SHIELDING / PARTITION | (PROXIMITY) CCW, CS & ESW PIPING SYSTEMS.   | (PROXIMITY) QPI INSTRU'S.  |
| 76  | 12-4028-W12                       | SHIELDING             | (PROXIMITY) CS PIPING SYSTEM.   | (PROXIMITY) DW PIPING SYSTEM.  |
| 77  | 12-4028-W13                       | SHIELDING             | (PROXIMITY) CS PIPING SYSTEM.   | (PROXIMITY) PW & DW PIPING SYSTEMS.  |
| 78  | 12-4028-W14                       | SHIELDING             | NONE  | (PROXIMITY) PW PIPING SYSTEM.  |
| 79  | 12-4028-W15                       | PARTITION             | NONE  | (PROXIMITY) HVAC DUCT, (ATTACHED) BRACKET FOR FIRE EXTING.   |
| 80  | 12-4028-W16                       | PARTITION             | NONE  | (PROXIMITY) HVAC DUCT, (ATTACHED) EL FOR EYE WASH & BRACKET FOR FIRE EXTING, 2" $\phi$ PIPE FOR SHOWER (THRU.) |
| 81  | 12-4028-W17                       | PARTITION             | NONE  | (PROXIMITY) HVAC DUCT, (ATTACHED) L'S FOR MISC. ITEMS.   |

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F. Gans

| NO. | UNIQUE WALL NO.    | FUNCTION  | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL  |   |
|-----|--------------------|-----------|--|---|
|     |                    |           | SAFETY RELATED   | NON-SAFETY RELATED  |
|     | AUXILIARY BUILDING |           |  |   |
| 82  | 12-4028-W18        | PARTITION | (PROXIMITY) CLASS 1E ELECT. PRESS SWITCH & CDT (ESS)   | (PROXIMITY) HVAC DUCTS, (ATTACHED) L'S & F'S FOR SUPPORT FOR CO <sup>2</sup> STAND.                               |
| 83  | 12-4028-W19        | PARTITION | NONE   | (PROXIMITY) HVAC DUCTS.   |
| 84  | 12-4028-W20        | PARTITION | NONE   | (PROXIMITY) HVAC DUCT.  |
| 85  | 12-4028-W21        | PARTITION | NONE   | (PROXIMITY) HVAC DUCTS.   |
| 86  | 12-4028-W22        | PARTITION | NONE   | (PROXIMITY) HVAC DUCTS.   |
| 87  | 12-4028-W23        | PARTITION | NONE   | (PROXIMITY) HVAC DUCTS.   |
| 88  | 12-4028-W24        | PARTITION | (PROXIMITY) CLASS 1E ELECT. TERM BOX, MOTOR CONT. CENT. CDT'S & CABLE TRAYS (ESS).                                 | (PROXIMITY) HVAC DUCT. (ATTACHED) BRACKET FOR FIRE EXTING., HZ & F'S FOR INSTR. TUBES & UNISTRUT FOR MISC. ITEMS. |
| 89  | 12-4028-W25        | PARTITION | NONE   | (PROXIMITY) HVAC DUCTS.   |
| 90  | 12-4028-W26        | PARTITION | (PROXIMITY) COMPONENT COOLING HEAT EXCHANGER, ESX PIPING SYSTEM, CLASS 1E ELECT. TERM. & PULL BOXES & CDT'S (ESS). | (PROXIMITY) HVAC DUCT. (ATTACHED) BRACKETS FOR FIRE EXTING. H'S FOR MISC. ITEMS.                                  |

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F. G. 105

| NO. | UNIQUE WALL NO.    | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL  |  |
|-----|--------------------|-----------------------|--|--|
|     |                    |                       | SAFETY RELATED   | NON-SAFETY RELATED   |
|     | AUXILIARY BUILDING |                       |  |  |
| 91  | 12- 4028- W27      | PARTITION             | (PROXIMITY) CLASS 1E ELECT. CABLE TRAYS & CDT'S (E66).   | NONE   |
| 92  | 12- 4028- W28      | PARTITION             | (PROXIMITY) CLASS 1E ELECT. CABLE TRAYS & CDT'S (ESS).   | (ATTACHED) BRACKET FOR FIRE EXTING. UNISTRUT FOR 1/2" $\phi$ CO <sup>2</sup> LINE. |
| 93  | 12- 4029- W1       | PARTITION / SHIELDING | (PROXIMITY) CLASS 1E ELECT. TERM. BOXES, CDT'S & CONDUITS (ESS).<br>(THRU) HVAC DUCTS (ATTACHED)<br>UNISTRUT FOR XSO INSTRU'S. | (PROXIMITY) HVAC DUCT.   |
| 94  | 12- 4029- W2       | SHIELDING             | (PROXIMITY) LET DOWN HEAT EXC - HANGER, CS PIPING SYSTEM.<br>CLASS 1E ELECT. TERM, BOX, CDT'S & BATT. CHARGER (ESS).           | (PROXIMITY) PA PIPING SYSTEM<br>HVAC DUCT, INSTRU. TUBES.                          |
| 95  | 12- 4029- W3       | SHIELDING / PARTITION | (PROXIMITY) LETDOWN HEAT EXC - HANGER, CS PIPING SYSTEM.<br>QTS INSTRU,  | NONE   |
| 96  | 12- 4029- W4       | SHIELDING             | (PROXIMITY) LET DOWN HEAT DISCHARGER & EXCHANGER, CCW & CS PIPING SYSTEM. QPC & QFI INSTRU'S.                                  | NONE   |

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F. GALLOS

| NO. | UNIQUE WALL NO.                  | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL  |  |
|-----|----------------------------------|-----------------------|--|--|
|     |                                  |                       | SAFETY RELATED   | NON-SAFETY RELATED                                     |
| 97  | AUXILIARY BUILDING<br>12-4029-W5 | SHIELDING / PARTITION | (PROXIMITY) LETDOWN HEAT EXCHANGER,<br>CS & ESW PIPING SYSTEMS, QTS INSTR.   | (PROXIMITY) WD PIPING SYSTEM,                          |
| 98  | 12-4029-W6                       | SHIELDING             | (PROXIMITY) LETDOWN HEAT DISCHARGER<br>& EXCHANGER, CCWS CS PIPING SYSTEMS,<br>QPC & QFI INSTRU'S.                       | (PROXIMITY) WD PIPING SYSTEM.                          |
| 99  | 12-4029-W7                       | PARTITION / SHIELDING | (PROXIMITY) CLASS 1E ELECT. TERM.<br>BOXES & CDT'S (ESS), (THRU) HVAC<br>DUCTS, (ATTACHED) UNISTRUT FOR<br>XSO INSTRU'S. | (PROXIMITY) HVAC DUCTS.                                |
| 100 | 12-4029-W8                       | SHIELDING             | (PROXIMITY) LETDOWN HEAT EXC-<br>HANGER, CS PIPING SYSTEM,   | (PROXIMITY) NSW & PA PIPING<br>SYSTEMS, INSTRU. TUBES. |
| 101 | 12-4029-W9                       | PARTITION / SHIELDING | NONE   | (PROXIMITY) ELECT. CDT'S (ESS)<br>(THRU.) HVAC DUCTS.  |
| 102 | 12-4029-W10                      | PARTITION / SHIELDING | NONE   | (THRU) HVAC DUCTS.                                     |
| 103 | 12-4029-W11                      | PARTITION             | NONE   | (PROXIMITY) HVAC DUCT.                                 |



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F. Garza

| NO. | UNIQUE WALL NO.                  | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL  |   |
|-----|----------------------------------|-----------------------|--|---|
|     |                                  |                       | SAFETY RELATED   | NON-SAFETY RELATED  |
| 104 | AUXILIARY BUILDING<br>12-4031-W1 | PARTITION / SHIELDING | (PROXIMITY) COMPUTER RM. CLASS 1E ELECT. PULL BOX, CDT'S & CABLE TRAYS (ESS), HVAC DUCTS. MISC. ITEMS. (ATTACHED) L'S & H'S FOR VTC & VRV INSTRU'S.  | (ATTACHED) BRACKET FOR FIRE EXTING. H'S & L'S FOR MISC. ITEMS. (THRU) HVAC DUCTS.                 |
| 105 | 12-4031-W2                       | PARTITION / SHIELDING | (PROXIMITY) COMPUTER RM. CLASS 1E ELECT. TERM. & PULL BOXES, CDT'S & CABLE TRAYS (ESS), HVAC DUCTS. MISC. ITEMS. (ATTACHED) L'S & H'S FOR VTC & VRV INSTRU'S.  | (ATTACHED) H'S & L'S FOR MISC. ITEMS. (THRU) HVAC DUCTS.  |
| 106 | 12-4031-W3                       | PARTITION / SHIELDING | (PROXIMITY) SURGE TANK. CCW PIPING SYSTEM CLASS 1E ELECT. TERM. & PULL BOXES & CDT'S (ESS). PPA & PPI INSTRU'S.  | (PROXIMITY) DW & PA PIPING SYSTEMS. (ATTACHED) BRACKETS & H'S FOR MISC. ITEMS. (THRU) HVAC DUCTS. |
| 107 | 1-4033-W1                        | PARTITION / FIRE WALL | (PROXIMITY) DIESEL GENERATOR, AIR RECEIVER & OIL DAY TANK, DG & FO PIPING SYSTEMS. CLASS 1E ELECT. TERM. & PULL BOXES & CDT'S (ESS). LLI, XPA, XPI & XPS INSTRU'S. (THRU) PIPE SLEEVE FOR 1"φ, 1 1/2"φ & 3 1/2"φ DG LINE. HVAC DUCT. | (PROXIMITY) CA PIPING SYSTEM.   |

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F. GILLES

| NO. | UNIQUE WALL NO.    | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL  |                                     |
|-----|--------------------|-----------------------|--|-------------------------------------|
|     |                    |                       | SAFETY RELATED   | NON-SAFETY RELATED                  |
|     | AUXILIARY BUILDING |                       |  |                                     |
| 108 | 1- 4033-W2         | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. AUX SUB. PNL & CDT'S (ESS),  | NONE                                |
| 109 | 1- 4033-W3         | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. AUX SUB. PNL & CDT'S (ESS),  | (ATTACHED) BRACKET FOR FIRE EXTING. |
| 110 | 1- 4033-W4         | PARTITION / FIRE WALL | (PROXIMITY) DIESEL GENERATOR, AIR RECEIVER & FUEL OIL DAY TANK, DG & FO PIPING SYSTEMS, CLASS 1E ELECT. TERM. BOXES, CDT'S, GEAR BOX & GRD. RESISTOR (ESS), LLI, XPA, XPI & XPS INSTRU'S. (THRU) SLEEVE FOR 1 1/2" & 3 1/2" DG LINE. HVAC DUCT. (ATTACHED) INSTRUT FOR INSTRU'S. | (PROXIMITY) CA PIPING SYSTEM.       |
| 111 | 1- 4034-W1         | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. TRANSF'S CDT'S & CABLE TRAYS (ESS), HVAC DUCTS   | NONE                                |
| 112 | 1- 4034-W2         | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. TRANSF'S TERM. & PULL BOXES, CDT'S & CABLE TRAYS (ESS), HVAC DUCTS.  | NONE                                |

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F. GARDNER

| NO. | UNIQUE WALL NO.    | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL                                |                    |
|-----|--------------------|-----------------------|--|--------------------|
|     |                    |                       | SAFETY RELATED   | NON-SAFETY RELATED |
|     | AUXILIARY BUILDING |                       |  |                    |
| 113 | 1- 4034-W3         | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S & CABLE TRAYS (ESS), HVAC DUCTS.           | NONE               |
| 114 | 1- 4034-W4         | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S & CABLE TRAYS (ESS), HVAC DUCTS.           | NONE               |
| 115 | 1- 4034-W5         | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S & CABLE TRAYS (ESS), HVAC DUCTS.           | NONE               |
| 116 | 1- 4034-W6         | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S & CABLE TRAYS (ESS), HVAC DUCTS.           | NONE               |
| 117 | 1- 4034-W7         | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S (ESS), HVAC DUCTS.                         | NONE               |
| 118 | 1- 4034-W8         | PARTITION / FIREWALL  | (PROXIMITY) CLASS 1E ELECT. CDT'S & CABLE TRAYS (ESS), HVAC DUCTS.           | NONE               |
| 119 | 1- 4034-W9         | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S & CABLE TRAYS (ESS), HVAC DUCTS.           | NONE               |
| 120 | 1- 4034-W10        | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S, TERM BOX & CABLE TRAYS (ESS), HVAC DUCTS. | NONE               |



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F. Gilkey

| NO. | UNIQUE WALL NO.                  | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL  |   |
|-----|----------------------------------|-----------------------|--|---|
|     |                                  |                       | SAFETY RELATED   | NON-SAFETY RELATED                              |
| 121 | AUXILIARY BUILDING<br>1-4034-W11 | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S & CABLE TRAYS (ESS), HVAC DUCTS.   | NONE  |
| 122 | 12-4035-W1                       | PARTITION             | (PROXIMITY) CLASS 1E ELECT. TERM. & PULL BOXES, CDT'S & CABLE TRAYS (ESS)  | (PROXIMITY) HVAC DUCTS. (ATTACHED) FIRE EXTING. |
| 123 | 12-4035-W2                       | PARTITION             | (PROXIMITY) CLASS 1E ELECT. CDT'S & CABLE TRAYS (ESS).   | (PROXIMITY) HVAC DUCTS. (ATTACHED) FIRE EXTING. |
| 124 | 2-4036-W1                        | PARTITION / FIRE WALL | (PROXIMITY) DIESEL GENERATOR, AIR RECEIVER & FUEL OIL DAY TANK, DG ESW & FO PIPING SYSTEMS. CLASS 1E ELECT. TERM. BOXES & CDT'S (ESS), LL, XPA, XPI & XPS INSTRU'S. (THRU) 1"Ø, 1 1/2"Ø & 3 1/2"Ø PIPE SLEEVES FOR DG LINE. HVAC DUCT. | (PROXIMITY) CA PIPING SYSTEM.                   |
| 125 | 2-4036-W2                        | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S & PNL (ESS).   | (ATTACHED) FIRE EXTING.                         |
| 126 | 2-4036-W3                        | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S & PNL (ESS).   | NONE  |

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F.G.M.S.

| NO. | UNIQUE WALL NO.                  | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL   |   |
|-----|----------------------------------|-----------------------|---|---|
|     |                                  |                       | SAFETY RELATED  | NON-SAFETY RELATED                                      |
| 127 | AUXILIARY BUILDING.<br>2-4036-W4 | PARTITION / FIRE WALL | (PROXIMITY) DIESEL GENERATOR<br>AIR RECEIVER & FUEL OIL DAY<br>TANK. FO PIPING, SYSTEM.<br>CLASS IE ELECT. TERM. BOXES,<br>CDT'S & GRD RESISTOR (ESS).<br>LLI, XPA, XPI & XPS INSTRU'S.<br>(THRU) 1"φ & 3/2"φ PIPE SLEEVES<br>FOR DG LINE. HVAC DUCT. | (PROXIMITY) CA PIPING SYSTEM.                           |
| 128 | 2-4037-W1                        | PARTITION / FIREWALL  | (PROXIMITY) CLASS IE ELECT.<br>TRANSF'S, CDT'S & CABLE TRAYS<br>(ESS), HVAC DUCTS.  | (ATTACHED) [3 FOR SUPPORT<br>1"φ PIPE CO <sup>2</sup> . |
| 129 | 2-4037-W2                        | PARTITION / FIRE WALL | (PROXIMITY) CLASS IE ELECT.<br>TERM. & PULL BOXES, CDT'S TRANS<br>& CABLE TRAYS (ESS), HVAC DUCTS.  | NONE  |
| 130 | 2-4037-W3                        | PARTITION / FIRE WALL | (PROXIMITY) CLASS IE ELECT. CDT'S<br>& CABLE TRAYS (ESS), HVAC DUCTS.   | NONE  |
| 131 | 2-4037-W4                        | PARTITION / FIRE WALL | (PROXIMITY) CLASS IE ELECT. CDT'S<br>& CABLE TRAYS (ESS), HVAC DUCTS.   | NONE  |

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F. Gray

| NO. | UNIQUE WALL NO.           | FUNCTION              | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL                                       |                    |
|-----|---------------------------|-----------------------|---|--------------------|
|     |                           |                       | SAFETY RELATED  | NON-SAFETY RELATED |
|     | <u>AUXILIARY BUILDING</u> |                       |   |                    |
| 132 | 2-4037- W5                | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S<br>& CABLE TRAYS (ESS), HVAC DUCTS.               | NONE               |
| 133 | 2-4037- W6                | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S<br>& CABLE TRAYS (ESS), HVAC DUCTS.               | NONE               |
| 134 | 2-4037- W7                | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. CDT'S<br>& CABLE TRAYS (ESS), HVAC DUCTS.               | NONE               |
| 135 | 2-4037- W8                | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT. TERM.<br>BOX & CDT'S (ESS), HVAC DUCTS.                 | NONE               |
| 136 | 2-4037- W9                | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT.<br>TERM. BOX, CDT'S & CABLE TRAY;<br>(ESS), HVAC DUCTS, | NONE               |
| 137 | 2-4037- W10               | PARTITION / FIRE WALL | (PROXIMITY) HVAC DUCTS.   | NONE               |
| 138 | 2-4037- W11               | PARTITION / FIRE WALL | (PROXIMITY) CLASS 1E ELECT.<br>CABLE TRAY (ESS), HVAC DUCTS.                        | NONE               |

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*F. G. V. S.*

| NO. | UNIQUE WALL NO.         | FUNCTION  | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL |   |
|-----|-------------------------|-----------|---|---|
|     |                         |           | SAFETY RELATED                                | NON-SAFETY RELATED  |
|     | <u>TURBINE BUILDING</u> |           |   |   |
| 139 | 12-4046-W1              | PARTITION | NONE  | (PROXIMITY) AUX, NSW & C PIPING SYSTEMS, XSO INSTRU'S. ELECT. PULL BOX, CDT'S CABLE TRAYS (ESS).  |
| 140 | 12-4046-W2              | PARTITION | NONE  | (PROXIMITY) AUX PIPING SYSTEM.  |
| 141 | 12-4049-W1              | PARTITION | NONE  | (PROXIMITY) NSW & FW PIPING SYSTEMS<br>(ATTACHED) BRACKETS FOR FIRE EXTING. ELECT. CDT'S (ESS)  |
| 142 | 12-4049-W2              | PARTITION | NONE  | (PROXIMITY) WRV & XSO INSTRU'S<br>(ATTACHED) FLS, LS, BRACKETS & UNISTRUT FOR FIRE EXTING & HOSES. INSTRU. TUBES & MISC. ITEMS. ELECT. TERM., PULL BOX & CDT'S (ESS). |
| 143 | 12-4049-W3              | PARTITION | NONE  | (ATTACHED) FLS & LS, BRACKETS & UNISTRUT FOR FIRE EXTING, INSTRU. TUBES & MISC. ITEMS. ELECT. CDT'S (ESS).  |

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| NO. | UNIQUE WALL NO.                       | FUNCTION  | ITEMS IN PROXIMITY TO/OR ATTACHED TO THE WALL |  |
|-----|---------------------------------------|-----------|---|--|
|     |                                       |           | SAFETY RELATED                                | NON-SAFETY RELATED                                     |
| 144 | <u>TURBINE BUILDING</u><br>12-4049-W4 | PARTITION | NONE  | (PROXIMITY) ELECT. TERM., PULL<br>BOXES & CDT'S (ESS). |

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PIPING SYSTEM PREFIXES

I SAFETY RELATED

|     |                               |
|-----|-------------------------------|
| C   | CONDENSATE                    |
| CCW | COMPONENT COOLING WTR.        |
| CS  | CHEMICAL & VOLUME CONTROL     |
| CTS | CONTAINMENT SPRAY             |
| DG  | DIESEL GENERATOR OIL & DRAINS |
| ESW | ESSENTIAL SERV. WTR.          |
| FO  | FUEL OIL                      |
| FW  | FEED WATER                    |
| LO  | LUBE OIL                      |
| MS  | MAIN STEAM                    |
| RH  | RESIDUAL HEAT REMOVAL         |
| SI  | SAFETY INJECTION              |
| VW  | EQUIPMENT ROOM VENT           |

II NON SAFETY RELATED

|       |  |
|-------|--|
| AUX   | AUXILIARY STEAM                              |
| BD    | BLOWDOWN DRAIN VENTS<br>FROM STEAM GENERATOR |
| CA    | CONTROL AIR                                  |
| DR&WD | STATION DRAINAGE                             |
| DW    | DEMINERALIZED WATER                          |
| FP    | FIRE PROTECTION                              |
| N     | NITROGEN                                     |
| NSW   | NON ESSENTIAL SERV. WTR.                     |
| PA    | PLANT AIR                                    |
| PW    | PRIMARY WATER                                |
| SF    | SPENT FUEL PIT COOLING                       |

*F. Gandy*



# INSTRUMENTATION LEGEND

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| FIRST LETTER IDENTIFICATION LIST |  |
|----------------------------------|--|
| A                                | AUXILIARY STEAM AND P&ID PUMP TURBINE STEAM                |
| B                                | STEAM GENERATOR  |
| C                                | CONDENSATE AND COOLING WATER                               |
| D                                | DRUM DRAINS AND WARMING STEAM                              |
| E                                | ENVIRONMENTAL MONITORING                                   |
| F                                | FEEDWATER  |
| G                                | GAS SYSTEMS EXCEPT FIRE FIGHTING CO <sub>2</sub>           |
| H                                | HEATER BLEEDS AND DRAINS                                   |
| I                                | SAFETY INJECTION RESIDUAL HEAT REMOVAL & CONTAINMENT SPRAY |
| J                                |  |
| K                                | CONDENSATE AND CHEMICAL SERVICES                           |
| L                                | LUBE OIL AND ELECTRO-HYDRAULIC CONTROL FLUID               |
| M                                | MAIN STEAM   |
| N                                | NUCLEAR REACTOR COOLANT AND N-CORE INSTRUMENTS             |
| O                                |  |
| P                                | PLANT AIR CONTAINMENT PRESSURIZATION CONTAINMENT PRESSURE  |
| Q                                | CHEMICAL AND VOLUME CONTROL                                |
| R                                | RADIOACTIVE WASTE DISPOSAL AND SPENT FUEL                  |
| S                                | SEAL SEALS AND AIR REMOVAL                                 |
| T                                | TURBINE  |
| U                                | BY-PASS SYSTEM   |
| V                                | VENTILATION AND HEATING STEAM                              |
| W                                | CIRCULATING WATER AND SERVICE WATER                        |
| X                                | CONTROL AIR  |
| Y                                |  |
| Z                                | FIRE SYSTEMS   |

| SECOND LETTER |                        | THIRD LETTER |                         |
|---------------|------------------------|--------------|-------------------------|
| LETTER        | PROCESS OR MEASUREMENT | LETTER       | MAIN FUNCTION           |
| D             | DIFFERENTIAL PRESSURE  | S            | CONTROL SWITCH          |
| F             | FLOW                   | A            | ALARM                   |
| C             | CONTROL                | C            | CONTROLLER              |
| P             | PRESSURE               | I            | INDICATOR               |
| T             | TEMPERATURE            | R            | RECORDER                |
| S             | SAMPLE                 | X            | TEST POINT              |
| R             | RADIATION              | Q            | COMPUTER INPUT          |
| V             | VIBRATION              | P            | PROTECTION SYSTEM INPUT |

## EXCEPTIONS

EPT = ELECTRIC PNEUMATIC TRANSDUCER  
 XSD = SOLENOID VALVE  
 VRV = VENT. & HTG. STEAM RAD. VALVE  
 V = AS THE THIRD LETTER DENOTES A VALVE

1<sup>ST</sup> LETTER      2<sup>ND</sup> LETTER      3<sup>RD</sup> LETTER

EXAMPLE      QFA

EXAMPLE

Q = CHEMICAL AND VOLUME CONTROL

F = FLOW

A = ALARM

## ELECTRICAL LEGEND

ESS = ENGINEERING SAFETY SYSTEM

BOP = BALANCE OF PLANT

F. G. 104

CRITERIA/COMMENTARY FOR THE REEVALUATION OF CONCRETE  
MASONRY WALLS AS PER NRC IE BULLETIN 80-11

ATTACHMENT 3  
AEP:NRC:0418D



# CRITERIA FOR THE RE-EVALUATION OF CONCRETE MASONRY WALLS

## ATTACHMENT #3

### 1.0 GENERAL

#### 1.1 PURPOSE

These criteria are provided for use in re-evaluating the structural adequacy of concrete masonry walls as required by NRC IE Bulletin 80-11, Masonry Wall Design, dated May 8, 1980.

#### 1.2 SCOPE

The re-evaluation shall determine whether the concrete masonry walls will perform their intended function under the loads and load combinations prescribed herein. Verification of wall adequacy shall include a review of the local transfer of load from block into wall, the global response of wall, and the transfer of wall reactions into supports. Anchorbolts and embedments for attachments are not considered to be within the scope of the evaluation.

### 2.0 GOVERNING CODE

The governing code shall be ACI-531-79 as modified herein. Supplemental allowables, as specified herein, shall be used for cases not directly covered by this code.

### 3.0 LOADS AND LOAD COMBINATIONS

#### 3.1 LOADS

The loads utilized in the reevaluation of concrete masonry walls are defined in the D. C. Cook FSAR.

### 3.2 LOAD COMBINATIONS

Load combinations utilized in the re-evaluation analyses shall be as follows:

#### Normal Loads

- a.  $D + L + SL$
- b.  $D + L + W + SL$
- c.  $D + L + E_o + SL$

#### Extreme Enviromental/Abnormal Loads

- d.  $D + L + E_{ss} + SL$

where

D = Dead Load

L = Live Load

W = Wind Load

SL = System load (i.e. cable, piping, equipment)

$E_o$  = Loads due to operating basis earthquake (OBE)

$E_{ss}$  = Loads due to design basis earthquake (DBE)

### 4.0 MATERIAL STRENGTHS

Material strengths utilized in the reanalysis shall be as follow

|  |            |
|--|------------|
| Design compressive strength of masonry ( $f'm$ ) | 2,000 psi  |
| Compressive strength of mortar ( $m_o$ )         | 2,000 psi  |
| Compressive strength of cell grout               | 2,000 psi  |
| Compressive strength of core concrete            | 2,000 psi  |
| Yield strength of reinforcing steel              | 60,000 psi |
| Yield strength of duro-wall truss reinforcing    | 70,000 psi |

### 5.0 DESIGN ALLOWABLES

#### 5.1 BASIC ALLOWABLE STRESSES

### 5.1.1 Masonry Stresses

The basic allowable tension, compression, shear bond, and bearing stresses shall be as given in the governing code of ACI 531-79 with modifications described in 5.2.

### 5.1.2 Reinforcing Steel

Reinforcement stress shall not exceed 0.9 times the minimum yield strength for extreme environmental abnormal loads, nor 20,000 psi for normal loads.

### 5.1.3 Secondary Effects

None of the masonry block walls assume the function of a bearing wall. Hence no contact is assumed between the top of the wall and the floor above.

Load effects due to interstory drift are resisted by reinforced concrete structural walls in-between floors.

## 5.2 Allowable Stress Increase

### 5.2.1 Stress Increased Factors

| <u>Item</u>   | <u>Normal Load<br/>Combinations</u> | <u>Extreme<br/>Environmental<br/>And Abnormal<br/>Load Combination</u> |
|---|-------------------------------------|--|
| Masonry Stresses (for walls without inspection the allowable masonry compressive stresses shall be reduced by one third and tensile and shear stresses by one-half) |                                     |  |
| Compression (axial or flexural)   | 1.0                                 | 1.33   |
| Bearing   | 1.0                                 | 1.33   |
| Shear and Bond  | 1.0                                 | 1.33   |
| Tension (axial or flexural)   | 1.0                                 | 1.33   |

### 5.2.2 Impact and Jet Force (or Step Pulse) Loads

Since no jet impingement, pipe whip, nor missile impact forces act on these masonry block walls, no additional increase in allowable stresses due to elasto-plastic deformation is allowed.

### 5.3 Damping

5.3.1 The damping values to be used shall be, for cracked reinforced sections 2% damping for OBE and 5% damping for DBE; and for uncracked reinforced or unreinforced sections 1% damping for OBE and 2% damping for DBE.

### 6.0 Analysis and Design

#### 6.1 Structural Response of Masonry Walls

##### 6.1.1 Equivalent Moment of Inertia ( $I_o$ )

To determine the out-of-plane frequencies of masonry walls, the uncracked behavior and capacities of the walls (Step 1) and if applicable, the cracked behavior and capacities of the walls (Step 2) shall be considered.

##### (a) Step 1 - Uncracked Condition

The equivalent moment of inertia of an uncracked wall ( $I_t$ ) shall be obtained from a transformed section consisting of the block, mortar, cell grout, and core concrete.

Alternatively, the cell grout and core concrete, neglecting block and mortar on the tension side, may be used.

##### (b) Step 2- Cracked Condition

If the applied moment ( $M_a$ ) due to all loads in a load combination exceeds the uncracked moment capacity ( $M_{cr}$ ) the wall shall be considered to be cracked. In this event the equivalent moment of inertia ( $I_e$ ) shall be computed as follows:

$$I_e = \left[ \frac{M_{cr}}{M_a} \right]^3 I_t + \left[ 1 - \left( \frac{M_{cr}}{M_a} \right)^3 \right] I_{cr}$$

$$M_{cr} = F_r \left( \frac{I_t}{y} \right)$$

If the use of  $I_e$  results in an applied moment,  $M_a$ , which is less than  $M_{cr}$ , then the wall shall be verified for  $M_{cr}$ .

c. Modulus of Rupture

The Modulus of Rupture for use in determining the

uncracked moment capacity shall be  $7.5 \sqrt{f'_c}$  or  $7.5 \sqrt{m_o}$  for concrete, grout and mortar and  $3F_t$  for masonry

Where

- $M_{cr}$  = Uncracked moment capacity
- $M_a$  = Applied maximum moment on the wall
- $I_t$  = Moment of inertia of the transformed section
- $I_{cr}$  = Moment of inertia of the cracked section
- $f_r$  = Modulus of rupture (as defined in Subsection 6.1.1.c)
- $y$  = Distance of neutral plane from tension face
- $f'_c$  = 28 day compressive strength of concrete
- $m_o$  = 28 day compressive strength of mortar
- $F_t$  = Allowable flexural tensile stress in masonry

6.1.2 Modes of Vibration

A uniform inertia load, equal in magnitude to the peak acceleration load at the center of the wall for first mode response, was used in lieu of the distributed loads corresponding to the mode shapes. The increased bending moments and reactions account for higher mode effects.

6.2 Structural Strength of Masonry Walls

6.2.1 Boundary Conditions

Boundary conditions shall be determined considering one-way or two-way spans with hinged, fixed, or free edges as appropriate. Conservative assumptions may be used to simplify the analysis.

6.2.2 Distribution of Concentrated Out-of Plane Loads

a. Two-Way Action

Where two-way bending is present in the wall, the localized moments per unit width under a concentrated load can be determined using appropriate analytical procedures for plates. Standard solutions and tabular values based on elastic theory contained in textbooks or other published documents can be used if applicable

6.2.2 for the case under investigation (considering load  
(cont'd) location and boundary conditions).

b. One-Way Action

For dominantly one-way bending, local moments shall be determined considering two-way plate action.

6.2.3 Interstory Drift Effects

See 5.1.3

6.2.4 In-Plane and Out-of-Plane Effects

The combined effects of in-plane (e.g., seismic) and out-of-plane (e.g., piping) loads shall be considered.

6.2.5 Seismic Effects on Attachments

For attachments to the masonry walls, the peak of the response spectra may be used in lieu of a more detailed analysis. For Seismic Category I cable tray and HVAC duct systems, the results from the systems design support analyses may be used. For seismic Category I piping, the results from the stress analyses shall be used.

6.2.6 Stress Calculations

All stress calculations shall be performed by conventional methods.

6.2.7 Analytical Techniques

In general, classical design techniques shall be used in evaluation. Simplified conservative analytical assumptions may be used.



# COMMENTARY ON CRITERIA FOR THE REEVALUATION

## OF CONCRETE MASONRY WALLS

### C 1.0 GENERAL

#### C 1.1 PURPOSE

On May 8, 1980, the NRC issued IE Bulletin 80-11 "Masonry Wall Design, "to certain owners of operating reactor facilities. One of the tasks required by the bulletin was to establish appropriate reevaluation criteria. A detailed justification of the criteria, along with qualified safety margins, are also to be provided by the Owner. This commentary serves as justification of the criteria used and provides a discussion of the margins of safety.

#### C 1.2 SCOPE

The concrete masonry walls are evaluated for all applicable loads and load combinations. Calculated wall stresses are first compared against an allowable stress criteria. In general, wall stresses are maintained within the elastic range of the load-carrying components.

Anchor bolts, embeds, and bearing plates provided for support of systems attached to the walls are the subject of another NRC Bulletin and are not considered to be within the scope of this evaluation.

C 2.0 The governing code used is ACI 531-79. This code does not address the abnormal loads typically applied to nuclear power plant design. Therefore, supplemental allowables are specified in the criteria for cases not directly covered by the code.

#### C 3.0 LOADS AND LOAD COMBINATIONS

The loads identified and defined in D.C. Cook FSAR for safety related structures form the basis for licensing of the plant and are used in the evaluation of the masonry walls.

#### C 4.0 MATERIALS

The material strengths were determined by review of the project specifications.

#### C 5.0 DESIGN ALLOWABLES

##### C 5.1 LOADS AND LOAD COMBINATION

Allowables in this section apply to loads and combinations of loads which are normally encountered during plant operation or shutdown and include dead loads, live loads, and pipe reactions. In addition, this section covers allowables for loads infrequently encountered, such as operating basis earthquake and wind loads.

The strength of mortared collar joints, 3 inches or less in thickness, is highly dependent on the degree of consolidation of the mortar or grout, moisture content of the mix and block, and construction workmanship. Therefore, the collar joint allowable shear stress was assumed to be zero.

##### C 5.2 ABNORMAL LOADS

This section deals with abnormal loads which are credible, but highly improbable, such as the design basis earthquake. Code allowable stresses for masonry in compression, tension, shear, and bond are modified by a factor of 1.33. In general, this provides a factor of safety against failure of  $2.25 = (3 \div 1.33)$ .

Reinforcing steel is allowed to approach 0.9 times the yield strength which is typical for reinforcing steel which is required to resist factored and abnormal loads.

##### C 5.3 DAMPING

Damping for reinforced walls which are expected to crack due to out-of plane seismic inertia is conservatively set at 2%

for OBE and 5% for SSE. These values are typically recognized as being realistic for reinforced concrete, yet are more conservative for reinforced masonry.

## C 6.0 ANALYSIS AND DESIGN

### C 6.1 STRUCTURAL RESPONSE

The structural response of the masonry walls subjected to out-of plane seismic inertia loads is based on a constant value of gross moment of inertia along the span of the wall for the elastic (uncracked) condition. If the wall is cracked a better estimate of the moment of inertia is obtained by use of the ACI 318 formula for effective moment of inertia used in calculating immediate deflections.

### C 6.2 STRUCTURAL STRENGTH

The determination of the out-of plane structural strength of masonry walls is highly sensitive to the boundary conditions assumed for the analysis. Fixed-end conditions are justified for walls built into thicker walls or continuous across walls and slabs that have the strength to resist the fixed-end moment and that have sufficient support rigidity to prevent rotation. Otherwise, the wall edge is simply supported or free, depending on the shear carrying capability of the wall and support.

### C 7.0 REFERENCES

1. John M. Biggs, "Introduction to Structural Dynamics" McGraw-Hill 1964.
2. Timoshenko & Woinowsky-Krieger "Theory of Plates & Shells" McGraw-Hill 1959

3. Technical Manual No. 5-809-10 by Army, Navy and Air Force  
"Seismic Design for Buildings" April 17, 1973
4. "Design of Structures to Resist the Effects of Atomic  
Weapons " Manual -Corps of Engineers U. S. Army  
March 15, 1957.

MASONRY WALL ANALYSIS SUMMARY TABLES

ATTACHMENT 4  
AEP:NRC:0418D

MASONRY WALL SURVEY  
SUMMARY SHEET  
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| NO | UNIQUE WALL NO. | SURVEYED |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS           |   |
|----|-----------------|----------|--------|---------------|---------------|----------------|-----|-----|--------------------|---|
|    |                 | SIDE 1   | SIDE 2 |               |               | (INCH)         | SW  | MW  |                    |   |
|    | (1)             | (2)      | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)                |   |
| 1  | 12-4025-W1      | ✓        | ✓      | 104           | 154           | 18             |     | ✓   | ADDITIONAL SUPPORT | S |
| 2  | 12-4025-W2      | ✓        | ✓      | 104           | 154           | 18             |     | ✓   | ADDITIONAL SUPPORT | S |
| 3  | 12-4025-W3      | ✓        | ✓      | 107           | 134           | 18             |     | ✓   | ADDITIONAL SUPPORT | S |
| 4  | 12-4025-W4      | ✓        | ✓      | 107           | 134           | 18             |     | ✓   | ADDITIONAL SUPPORT | S |
| 5  | 12-4025-W9      | ✓        | ✓      | 112           | 64            | 20             |     | ✓   |                    | S |
| 6  | 12-4025-W10     | ✓        | ✓      | 136           | 64            | 20             |     | ✓   |                    | S |
| 7  | 12-4025-Y       | ✓        | ✓      | 136           | 74            | 20             |     | ✓   |                    | S |
| 8  | 12-4025-W12     | ✓        | ✓      | 136           | 74            | 20             |     | ✓   |                    | S |
| 9  | 12-4025-W13     | ✓        | ✓      | 110           | 60            | 20             |     | ✓   |                    | S |
| 10 | 12-4025-W14     | ✓        | ✓      | 110           | 64            | 20             |     | ✓   |                    | S |

(NOTE : S= SAFETY RELATED WALL  
SIDE 1: NORTH OR EAST

N = NON - SAFETY RELATED WALL)  
SIDE 2: SOUTH OR WEST



MASONRY WALL SURVEY  
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ANALYSIS TABLE

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| NQ | UNIQUE WALL NO. | SURVEYED      |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS                         |   |
|----|-----------------|---------------|--------|---------------|---------------|----------------|-----|-----|----------------------------------|---|
|    |                 | SIDE 1        | SIDE 2 |               |               | (INCH)         | SW  | MW  |                                  |   |
|    | (1)             | (2)           | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)                              |   |
| 11 | 12-4025-W15     | ✓             | ✓      | 136           | 74            | 20             |     | ✓   |                                  | S |
| 12 | 12-4025-W16     | ✓             | ✓      | 136           | 74            | 20             |     | ✓   |                                  | S |
| 13 | 12-4025-W21     | ✓             | ✓      | 104           | 154           | 18             |     | ✓   | ADDITIONAL SUPPORT               | S |
| 14 | 12-4025-W22     | ✓             | ✓      | 104           | 154           | 18             |     | ✓   | ADDITIONAL SUPPORT               | S |
| 15 | 12-4025-W23     | ✓             | ✓      | 107           | 134           | 18             |     | ✓   | ADDITIONAL SUPPORT               | S |
| 16 | 12-4025-W24     | ✓             | ✓      | 107           | 134           | 18             |     | ✓   | ADDITIONAL SUPPORT               | S |
| 17 | 12-4025-W25     | PHYS<br>INAC. | ✓      | 48            | 36            | 21             |     | ✓   | PLUG WALL (SEE NOTE *2 SHT. *15) | S |
| 18 | 12-4025-W26     | ✓             | ✓      | 84            | 284           | 8              | ✓   |     | ADDITIONAL SUPPORT               | S |
| 19 | 12-4025-W27     | ✓             | ✓      | 102           | 72            | 30             |     | ✓   |                                  | S |
| 20 | 12-4025-W28     | PHYS<br>INAC. | ✓      | 48            | 36            | 19             |     | ✓   | PLUG WALL (SEE NOTE *2 SHT. *15) | S |

(NOTE: S = SAFETY RELATED WALL)  
SIDE 1: NORTH OR EAST

SIDE 2: SOUTH OR WEST

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ATTACHMENT 4  
NRC - BULLETIN 80-11  
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F. Galley

| NO. | UNIQUE WALL NO. | SURVEYED |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS |   |
|-----|-----------------|----------|--------|---------------|---------------|----------------|-----|-----|----------|---|
|     |                 | SIDE 1   | SIDE 2 |               |               | (INCH)         | SW  | MW  |          |   |
|     | (1)             | (2)      | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)      |   |
| 21  | 12-4026-W1      | ✓        | ✓      | 144           | 78            | 30             |     | ✓   |          | S |
| 22  | 12-4026-W2      | ✓        | ✓      | 144           | 72            | 30             |     | ✓   |          | S |
| 23  | 12-4026-W3      | ✓        | ✓      | 144           | 72            | 30             |     | ✓   |          | S |
| 24  | 12-4026-W4      | ✓        | ✓      | 144           | 78            | 30             |     | ✓   |          | S |
| 25  | 12-4026-W5      | ✓        | ✓      | 144           | 72            | 30             |     | ✓   |          | S |
| 26  | 12-4026-W6      | ✓        | ✓      | 144           | 72            | 30             |     | ✓   |          | S |
| 27  | 12-4026-W7      | ✓        | ✓      | 72            | 179           | 16             |     | ✓   |          | S |
| 28  | 12-4026-W8      | ✓        | ✓      | 144           | 48            | 24             |     | ✓   |          | S |
| 29  | 12-4026-W9      | ✓        | ✓      | 144           | 48            | 18             |     | ✓   |          | S |
| 30  | 12-4026-W10     | ✓        | ✓      | 144           | 48            | 18             |     | ✓   |          | S |

(NOTE: S = SAFETY RELATED WALL)  
SIDE 1: NORTH OR EAST

SIDE 2: SOUTH OR WEST

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ATTACHMENT 4  
NRC - BULLETIN 80-11  
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F. G. V. 12/7/79

| NQ | UNIQUE WALL NO. | SURVEYED |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS           |   |
|----|-----------------|----------|--------|---------------|---------------|----------------|-----|-----|--------------------|---|
|    |                 | SIDE 1   | SIDE 2 |               |               | (INCH)         | SW  | MW  |                    |   |
|    | (1)             | (2)      | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)                |   |
| 31 | 12-4026-W11     | ✓        | ✓      | 144           | 48            | 24             |     | ✓   |                    | S |
| 32 | 12-4026-W12     | ✓        | ✓      | 108           | 36            | 12             | ✓   |     |                    | S |
| 33 | 12-4026-W13     | ✓        | ✓      | 96            | 48            | 28             |     | ✓   |                    | S |
| 34 | 12-4026-W14     | ✓        | ✓      | 168           | 125           | 28             |     | ✓   | ADDITIONAL SUPPORT | S |
| 35 | 12-4026-W15     | ✓        | ✓      | 72            | 82            | 24             |     | ✓   |                    | S |
| 36 | 12-4026-W16     | ✓        | ✓      | 180           | 144           | 39             |     | ✓   | ADDITIONAL SUPPORT | S |
| 37 | 12-4026-W17     | ✓        | ✓      | 88            | 1,268         | 16             |     | ✓   |                    | S |
| 38 | 12-4026-W18     | ✓        | ✓      | 180           | 144           | 39             |     | ✓   | ADDITIONAL SUPPORT | S |
| 39 | 12-4026-W19     | ✓        | ✓      | 72            | 82            | 24             |     | ✓   |                    | S |
| 40 | 12-4026-W20     | ✓        | ✓      | 168           | 125           | 28             |     | ✓   | ADDITIONAL SUPPORT | S |

(NOTE: S - SAFETY RELATED WALL)  
SIDE 1: NORTH OR EAST

SIDE 2: SOUTH OR WEST

MASONRY WALL SURVEY  
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NRC - BULLETIN 80-11  
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F. Gentry

| NQ | UNIQUE WALL NO. | SURVEYED         |               | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS                         |   |
|----|-----------------|------------------|---------------|---------------|---------------|----------------|-----|-----|----------------------------------|---|
|    |                 | SIDE 1           | SIDE 2        |               |               | (INCH)         | SW  | MW  |                                  |   |
|    | (1)             | (2)              | (3)           | (4)           | (5)           | (6)            | (7) | (8) | (9)                              |   |
| 41 | 12-4026-W21     | ✓                | ✓             | 96            | 48            | 28             |     | ✓   |                                  | S |
| 42 | 12-4026-W22     | ✓                | ✓             | 108           | 36            | 12             | ✓   |     |                                  | S |
| 43 | 12-4026-W23     | ✓                | ✓             | 108           | 12            | 18             |     | ✓   |                                  | S |
| 44 | 12-4026-W24     | ✓                | ✓             | 108           | 12            | 18             |     | ✓   |                                  | S |
| 45 | 12-4027-W1      | ✓                | ✓             | 132           | 36            | 24             |     | ✓   |                                  | S |
| 46 | 12-4027-W2      | ✓                | ✓             | 132           | 355           | 24             |     | ✓   |                                  | S |
| 47 | 12-4027-W3      | ✓                | ✓             | 132           | 63            | 24             |     | ✓   |                                  | S |
| 48 | 12-4027-W4      | ✓                | ✓             | 132           | 163           | 24             |     | ✓   |                                  | S |
| 49 | 12-4027-W5      | ✓                | PHYS<br>INAC. | 210           | 99            | 48             |     | ✓   | PLUG WALL (SEE NOTE *2 SHT. *15) | S |
| 50 | 12-4027-W6      | UNDER<br>CONSTR. |               | 216           | 151           | 20             |     | ✓   | SEE NOTE *1 SHT. *15             | S |

(NOTE: S = SAFETY RELATED WALL)  
SIDE 1: NORTH OR EAST

SIDE 2: SOUTH OR WEST



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| NO. | UNIQUE WALL NO. | SURVEYED      |            | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS                             |   |
|-----|-----------------|---------------|------------|---------------|---------------|----------------|-----|-----|--------------------------------------|---|
|     |                 | SIDE 1        | SIDE 2     |               |               | (INCH)         | SW  | MW  |                                      |   |
|     | (1)             | (2)           | (3)        | (4)           | (5)           | (6)            | (7) | (8) | (9)                                  |   |
| 51  | 12-4027-W7      | ✓             | ✓          | 84            | 63            | 24             |     | ✓   |                                      | S |
| 52  | 12-4027-W8      | UNDER CONSTR. |            | 156           | 177           | 20             |     | ✓   | SEE NOTE *1 SHT. *15                 | S |
| 53  | 12-4027-W9      | UNDER CONSTR. |            | 84            | 101           | 20             |     | ✓   | SEE NOTE *1 SHT. *15                 | S |
| 54  | 12-4027-W10     | ✓             | ✓          | 120           | 144           | 24             |     | ✓   | ADDITIONAL SUPPORT                   | S |
| 55  | 12-4027-W11     | ✓             | PHYS INAC. | 20            | 120           | 16             |     | ✓   | CLOSURE WALL<br>SEE NOTE *2 SHT. *15 | S |
| 56  | 12-4027-W12     | ✓             | PHYS INAC. | 28            | 255           | 24             |     | ✓   | CLOSURE WALL<br>SEE NOTE *2 SHT. *15 | S |
| 57  | 12-4027-W13     | ✓             | ✓          | 80            | 43            | 16             |     | ✓   |                                      | S |
| 58  | 12-4027-W14     | ✓             | ✓          | 80            | 261           | 16             |     | ✓   |                                      | S |
| 59  | 12-4027-W15     | ✓             | ✓          | 80            | 151           | 16             |     | ✓   |                                      | S |
| 60  | 12-4027-W16     | ✓             | ✓          | 95            | 162           | 8              | ✓   |     |                                      | N |

(NOTE: S = SAFETY RELATED WALL  
SIDE 1: NORTH OR EAST

N = NON-SAFETY RELATED WALL)  
SIDE 2: SOUTH OR WEST

MASONRY WALL SURVEY  
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NRC - BULLETIN 80-11  
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| NO. | UNIQUE WALL NO. | SURVEYED      |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS                             |   |
|-----|-----------------|---------------|--------|---------------|---------------|----------------|-----|-----|--------------------------------------|---|
|     |                 | SIDE 1        | SIDE 2 |               |               | (INCH)         | SW  | MW  |                                      |   |
|     | (1)             | (2)           | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)                                  |   |
| 61  | 12-4027-W17     | ✓             | ✓      | 101           | 236           | 8              | ✓   |     |                                      | N |
| 62  | 12-4027-W18     | PHYS<br>INAC. | ✓      | 28            | 210           | 32             |     | ✓   | CLOSURE WALL<br>SEE NOTE *2 SHT. *15 | S |
| 63  | 12-4027-W19     | PHYS<br>INAC. | ✓      | 28            | 220           | 24             |     | ✓   | CLOSURE WALL<br>SEE NOTE *2 SHT. *15 | S |
| 64  | 12-4027-W20     | ✓             | ✓      | 53            | 64            | 8              | ✓   |     |                                      | N |
| 65  | 12-4028-W1      | ✓             | ✓      | 96            | 114           | 24             |     | ✓   |                                      | N |
| 66  | 12-4028-W2      | ✓             | ✓      | 192           | 162           | 30             |     | ✓   | ADDITIONAL SUPPORT                   | S |
| 67  | 12-4028-W3      | ✓             | ✓      | 162           | 120           | 45             |     | ✓   | ADDITIONAL SUPPORT                   | S |
| 68  | 12-4028-W4      | ✓             | ✓      | 78            | 66            | 32             |     | ✓   |                                      | S |
| 69  | 12-4028-W5      | ✓             | ✓      | 78            | 66            | 32             |     | ✓   |                                      | S |
| 70  | 12-4028-W6      | ✓             | ✓      | 138           | 111           | 30             |     | ✓   | ADDITIONAL SUPPORT                   | S |

(NOTE: S = SAFETY RELATED WALL  
SIDE 1: NORTH OR EAST

N = NON-SAFETY RELATED WALL)  
SIDE 2: SOUTH OR WEST



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NRC - BULLETIN 80-11  
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F. G. G. G.

| NQ | UNIQUE WALL NO. | SURVEYED |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS           |   |
|----|-----------------|----------|--------|---------------|---------------|----------------|-----|-----|--------------------|---|
|    |                 | SIDE 1   | SIDE 2 |               |               | (INCH)         | SW  | MW  |                    |   |
|    | (1)             | (2)      | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)                |   |
| 71 | 12-4028-W7      | ✓        | ✓      | 96            | 114           | 24             |     | ✓   |                    | N |
| 72 | 12-4028-W8      | ✓        | ✓      | 192           | 162           | 30             |     | ✓   | ADDITIONAL SUPPORT | S |
| 73 | 12-4028-W9      | ✓        | ✓      | 162           | 120           | 45             |     | ✓   | ADDITIONAL SUPPORT | S |
| 74 | 12-4028-W10     | ✓        | ✓      | 78            | 191           | 16             |     | ✓   |                    | S |
| 75 | 12-4028-W11     | ✓        | ✓      | 78            | 124           | 16             |     | ✓   |                    | S |
| 76 | 12-4028-W12     | ✓        | ✓      | 96            | 30            | 18             |     | ✓   |                    | S |
| 77 | 12-4028-W13     | ✓        | ✓      | 96            | 60            | 18             |     | ✓   |                    | S |
| 78 | 12-4028-W14     | ✓        | ✓      | 96            | 60            | 18             |     | ✓   |                    | S |
| 79 | 12-4028-W15     | ✓        | ✓      | 120           | 234           | 12             | ✓   |     |                    | N |
| 80 | 12-4028-W16     | ✓        | ✓      | 120           | 309           | 12             | ✓   |     |                    | N |

(NOTE: S = SAFETY RELATED WALL  
SIDE 1: NORTH OR EAST

N = NON-SAFETY RELATED WALL)  
SIDE 2: SOUTH OR WEST

MASONRY WALL SURVEY  
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| NQ | UNIQUE WALL NO.<br>(1) | SURVEYED      |               | HEIGHT (INCH)<br>(4) | LENGTH (INCH)<br>(5) | WALL THICKNESS |           |           | COMMENTS<br>(9) |   |
|----|------------------------|---------------|---------------|----------------------|----------------------|----------------|-----------|-----------|-----------------|---|
|    |                        | SIDE 1<br>(2) | SIDE 2<br>(3) |                      |                      | (INCH)<br>(6)  | SW<br>(7) | MW<br>(8) |                 |   |
| 81 | 12-4028-W17            | ✓             | ✓             | 114                  | 36                   | 24             |           | ✓         |                 | N |
| 82 | 12-4028-W18            | ✓             | ✓             | 60                   | 118                  | 4              | ✓         |           |                 | S |
| 83 | 12-4028-W19            | ✓             | ✓             | 120                  | 250                  | 6              | ✓         |           |                 | N |
| 84 | 12-4028-W20            | ✓             | ✓             | 120                  | 84                   | 12             | ✓         |           |                 | N |
| 85 | 12-4028-W21            | ✓             | ✓             | 120                  | 746                  | 12             | ✓         |           |                 | N |
| 86 | 12-4028-W22            | ✓             | ✓             | 162                  | 320                  | 8              | ✓         |           |                 | N |
| 87 | 12-4028-W23            | ✓             | ✓             | 60                   | 86                   | 4              | ✓         |           |                 | S |
| 88 | 12-4028-W24            | ✓             | ✓             | 96                   | 400                  | 8              | ✓         |           |                 | S |
| 89 | 12-4028-W25            | ✓             | ✓             | 120                  | 348                  | 4              | ✓         |           |                 | N |
| 90 | 12-4028-W26            | ✓             | ✓             | 88                   | 592                  | 8              | ✓         |           |                 | S |

(NOTE: S= SAFETY RELATED WALL  
SIDE 1: NORTH OR EAST

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SIDE 2: SOUTH OR WEST

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| NQ  | UNIQUE WALL NO. | SURVEYED      |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS                         |   |
|-----|-----------------|---------------|--------|---------------|---------------|----------------|-----|-----|----------------------------------|---|
|     |                 | SIDE 1        | SIDE 2 |               |               | (INCH)         | SW  | MW  |                                  |   |
|     | (1)             | (2)           | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)                              |   |
| 91  | 12-4028-W27     | ✓             | ✓      | 78            | 120           | 8              | ✓   |     |                                  | S |
| 92  | 12-4028-W28     | ✓             | ✓      | 78            | 120           | 8              | ✓   |     |                                  | S |
| 93  | 12-4029-W1      | ✓             | ✓      | 186           | 522           | 12             | ✓   |     | ADDITIONAL SUPPORT               | S |
| 94  | 12-4029-W2      | PHYS<br>INAC. | ✓      | 48            | 36            | 24             |     | ✓   | PLUG WALL (SEE NOTE *2 SHT. *15) | S |
| 95  | 12-4029-W3      | ✓             | ✓      | 96            | 84            | 24             |     | ✓   |                                  | S |
| 96  | 12-4029-W4      | ✓             | ✓      | 96            | 12            | 24             |     | ✓   |                                  | S |
| 97  | 12-4029-W5      | ✓             | ✓      | 96            | 84            | 24             |     | ✓   |                                  | S |
| 98  | 12-4029-W6      | ✓             | ✓      | 96            | 12            | 24             |     | ✓   |                                  | S |
| 99  | 12-4029-W7      | ✓             | ✓      | 186           | 522           | 12             | ✓   |     | ADDITIONAL SUPPORT               | S |
| 100 | 12-4029-W8      | PHYS<br>INAC. | ✓      | 48            | 36            | 24             |     | ✓   | PLUG WALL (SEE NOTE *2 SHT. *15) | S |

(NOTE: S= SAFETY RELATED WALL)  
SIDE 1: NORTH OR EAST

SIDE 2: SOUTH OR WEST

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F. G. G. G.

| NQ  | UNIQUE WALL NO. | SURVEYED |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS           |   |
|-----|-----------------|----------|--------|---------------|---------------|----------------|-----|-----|--------------------|---|
|     |                 | SIDE 1   | SIDE 2 |               |               | (INCH)         | SW  | MW  |                    |   |
|     | (1)             | (2)      | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)                |   |
| 101 | 12-4029-W9      | ✓        | ✓      | 174           | 416           | 8              | ✓   |     |                    | N |
| 102 | 12-4029-W10     | ✓        | ✓      | 174           | 429           | 8              | ✓   |     |                    | N |
| 103 | 12-4029-W11     | ✓        | ✓      | 111           | 172           | 4              | ✓   |     |                    | N |
| 104 | 12-4031-W1      | ✓        | ✓      | 108           | 652           | 8              | ✓   |     | ADDITIONAL SUPPORT | S |
| 105 | 12-4031-W2      | ✓        | ✓      | 108           | 712           | 8              | ✓   |     | ADDITIONAL SUPPORT | S |
| 106 | 12-4031-W3      | ✓        | ✓      | 314           | 860           | 8              | ✓   |     |                    | S |
| 107 | 1-4033-W1       | ✓        | ✓      | 60            | 316           | 8              | ✓   |     | ADDITIONAL SUPPORT | S |
| 108 | 1-4033-W2       | ✓        | ✓      | 120           | 120           | 8              | ✓   |     |                    | S |
| 109 | 1-4033-W3       | ✓        | ✓      | 120           | 120           | 8              | ✓   |     |                    | S |
| 110 | 1-4033-W4       | ✓        | ✓      | 60            | 316           | 8              | ✓   |     | ADDITIONAL SUPPORT | S |

(NOTE : S = SAFETY RELATED WALL  
SIDE 1: NORTH OR EAST

N = NON-SAFETY RELATED WALL)  
SIDE 2: SOUTH OR WEST



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| NQ  | UNIQUE WALL NO. | SURVEYED |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS           |   |
|-----|-----------------|----------|--------|---------------|---------------|----------------|-----|-----|--------------------|---|
|     |                 | SIDE 1   | SIDE 2 |               |               | (INCH)         | SW  | MW  |                    |   |
|     | (1)             | (2)      | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)                |   |
| 111 | 1-4034-W1       | ✓        | ✓      | 196           | 144           | 12             | ✓   |     | ADDITIONAL SUPPORT | S |
| 112 | 1-4034-W2       | ✓        | ✓      | 196           | 144           | 12             | ✓   |     | ADDITIONAL SUPPORT | S |
| 113 | 1-4034-W3       | ✓        | ✓      | 110           | 136           | 12             | ✓   |     |                    | S |
| 114 | 1-4034-W4       | ✓        | ✓      | 110           | 136           | 12             | ✓   |     |                    | S |
| 115 | 1-4034-W5       | ✓        | ✓      | 110           | 136           | 12             | ✓   |     |                    | S |
| 116 | 1-4034-W6       | ✓        | ✓      | 110           | 136           | 12             | ✓   |     |                    | S |
| 117 | 1-4034-W7       | ✓        | ✓      | 110           | 176           | 12             | ✓   |     |                    | S |
| 118 | 1-4034-W8       | ✓        | ✓      | 62            | 176           | 12             | ✓   |     |                    | S |
| 119 | 1-4034-W9       | ✓        | ✓      | 62            | 176           | 12             | ✓   |     |                    | S |
| 120 | 1-4034-W10      | ✓        | ✓      | 62            | 176           | 12             | ✓   |     |                    | S |

(NOTE: S = SAFETY RELATED WALL)  
SIDE 1: NORTH OR EAST

SIDE 2: SOUTH OR WEST

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| NO. | UNIQUE WALL NO. | SURVEYED |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS           |   |
|-----|-----------------|----------|--------|---------------|---------------|----------------|-----|-----|--------------------|---|
|     |                 | SIDE 1   | SIDE 2 |               |               | (INCH)         | SW  | MW  |                    |   |
|     | (1)             | (2)      | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)                |   |
| 121 | 1-4034-W11      | ✓        | ✓      | 62            | 152           | 12             | ✓   |     |                    | S |
| 122 | 12-4035-W1      | ✓        | ✓      | 132           | 501           | 12             | ✓   |     | ADDITIONAL SUPPORT | S |
| 123 | 12-4035-W2      | ✓        | ✓      | 84            | 459           | 12             | ✓   |     | ADDITIONAL SUPPORT | S |
| 124 | 2-4036-W1       | ✓        | ✓      | 60            | 316           | 8              | ✓   |     | ADDITIONAL SUPPORT | S |
| 125 | 2-4036-W2       | ✓        | ✓      | 120           | 120           | 8              | ✓   |     |                    | S |
| 126 | 2-4036-W3       | ✓        | ✓      | 120           | 120           | 8              | ✓   |     |                    | S |
| 127 | 2-4036-W4       | ✓        | ✓      | 60            | 316           | 8              | ✓   |     | ADDITIONAL SUPPORT | S |
| 128 | 2-4037-W1       | ✓        | ✓      | 196           | 144           | 12             | ✓   |     | ADDITIONAL SUPPORT | S |
| 129 | 2-4037-W2       | ✓        | ✓      | 196           | 144           | 12             | ✓   |     | ADDITIONAL SUPPORT | S |
| 130 | 2-4037-W3       | ✓        | ✓      | 62            | 176           | 8              | ✓   |     |                    | S |

(NOTE: S: SAFETY RELATED WALL)  
SIDE 1: NORTH OR EAST

SIDE 2: SOUTH OR WEST



MASONRY WALL SURVEY  
SUMMARY SHEET  
D.C. COOK NUCLEAR PLANT  
ANALYSIS TABLE

ATTACHMENT 4  
NRC - BULLETIN 80-11  
RFC-DC-12-252G  
SHEET 14 OF 15

F. Galt

| NQ  | UNIQUE WALL NO. | SURVEYED |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS |   |
|-----|-----------------|----------|--------|---------------|---------------|----------------|-----|-----|----------|---|
|     |                 | SIDE 1   | SIDE 2 |               |               | (INCH)         | SW  | MW  |          |   |
|     | (1)             | (2)      | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)      |   |
| 131 | 2-4037-W4       | ✓        | ✓      | 110           | 152           | 8              | ✓   |     |          | S |
| 132 | 2-4037-W5       | ✓        | ✓      | 62            | 176           | 8              | ✓   |     |          | S |
| 133 | 2-4037-W6       | ✓        | ✓      | 110           | 176           | 8              | ✓   |     |          | S |
| 134 | 2-4037-W7       | ✓        | ✓      | 110           | 176           | 8              | ✓   |     |          | S |
| 135 | 2-4037-W8       | ✓        | ✓      | 110           | 136           | 8              | ✓   |     |          | S |
| 136 | 2-4037-W9       | ✓        | ✓      | 110           | 136           | 8              | ✓   |     |          | S |
| 137 | 2-4037-W10      | ✓        | ✓      | 110           | 136           | 8              | ✓   |     |          | S |
| 138 | 2-4037-W11      | ✓        | ✓      | 110           | 136           | 8              | ✓   |     |          | S |
| 139 | 12-4046-W1      | ✓        | ✓      | 216           | 456           | 8              | ✓   |     |          | N |
| 140 | 12-4046-W2      | ✓        | ✓      | 216           | 120           | 12             | ✓   |     |          | N |

(NOTE: S= SAFETY RELATED WALL  
SIDE 1: NORTH OR EAST

N= NON-SAFETY RELATED WALL)  
SIDE 2: SOUTH OR WEST

MASONRY WALL SURVEY  
SUMMARY SHEET  
D.C. COOK NUCLEAR PLANT

ANALYSIS TABLE

ATTACHMENT 4  
NRC - BULLETIN 80-11  
RFC-DC-12-2526

SHEET 15 OF 15

F. G. G. G.

| NQ   | UNIQUE WALL NO. | SURVEYED |        | HEIGHT (INCH) | LENGTH (INCH) | WALL THICKNESS |     |     | COMMENTS           |   |
|--|-----------------|----------|--------|---------------|---------------|----------------|-----|-----|--------------------|---|
|  |                 | SIDE 1   | SIDE 2 |               |               | (INCH)         | SW  | MW  |                    |   |
|  | (1)             | (2)      | (3)    | (4)           | (5)           | (6)            | (7) | (8) | (9)                |   |
| 141  | 12-4049-W1      | ✓        | ✓      | 288           | 456           | 8              | ✓   |     |                    | N |
| 142  | 12-4049-W2      | ✓        | ✓      | 288           | 366           | 12             | ✓   |     |                    | N |
| 143  | 12-4049-W3      | ✓        | ✓      | 144           | 120           | 12             | ✓   |     |                    | N |
| 144  | 12-4049-W4      | ✓        | ✓      | 288           | 960           | 12             | ✓   |     | ADDITIONAL SUPPORT | S |
| NOTE #1: THESE THREE WALLS WERE DESIGNED IN RESPONSE TO RFC-DC-12-2074. NO ATTACHMENTS WILL BE MADE NOR ANY CLASS 1 ITEM PLACED IN PROXIMITY TO THESE WALLS EXCEPT AS SHOWN ON AEP DESIGN DRAWINGS.  |                 |          |        |               |               |                |     |     |                    |   |
| NOTE #2: "PLUG WALLS" AND "CLOSURE WALLS" ARE LOCALIZED MASONRY BLOCK INFILLS IN REINFORCED CONCRETE WALLS. THE FAR FACE OF THE INFILL IS INACCESSIBLE ONCE THE INFILL IS MADE. THEREFORE NO ATTACHMENTS CAN BE MADE TO OR TRAVERSE THIS FAR FACE. |                 |          |        |               |               |                |     |     |                    |   |
|  |                 |          |        |               |               |                |     |     |                    |   |
|  |                 |          |        |               |               |                |     |     |                    |   |
|  |                 |          |        |               |               |                |     |     |                    |   |
|  |                 |          |        |               |               |                |     |     |                    |   |
|  |                 |          |        |               |               |                |     |     |                    |   |
|  |                 |          |        |               |               |                |     |     |                    |   |
|  |                 |          |        |               |               |                |     |     |                    |   |
|  |                 |          |        |               |               |                |     |     |                    |   |

(NOTE: S= SAFETY RELATED WALL  
SIDE 1: NORTH OR EAST

N= NON-SAFETY RELATED WALL)  
SIDE 2: SOUTH OR WEST

AEP ARCHITECTURAL WALL SPECIFICATION NO. DCCA-139-QCS

ATTACHMENT 5  
AEP:NRC:0418D

INDIANA AND MICHIGAN ELECTRIC COMPANY  
DONALD C. COOK NUCLEAR PLANT



SPECIFICATION COVER SHEET

| Specification No.  | Dated              | Revision No. | Dated  |        |
|--|--------------------|--------------|--------|--------|
| DCCAL39QCS   | July 20, 1970      |              |        |        |
|  |                    | ATTACHMENTS  |        |        |
| TITLE: MASONRY<br>Materials and Installation   |                    |              |        |        |
| SYSTEM:  |                    |              |        |        |
| SCOPE OF REVISION:   |                    |              |        |        |
| <p>This document contains proprietary information of American Electric Power Service Corporation, and is to be returned upon request. Its contents may not be used for other than the expressed purpose for which loaned without the written consent of American Electric Power Service Corporation.</p> |                    |              |        |        |
| INTERNAL APPROVAL SIGNATURES   |                    |              |        |        |
|  | ORIGINAL ISSUE     | Rev. 1       | Rev. 2 | Rev. 3 |
| Author   | <i>[Signature]</i> |              |        |        |
| Approved by  | <i>[Signature]</i> |              |        |        |
| Quality Assurance  |                    |              |        |        |

DONALD C. COOK NUCLEAR PLANT  
Units 1 & 2  
INDIANA & MICHIGAN ELECTRIC COMPANY

July 20, 1970

1. GENERAL CONDITIONS

All work to be done under this contract shall comply with the Owner's Instructions to Bidders and General Conditions for Performing Contract Work revised July 15, 1979.

2. PROPOSALS

- a. Bidders shall submit two copies of the proposal form attached at end of this specification. Added loose copies of this form will be furnished to each bidder.
- b. For purposes of meeting accounting requirements only, a breakdown of the base bid is required between (1) materials, and (2) installation. The contract will be awarded on the basis of the entire work.
- c. Also, because of accounting requirements, please submit breakdown of base bid between the various structures as shown on proposal form. See Article 12 herein for description of these structures.
- d. The Plant site, situated on Thornton Road, about 1/2 mile north of Livingston Road, Bridgman, Michigan in Berrien County, is located on Lake Michigan in the southwest corner of the state. A siding of the C & C Railroad serves the site as well as Red Arrow Highway (Old Highway 12).
- e. Please address your proposal as follows:

Indiana & Michigan Electric Company  
Post Office Box 18  
Bowling Green Station  
New York, New York 10004  
Attention: Mr. W. F. Garrity

3. CONSTRUCTION SCHEDULE

- a. Starting dates for major phases of the masonry work in the following areas are as shown below:

|                                      |                |
|--------------------------------------|----------------|
| Unit No. 1 (Main Plant Areas)        | November 1970  |
| Service Bay                          | November, 1970 |
| Office Building                      | December, 1970 |
| Unit No. 2 (Main Plant Areas)        | April, 1971    |
| High Density Block (auxiliary Bldg.) | October, 1971  |

3. CONSTRUCTION SCHEDULE (Cont'd)

- b. The foregoing dates are only approximate, and exact dates will be established at job site by Owner's Engineer. Contractor agrees that given five working days notice, he will start work at any designated location.

4. DEFINITIONS

- a. The term "work" of the Contractor includes materials and installation, unless otherwise stated.
- b. The Owner and the Contractor are those mentioned as such in the Contract.

5. CORRELATION OF DOCUMENTS

The drawings and specifications are complementary to each other, and it will not be the province of the specifications to detail any section of the work that drawings are competent to explain, or vice versa. Any part of the work that is required by either the drawings or specifications shall be supplied in place as though it were indicated in both.

6. TAXES

Bidders shall not include Michigan Sales or Use Taxes in their proposal.

7. PERMITS

The Contractor shall obtain and pay for any necessary permits or licenses as may be required by public authorities having jurisdiction.

8. TEMPORARY HOISTS, SCAFFOLDING, ETC.

Contractor shall furnish, maintain, and operate all equipment such as temporary hoists, steps, ladders, ramps, runways, cranes, chutes, scaffolding, etc., as required for completion of the work.

9. UNLOADING, ETC.

The unloading, storage, and job distribution of all materials and items shall be part of the work included herein.

10. AEP STANDARD SPECIFICATION

The Owner's "Specifications for Masonry Construction", revised July 1, 1947, which accompanies bid documents, will apply only to items not otherwise covered herein in this specification dated July 20, 1970.



# 11. DRAWINGS

The following drawings accompany this specification, and will constitute part of the contract.

Drawing  
Number

## T I T L E

### Key Plan

|          |  |
|----------|--|
| 12-4001  | Basement Plan El. 595'-0" Office Bldg.   |
| 12-4002  | Main Floor El. 609'-0" Office Building   |
| 12-4003  | Second Floor El. 621'-0" Office Bldg.  |
| 12-4004  | Roof Plan El. 633'-0" Office Building  |
| 12-4005  | Ext. Elevations & Cross Sections Off. Bldg.                                    |
| 12-4006  | Cross & Longitudinal Sections-Off. Bldg.                                       |
| 12-4007  | Exterior Wall Details - Office Building  |
| 12-4008  | Exterior Wall Details - Office Building  |
| 12-4010  | Lobby and Entrance Details-Office Bldg.  |
| 12-4012  | Cafeteria, Kitchen & Kitchen Stores Detail                                     |
| 12-4013  | Shelter Toilets & Showers Service Bay Area                                     |
| 12-4014  | General & Foremens Toilets, Shower & Locker Rooms Service Bay & Office Bldg.   |
| 12-4015  | Toilets & Details El. 609'-0" & 621'-0" Office Bldg.                           |
| 12-4017  | Misc. Interior Details & Finish Schedule                                       |
| 12-4025  | Plan El. 573'-0" Auxiliary Building  |
| 12-4026  | Plan El. 587'-0" West End Auxiliary Bldg.                                      |
| 12-4027  | Plan El. 587'-0", El. 609'-0" East End Auxiliary Bldg.                         |
| 12-4028  | Plan El. 609'-0" West End Auxiliary Bldg.                                      |
| 12-4029  | Plan El. 633'-0" West End Auxiliary Bldg.                                      |
| 12-4031  | Plan El. 650'-0" West End Auxiliary Bldg.                                      |
| 12-4033- | Auxiliary Bldg. Unit 1 Transformer & Generator Rooms El. 591'-0" & El. 587'-0" |
| 12-4034  | Auxiliary Bldg. Unit 1 Elec. Switchgear Rooms El. 609'-6" & El. 625'-10"       |

Drawing  
Number

T I T L E

|         |  |
|---------|--|
| 12-4035 | Plan Cable Vaults & Cable Passageways<br>El. 624'-0", 622'-6", 620'-6"                                   |
| 12-4036 | Auxiliary Bldg. Unit 2 Transformer &<br>Generator Rooms. El. 591'-0" & 587'-0"                           |
| 12-4037 | Auxiliary Bldg. Unit 2 Elec. Switchgear<br>Rooms El. 609'-8" & El. 625'-10" South<br>Auxiliary Building. |
| 12-4038 | Stair Details- Service Bay Area  |
| 12-4039 | East-West Section Auxiliary Bldg.  |
| 12-4041 | Freight & Passenger Elevators Auxiliary Bldg.  |
| 12-4042 | Passenger Elevator East Heater Bay   |
| 12-4043 | Freight Elevator East Heater Bay   |
| 12-4044 | Passenger Elevator Office Building   |
| 1 -4045 | Basement Plan El. 595'-0" & 591'-0" Col. 29<br>to 19 Service & Turbine Bays                              |
| 12-4046 | Basement Plan El. 591'-0" Col. 19 to 9<br>Turbine Bay  |
| 2-4047  | Basement Plan El. 591'-0" Col. 9 to 1<br>Turbine Bay   |
| 1-4048  | Plan El. 609'-0" Col. 29 to 19 Service &<br>Turbine Bays   |
| 12-4049 | Plan El. 609'-0" Col. 19 to 9 Turbine Bay  |
| 12-4050 | Plan El. 609'-0" Col. 9 to 1 Turbine Bay   |
| 1-4051  | Plan El. 621'-0" Col. 29 to 26 Service Bay   |
| 1-4052  | Plan El. 633'-0" Col. 29 to 19 Service &<br>Turbine Bays   |
| 12-4053 | Plan El. 633'-0" Col. 19 to 9 Turbine Area   |
| 2-4054  | Plan El. 633'-0" Col. 9 to 1 Turbine Area  |
| 1-4055  | Plan Roof El. 659'-0" Col. 29 to 26 Service Bay  |
| 12-4057 | Elevations - Auxiliary Bldg. Units 1 & 2   |
| 12-4058 | West Elevation Turbine Room & Heater Bay   |
| 12-4059 | East Elevation Turbine Room & Heater Bay   |
| 12-4060 | North & South Elev.'s Turbine Room & Control<br>Building   |

11. (continued)

|         |  |
|---------|--|
| 12-4065 | Exterior Wall Details  |
| 12-4066 | Exterior Wall Details  |
| 12-4067 | Plan and Sections - Access Control Area<br>Auxiliary Building    |
| 1-4071  | Plans Sections Details Control Room Unit 1<br>Auxiliary Building |
| 12-4072 | Ceiling Plan and Details Control Room Auxiliary Bldg.            |
| 12-4073 | Plans Sections Details Control Room Unit 1 Aux. Bldg.            |
| 12-4074 | Details Control Rooms (Toilets, etc.)<br>Auxiliary Building      |
| 12-4075 | Screen and Pump House El. 591'-0"                                |
| 12-4076 | Screen and Pump House Elevations                                 |

12. DESCRIPTION OF BUILDING

- a. Main Plant as referred to in this specification is comprised of all areas listed in this paragraph. It includes the turbine rooms, heater bays, service bay, auxiliary building, containment buildings, screen and pump house as shown on "Key Plan".

The turbine room and heater bays for units 1 and 2 extends between column lines 1 and 26A from A to H.

The service bay extends between column lines 26A and 29 from A to H.

The auxiliary building is tee-shaped with the head of the tee adjacent to and parallel with the east heater bay and extending between work line WL-1 and work line WL-11 from column line H to work line WL-M.

The leg of the tee extends east from column line J to column line T between column lines 15B and 11B. The screen and pump house is located at the west side of the building and extends between column lines 9A and 17A from A to AC.

- b. Office building is shown on key plan between columns 26 and 34 from AB to AE. It is a two story building with basement and is connected to the main plant at basement main floor and roof levels.

GENERAL NOTE: The relationship of building areas to the column lines is approximate and should be used for job familiarization only.

### 13. SCOPE

- a. The Contractor shall provide and pay for all labor, materials, tools, equipment, transportation, and services necessary or required to furnish and install complete, all items of masonry work as indicated on the drawings and/or herein mentioned.
- b. The major items of work are shown on but not limited to the drawings listed below.
  1. Face Brick - Drawings No. 4043, 4048, 4052, 4053 & 4054.
  2. Facing Tile - See finish schedule (drawing 4017) for general locations in plant and office building.
  3. Concrete block - Interior partitions and wall in general for all structures, as indicated. Include back-up block for facing brick and tile. High density block for radiation shielding is described separately in Paragraph 17 of this specification.
  4. Other - See details herein.

### 14. WORK NOT INCLUDED

The following work is not included herein except building in of certain items as required.

1. Slate or marble door saddles.
2. Ceramic tile floors.
3. Ceramic tile base.
4. Steel shelf angles.
5. Perimeter insulation on foundation walls.
6. Insulation under shower floors.
7. Glazed epoxy finish.
8. Caulking and Sealants.

### 15. MATERIALS

- a. Face brick: Standard size, "Sea Gray" Factory No. 53 by Belden-Stark Brick Corporation, 386 Park Avenue South, New York 16, New York. All requirements of ASTM Spec. C216, Grade MW, Type FBX, shall apply. Unless otherwise indicated all brick are laid in running bond without headers. In order to obtain uniformity of appearance it will be required that all brick be ordered at one time and from a single kiln lot of the brick manufacturer.
- b. Structural facing tile: Select quality, ceramic clear glaze, 5-1/3 x 12 inch nominal face size, as produced by Natco, Metropolitan, Stark or approved equal. Tile shall conform to ASTM C212 Type FTX. Bullnose units shall be used for external corners unless otherwise shown on drawings. Provide cove base where mosaic floor tile is used, unless mosaic base by others is shown. Note caps, trim soffits, etc. and provide all other shapes required to meet field conditions and complete the work. Backs of units to be

plastered shall be scored, otherwise use plain surface for unexposed surfaces.

- c. Concrete block: All block, except "High Density" shall be light weight type using expanded slag, shale, or clay aggregate. All blocks shall be steam cured for not less than 8 hours at a temperature of 170°F to 200°F followed by air drying for 30 days before delivery. The average moisture content of blocks, at time of delivery, and when built into wall, shall not exceed 40% of their total absorption. Concrete blocks shall be provided in corner units and half units at openings and at external angles. Provide other special sizes and shapes as indicated on drawings or as required to meet job conditions. Except as noted below, all block shall be non-load bearing type conforming to ASTM Spec. C129 Type I (moisture controlled). Load-bearing block shall conform to ASTM Spec C-90 Type P-1. Solid block shall conform to ASTM Spec C-145 Type G-1. Fire-resistant block shall meet the 4 hour rating of the National Board of Fire Underwriters.
- d. Mortar: ASTM C270-64T, Type N, having approximate mix of 1 part portland cement, (C150-66), 1 part lime (C207-49), and 6 parts sand (C144-665), all by volume. Note that lime used shall be Type S, 92% hydrated. (See special mortar under "High Density Block")
- e. Other materials: See hereinafter.

## 16. ANCHORS AND REINFORCEMENT

- a. All concrete block work, walls, partitions and backup shall have standard weight, "Dur-O-Wal", or equal, joint reinforcement of required width to engage both face shells of the concrete block. The joint reinforcement shall be installed continuous in alternate joints (16" o.c.), for the entire height of the masonry. In addition, place reinforcement in first bed joint above all windows and door openings, extending to 2 feet beyond opening on each side. See drawings for other mesh locations. Reinforcement shall be made continuous around corners, and ends shall be lapped 3 inches.
- b. Face brick for exterior walls shall be bonded to concrete block backup with 16 gage corrugated galvanized wall ties spaced 16 inches vertically and 24 inches horizontally. Place additional ties around the perimeter of, and within 12 inches of, all wall openings.
- c. Structural facing tile backed with masonry shall be bonded with 3/16 inch diameter galvanized wire zee ties, spaced 16 inches vertically and 24 inches horizontally. Place additional ties around the perimeter of, and within 12 inches of, all wall openings.



16. ANCHORS AND REINFORCEMENT (Cont'd)

- d. Facing tile supported on shelf angles in Control Room shall be secured to backup with approved type anchors spaced as above.
- e. Tile and interior brick facing, 4 inches thick and not over 12 feet high, where backed by concrete shall be anchored along top of facing by approved method
- f. Interior concrete block partition intersections shall be bonded with overlapping alternate courses or with hardware cloth in alternate courses.
- g. Masonry anchors which are shown secured to structural steel are furnished by steel contractor.
- h. All other anchors as indicated or required to properly secure and bond the masonry work shall be furnished and installed as part of the work of this section.

17. HIGH DENSITY BLOCK

- a. High density concrete block is used in portions of the Auxiliary Building to shield equipment having a high radiation hazard. Plan locations and details of this block show on Drawings 4025, 4026, 4027, 4028 and 4029. Most of these block walls will be built after the plant equipment has been installed. Block walls used for shielding are required to have an overall density not less than the surrounding poured concrete walls. In order to achieve this equivalent shielding value, the block will be required to be solid and made of a high density concrete. Joints will be staggered with mortar of normal density.
- b. Weight of block shall be not less than 195 pounds cubic foot and not more than 210 pcf.
- c. Size of block shall be nominal 8 X 16 inch face, with thickness 4 or 6 inch at option of contractor. Actual dimensions to be 3/8 inch less than above.
- d. Solid block only shall be used with no open cells or voids permitted.
- e. Heavy aggregate shall be Ilmenite, an iron-titanium ore produced by Nuclear Shielding Supplies & Service, Inc., 2545 Delorimer Ave., Longueuil, Que., Canada. Grade uniformly with local dense stone aggregate to produce required block weight.



17. HIGH DENSITY BLOCK (Cont'd)

- f. Block shall conform to applicable requirements of ASTM Spec. C145 grade G1, except no open cells or voids permitted.
- g. Furnish special block sizes as required by design requirements or job conditions.
- h. Samples shall be submitted to Owner for testing and approval obtained before proceeding with block fabrication. Give details of mix and materials.
- i. Mortar, in order to retain high density requirements of wall construction, shall be mixed one part portland cement to three parts sand by volume. Cement may be tempered with 10% hydrated lime. Sand shall be normal heavy weight type. Conform to other applicable requirements of ASTM Spec. C270. Dry weight of finished mortar shall average not less than 118 pounds per cubic foot. Submit sample mix to Owner for testing in advance of job use and give details of mix and materials used.
- j. Erection of concrete block walls shall be performed so that entire thickness of walls shall be a completely solid construction entirely free of voids. All joints and spaces between blocks shall be filled with mortar. Wall thicknesses vary from about 18 to 39 inches and shall have four or six inch (optional) thick block laid to make up the full wall thickness. The horizontal bed joints shall be offset about mid-point in thickness of wall to avoid thru-joints at one level. Similarly, the vertical end joints between blocks shall be staggered at third points in block length so that joints will not occupy same plane for more than 1/2 of total wall thickness. See typical details on drawing.
- k. To assure complete filling of all joints and spaces, each block when laid shall be parged with full 3/8 inch of mortar on all contact surfaces before adjoining block is set in position. Each block then, is to be firmly set against the already parged surfaces of preceding blocks so that continuous mortar to block contact is achieved without voids. Rear surfaces of block shall also be parged. Slushing up vertical joints or back spaces after block has been laid in wall will not be permitted.
- l. Metal joint reinforcing shall be used in horizontal bed joints of all block work, installed continuous in alternating joints (16" o.c.). Welded wire mesh reinforcement equivalent to truss-type in 9 gage wire shall be of special widths required to extend across approximately one-half of the total wall thickness for the purpose of bonding together the narrow block wythes. See plans and details of the variations in wall thickness requiring many different reinforcement widths. See drawing 4025.

- m. Dovetail anchor slots are provided by others, placed vertically, wherever ends of block walls abut poured concrete walls. Furnish and install herein 12 gage galvanized crimped dovetail anchors to engage the slots, and space anchors 16 inches apart vertically. See detail on drawing.
- n. See drawings for details of wall openings, areas of removable block, etc. Furnish required steel or block lintels for openings.
- o. Do all job cutting and fitting of block required by design requirements or to meet job conditions.
- p. Completed high density block walls will be subject to testing by Owner for any loss in shielding effectiveness due to voids or imperfect materials or workmanship. Any defective areas shall be corrected by Contractor without added cost to Owner.

#### 18. STORAGE

- a. Cement, lime and other materials, subject to damage by the elements, shall be delivered to the site in their original unbroken packages, and stored off the ground in weather tight enclosure.
- b. Concrete blocks shall be kept dry at all times during delivery, storage, and after being laid in wall. Store on planks off the ground and under waterproof cover.

#### 19. PRECAUTIONS

- a. Do not lay masonry in freezing weather unless suitable means are provided to heat materials, protect work from cold and frost, and insure that mortar will harden without freezing. No anti-freeze ingredient shall be used.
- b. Protect facing materials against staining, and keep top of walls covered with non-staining waterproof covering when work is not in progress. When work is resumed, top surface of work shall be cleaned of all loose mortar and, in drying weather made thoroughly wet.
- c. Except in freezing weather, all brick shall be thoroughly wetted as necessary to reduce rate of absorption of water at the time of laying to not more than 0.7 ounce per brick when placed on its flat side (30 square inches) in 1/4" of water for one minute. For a field check, deposit a quantity of water to the flat side of the brick to wet an area the size of a 50-cent coin. If the water disappears in less than 15 seconds, they shall be wetted. No free moisture shall remain on surface of brick at time of setting.

19. PRECAUTIONS (Cont'd)

- d. Structural clay tile having a relatively high rate of absorption, 12% or more, shall be wetted thoroughly several hours before use so that no free moisture remains on surface when laid.

20. LAYING MASONRY

- a. Install all work level, plumb, and true to line; with joints made of uniform size, and vertical joints lined up plumb.
- b. Finished surfaces of laid up masonry shall be uniform in appearance, color and texture for masonry units and mortar joints. Allowance chippage in exposed faces of installed brick shall be subject to ASTM limits given for types listed under Article on "Materials".
- c. Mortar type and mix is given under preceeding Article on "Materials".
- d. The job cutting of exposed edges of brick and concrete block shall be done only with a power saw.
- e. Brick shall be laid in full mortar beds and vertical joints completely filled. Joints shall be compacted, tooled concave or V-pointed as indicated or approved, and left free of all voids. Use maximum amount of mixing water in mortar consistent with workability. Machine mix for minimum time of five minutes.
- f. In cold weather, sand and water shall be heated to maintain the temperature of mortar "when used" to above 50 degrees Fahrenheit. Anti-freeze compounds accelerators or other admixtures will not be permitted without approval of the Owner's Engineer.
- g. Running bond without headers shall be used for all face brick, unless otherwise indicated. Bonding of face brick to backup shall be done as specified under previous Article on "Anchors and Reinforcement".
- h. See under preceeding Article "Precautions" for requirements on wetting brick before laying.
- i. Provide soft mortar bed for laying in of keyed metal flashings by Roofer.
- j. Facing tile shall be laid in running bond with courses level and true to line. Lay out work so that no piece shorter than 4" will occur in any vertical angle or jamb corner. Vertical joints shall occur over center of units below and be aligned vertically. All joints shall be

20. LAYING MASONRY (Cont'd)

compactly tooled to slightly concave form. Cutting at job site shall be performed with a power saw to provide true and even edges. Metal ties for bonding of facing tiles are specified under Article on "Anchors". As work progresses all surfaces shall be cleaned with burlap. At completion tile surfaces shall be scrubbed with fiber brush and water. No acid, or metal scrapers, shall be used in cleaning.

- k. Facing tile shall stop at level of hung ceilings unless otherwise indicated on drawings.
- l. Concrete block shall be laid in regular bond with vertical joints broken at least 3". Hollow units shall be laid with face shell bedding and solid units full bedded. Mortar mix is specified under article on "Materials". Do not wet concrete block before laying. Enough mortar shall be used to cause excess mortar to ooze out on both sides of the face shell in each head joint and bed joint. Mortar joints shall be tooled slightly concave.
- m. See details of concrete block joint reinforcing and anchorage under article on "Anchors".
- n. All concrete block partitions and walls shall be carried up to underside of structural deck above, unless otherwise shown on drawings.
- o. Solid or mortar-filled concrete blocks shall be used at structural bearing points, and at areas where all fastenings occur. Where anchor bolts occur fill spaces around bolts solidly with mortar.
- p. Where block masonry is to be left exposed or painted, select blocks to give finished surface free of broken units or chipped edges. All job cutting of exposed edges shall be done with a power saw. Units laid with open cells exposed will not be permitted.
- q. Provide 1/2 inch Celotex fiber-board laid in top of hollow metal door frames before setting masonry above.
- r. Weep holes, 3 feet apart, shall be placed at bottom of exterior masonry walls and at built-in masonry wall flashings.
- s. A solid smooth bedding of mortar shall be placed under and above all flashings (both fabric and metal types) where built into masonry walls. Where metal flashings of the mechanically-keyed type are used, such flashings shall be firmly embedded in soft mortar to provide proper tie between the metal flashing and masonry.

20. LAYING MASONRY (Cont'd)

- t. Piping, conduit, wiring and devices, etc., shall be built into or concealed by masonry partition work unless otherwise indicated or approved.
- u. Build in as required the items furnished by others.
- v. Metal door frames set in masonry shall be backed up with mortar plug at each metal anchor point, filling the space solid between frame and masonry block above each anchor.
- w. Provide all openings in masonry walls and partitions required for other trades, including electrical, plumbing, heating and ventilating. Do all necessary cutting and fitting required to accommodate work of other trades.

21. PIPE SLEEVES

- a. Furnish and install galvanized sheet metal sleeves for penetrations thru partitions such as pipes, conduit, etc. indicated on drawings. Include sleeves only up to 12 inch diameter.
- b. Sleeves over 12 inch diameter will be furnished by others.

22. LINTELS

Furnish and install the structural lintels required for openings, not over 6 feet wide, occurring in interior masonry walls or partitions. Include openings for pipes, conduit, troughs, ducts, grilles, registers, electric panels and distribution boards, telephone panels, fire hose cabinets, access panels, wall recesses, et cetera. Also provide lintels for interior door openings over 3 feet wide having hollow metal frames. Lintels may be steel angles or reinforced masonry.

23. FABRIC FLASHING

- a. Furnish and install fabric flashing as follows:
  - 1. Thru-wall type for lintels above following openings:
  - 2. Interior vertical wall flashing 6 feet high placed continuous in walls enclosing shower spaces listed below:

Office Building  
See Drawings 4001 and 4015  
4002 and 4014

Service Bay  
See Drawings 4048 and 4014  
4045 and 4013



## FABRIC FLASHING (Cont'd)

Plant

See Drawing 4067

- b. Fabric flashing shall be Wasco "Copper-Fabric" in 3-ounce copper weight as made by Wasco Products, Cambridge 38, Mass.
- c. Thru-wall flashings over lintels shall extend 2 inches beyond opening, with back inside edge and ends flanged to turn water outward to exterior face of wall.
- d. The six foot high vertical flashings for shower rooms are set between the facing tile and concrete block backup. At floor the fabric shall be lapped and sealed to base flashing placed by ceramic tile flooring contractor, or sealed to the lead pan provided by plumber. The joined edges of flashing sheets shall be lapped 2 inches and continuously sealed with mastic. Anchors and other penetrations through flashing shall be sealed with mastic.

\* \* \* \* \*

AEP RECORD

FRU NO. 210404 PLANT  
210919 OFFICE BUILDING



DRAWING SHOWING MASONRY WALL LOCATIONS &  
STANDARD MASONRY WALL DETAILS

S-12-4025 Rev. 10 (Details)  
S-12-4026 Rev. 18 (Details)  
S-12-4027 Rev. 22  
S-12-4028 Rev. 15  
S-12-4029 Rev. 18  
S-12-4031 Rev. 15  
S-1 -4033 Rev. 11  
S-1 -4034 Rev. 13  
S-12-4035 Rev. 5  
S-2 -4036 Rev. 10  
S-2 -4037 Rev. 14  
S-12-4046 Rev. 13  
S-12-4049 Rev. 9

ATTACHMENT 6  
AEP:NRC:0418D