

D.C. Cook

Electronic Corrective Action Program

Condition Report: P-99-14004
Current Status: Screened
Action Category: 4

I. Problem ID

Discovered Time/Date: 08:00 05/28/1999 Occurred Time/Date: ___/___/___

Unit Affected: 0

<u>Status at Time Discovered</u>	<u>Unit 1</u>	<u>Unit 2</u>
Mode	5	5
% Power		

Unit Status Remarks:

System(s) Affected: AB AUXILIARY BUILDING
 CNTMT CONTAINMENT BUILDING STRUCTURE

Affected Equipment

<u>Equipment ID No.</u>	<u>Comp. Code</u>	<u>Manufacturer</u>
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Location of Problem - Bldg: Column Line: Elev:

Location Remarks:

Brief Condition Description:

ESRR - Reasonable assurance can not be provided that current concrete block wall installations conform with the design and licensing bases due to the lack of controlled configuration documentation and corrective actions.

Detailed Condition Description:

ESRR- Reasonable assurance can not be provided that current concrete block wall installations conform with the design and licensing bases due to the lack of controlled configuration documentation and corrective actions.

Per the requirements of IE Bulletin 80-11, masonry block walls which could endanger Seismic Class I piping and equipment were re-evaluated and modified as necessary to ensure the masonry block walls can perform their intended function under all postulated loads and load combinations. The types of masonry blocks used in CNP are high density blocks with DUR-O-WAL, hollow concrete blocks with DUR-O-WAL, solid concrete blocks with DUR-O-WAL or four-hour fire rated blocks with DUR-O-WAL.

As a result of IE 80-11, concrete block walls in the Class I areas of the plant were reviewed for their proximity to Seismic Class I equipment, piping, instrumentation and electrical items. Walls which could adversely affect Seismic Class I items were classified as safety related and were analyzed for their structural adequacy. There are 123 safety related walls. Walls which were located such as they could not adversely affect Seismic Class I items were classified as non-safety related and were not structurally analyzed. There are 21 non-safety related walls.

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Operable:

ODE Appl. Mode:

Operability Type:

Executive Summary:

Comments:

System(s):

<u>Indiv</u>	<u>Team</u>	<u>Group</u>	<u>Date</u>
No current Signatures for this section.			

Past Operability:

Responsible Group: NED

Status: Open

Operable: 1

Operability Type: ODE

Comments:

Past Operability Determination Evaluation for Concrete Masonry Walls

1. System, Structure, or Component(s) (SSCs) that have been identified as Degraded and/or Non-Conforming:

System: For the purposes of this ODE, concrete masonry walls in the Containment, Auxiliary, Turbine and Screenhouse Buildings will be considered a system.

Structure: Concrete Masonry Walls are found in the Containment, Auxiliary, Turbine and Screenhouse Buildings

Components: For the purposes of this ODE, the individual concrete masonry walls will be considered the components of this concrete masonry wall system.

2. Function Of SSC:

Function of System: The Concrete Masonry Walls serve several functions, such as:

1. Provide an enclosure for certain areas/rooms within the plant.
2. Provide radiation barrier.
3. Provide support for various plant components (both non-safety and safety related)

Function of Structure: For the purposes of this ODE the structures that contain these concrete masonry walls are not affected by the structural integrity of the individual walls.

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Function of Components: Individual concrete masonry walls (components) serve one or more functions listed above.

3. Description of Degraded and/or Non-Conforming Condition:

In response to NRC IE Bulletin No. 80-11 (Seismic Qualification of Concrete Masonry Walls), calculations had been generated to qualify safety-related concrete masonry walls. Based on the result of these calculations, modifications were designed, issued and installed.

As part of the Calculation Reconstitution Project these calculations were reviewed. It was determined that the calculations contained erroneous assumptions, omissions and in some cases, a failure to conform to NRC commitments made in the AEP response to 80-11. These findings have led to the conclusion that a number of concrete masonry walls at the Cook Plant are not qualified for seismic load conditions.

Sargent & Lundy Engineers (S&L) was authorized to re-

evaluate the concrete masonry walls. Initially 48 randomly selected walls were evaluated based on as-built information obtained via field walkdowns. The evaluation showed that an unacceptable number of walls required further modification. Therefore it was decided to re-evaluate all concrete masonry walls. That effort has resulted in the release of 2-DCP-4295. Following is a summary of the modifications, required for Unit 2 Restart, issued under this DCP: (Note that a wall is identified by the Architectural drawing on which it is shown and a sequential number shown on the drawing)

A) Modifications at connection of concrete masonry walls to poured concrete walls (Details 1,2 or3 of 2-DCP-4295):

- Wall # 4025-W23
- 4025-W24
- 4025-W27
- 4026-W15
- 4026-W19
- 4027-W7
- 4027-W10
- 4028-W13
- 4028-W14
- 4028-W8
- 4031-W2
- 4035-W1
- 4035-W2
- 4036-W2
- 4036-W3
- 4036-W4
- 4037-W1
- 4037-W2

The above modifications are required due to 1) insufficient capacity of the Dovetail Anchors (used to connect the walls together) to resist the out-of-plane load resulting from the self-weight seismic excitation of the concrete masonry wall or 2) inability to confirm that the dovetail anchors were installed as required.

The following similar modifications were issued under 2-DCP-4295 but will be deleted (via FCN) based on a more rigorous analysis:

- Wall # 4025-W13
- 4025-W14

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4025-W15

- 4025-W16
- 4025-W21
- 4025-W22
- 4026-W7
- 4028-W11
- 4029-W8

B) Modifications at connections of concrete masonry walls to poured concrete walls (Details 4 through 8 of 2-DCP-4295):

- Wall # 4026-W15
 4026-W19
 4028-W13
 4028-W14
 4028-W8
 4031-W2

The above modifications are required due to 1) insufficient capacity of the Dovetail Anchors (used to connect the walls together) to resist the out-of-plane shear and moment from a cantilevered portion of the wall or 2) the necessity to change the boundary conditions for the wall from simple support to

fixed end in order to reduce the bending stresses in the wall.

C) Modifications to add an additional support column:

- Wall # 4025-W26
 4027-W14
 4028-W13
 4028-W14
 4037-W1
 4037-W2

D) Miscellaneous modifications:

- | | |
|-----------------|--|
| Wall # 4026-W17 | Add shims or grout between wall and I.P. steel column. |
| 4027-W4 | Ditto |
| 4027-W5 | Ditto |
| 4028-W10 | Ditto |
| 4028-W11 | Ditto |
| 4027-W10 | Reinforce connection of I.P. column to concrete wall |
| 4028-W8 | Ditto |
| 4028-W26 | Provide connection between wall and Concrete roof slab. |
| 4028-W9 | Provide additional support for grating at cutouts (Removable Wall) |

E) RFC-3035

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Further review of existing Condition Reports showed that 12RFC3035, which contained modification details for removable concrete masonry walls at the Unit 1&2 Letdown Heat Exchanger Rooms, had NOT been installed in Unit 2.

F) Walls requiring modification but not issued under 2-DCP-4295

The initial analysis for the following walls has shown that modifications are required. The design of these modifications had not been completed when 2-DCP-4295 was issued. Upon completion of calculations, the required modifications will be issued as an FCN against 2-DCP-4295:

Wall # 4026-W14
 4026-W20
 4027-W11
 4027-W16
 4027-W19
 4028-W24
 4029-W7
 4031-W2
 4031-W3
 4035-W2
 4049-W2
 4049-W4

4. Describe the conditions under which the discrepant condition impacts the SSC. (what, how and when):

All of the walls described in Item 3 above are adequate for normal plant conditions. The modifications are only required due to seismic loads. As a result of the horizontal ground motion generated during an earthquake, the walls will be subjected to out-of-plane forces. Calculations SD-990909-04 and SD-991028-002 have shown that these walls are not strong enough to resist this type of loading thus possibly leading to failure. Due to the brittle

nature of concrete masonry wall construction, it is likely that the failure mode would be collapse of the wall.

Part of the scope for evaluating concrete masonry walls was to perform walkdowns to determine if for each wall there were safety-related components either **attached directly to the walls or within proximity of it such that failure of the wall could result in the component being impacted by the falling masonry blocks.**

These walkdowns were done strictly on a "Yes/No" basis and did not identify the affected individual safety-related component numbers. All the walls listed above fell into the "Yes" category and as such are considered safety-related.

A review of the General Arrangement drawings has shown the following components, in part, to be in proximity to one of the walls listed above:

Elevation 573'

Blockwalls in each RHR pump room and each CTS pump room in Unit 2 require reinforcement. This impacts each RHR pump and each CTS pump.

Blockwall on the west side of the Auxiliary Building low level sump tank in Unit 2 needs modification. This impacts the Auxiliary Building low level sump tank.

Blockwall on the south side of the Unit 1 reactor coolant drain tank pumps and adjacent to the sump pump needs reinforcement. This impacts the sump pumps.

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Elevation 587'

Blockwalls at west end of each Unit 2 EDG require reinforcement. This impacts EDG starting air.
Blockwalls surrounding EDG day tanks on each Unit 2 EDG require reinforcement. This impacts the day tank and the generator of each EDG.
Blockwall on east side of boric acid tank room requires reinforcement. This affects the boric acid transfer pumps.
Blockwall on north side of spent resin storage tank in Unit 2 requires modification. This affects the spent resin storage tank.
Blockwalls on the north and east sides of rad waste demineralization system related equipment (south side of 15 GPM waste evaporator) in Unit 2 requires modification. This affects the demineralization

system related equipment and the 15 GPM waste evaporator.

Blockwalls on the south and east sides of the north boric acid evaporator and on the north and east sides of the south boric acid evaporator require modification. This impacts the north and south boric acid evaporators.
Blockwalls adjacent to the refueling water filter in Unit 1 need modification. This impacts the refueling water filter.

Elevation 609'

Blockwalls adjacent to the spent fuel pit filter and spent fuel pit skimmer filter require modification. This affects the spent fuel pit filter and spent fuel pit skimmer filter.
Blockwalls adjacent to the spent fuel pit demineralizer in Unit 2 need reinforcement. This impacts the spent fuel pit demineralizer.
Blockwall adjacent to the boron injection tank in Unit 2 requires modification. This impacts the boron injection tank.
Blockwall on the west side of the volume control tank in Unit 2 needs reinforcement. This impacts the volume control tank.
Blockwalls next to the evaporator condensate filter in Unit 2 need modification. This impacts the evaporator condensate filter.
Blockwall between the 600 volt transformers TR11A & TR11C and transformers TR11B & TR11D in Unit 2 need reinforcement. This impacts the transformers TR11A, TR11C, TR11B & TR11D.
Blockwall next to the Turbine driven AFW pump exhaust in Unit 2 needs reinforcement. This impacts the Turbine driven AFW pump.

Elevation 622'

Blockwall on the east side of the cable passage way (next to control room cable vault) in Unit 2 requires modification.
Equipment impacted by this is not identified.

Elevation 650'

Blockwall in the south side of the computer room (above control room) in Unit 2 need modification.
This impacts the computer, control room air conditioning and the HVAC equipment.

5. Technical Specification function/activity impacted:

There are no Tech. Specs. that deal directly with concrete masonry walls. However, there will obviously be a number of Tech. Spec. functions/activities related to the SSCs attached to or in close proximity to the aforementioned walls. As stated above, the identity of each and every one of these SSCs has not been documented at this time.

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6. Impact of deficiency on environmental qualification, appendix R, station blackout, and seismic qualification:

If a concrete masonry wall fails and collapses during a seismic event the following scenarios are possible: If a safety-related component is attached directly to the wall it is likely that it would be impacted by falling masonry blocks. This could damage the component such that it is no longer functional. If the component survived the impact then it would be required to maintain its structural adequacy during the remainder of the event without the support of the failed wall.

If a safety-related component is within the fall zone of the wall and the wall should collapse then that component could be impacted by masonry blocks falling from a height of up to twenty feet. This could again sufficiently damage the component such that it is no longer functional.

In addition to the above scenarios, since concrete masonry walls are in some instances used as a ventilation barrier to maintain a certain temperature range within a room (Battery Rooms, Computer Rooms, etc.), failure of such a wall could result in a rise in room temperature. This could invalidate the EQ of a particular piece of equipment.

Currently, these scenarios have not been investigated on an individual basis and as such it is undetermined at this time as to the actual effect of the failure of a particular wall. However, CR 98-05604 was written against wall 4049-W2 in the Turbine Bldg. The CR states that this wall is in close proximity to the Unit 1&2 AFW pump (Terry Turbine) exhaust. Subsequent work by Stevenson & Associates, S&L and the current AEP NESD staff has shown that this wall will indeed collapse under a Design

Basis Earthquake (DBE) and will damage this safety-related equipment exhaust piping.

7. Is the SSC operable under defined normal service and safety related/accident scenarios:

No.

It is NESD's opinion that all walls requiring modification as specified in 2-DCP-4295 should be considered inoperable during a seismic event. However, we believe that they will continue to maintain their design functions during normal conditions and other accident conditions (other than DBE) such as fire and station blackout.

8. Describe basis for operability conclusion:

The basis for concluding that all concrete masonry walls requiring modification should be declared inoperable during a DBE is as follows:

- 1) The ratio of actual stresses to allowable stresses for a number of walls was greater than two.
- 2) Concrete masonry wall construction is inherently brittle. There is no yielding such as one finds with steel structures. This is amplified due to the load reversals ("shaking") experienced during an earthquake. This would likely lead to sudden catastrophic failure.
- 3) Although the impact of a falling brick on a steel cased pump may not be sufficient to cause failure, it would likely be sufficient to break tubing lines, small piping and/or electrical connections required to operate the pump.
- 4) For a safety-related component attached directly to a concrete masonry wall, it would be unconservative to assume that the component would remain structurally adequate without these support points.

9. Supporting Documentation: (Reference Document Number and Section)

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Calculation SD-990909-004 Rev.0
Calculation SD-991028-002 Rev.0
2-DCP-4295

10. Corrective Action Implementing Document(s):

2-DCP-4295 was issued to install modifications.

A new criteria/procedure will be created to formalize the qualification of concrete masonry walls for physical changes and/or new/revised loads.
Any other required corrective action would be

determined and tracked through the condition report investigation and approval process.

Attachment: None

	<u>Indiv</u>	<u>Team</u>	<u>Group</u>	<u>Date</u>
Assigned To:	SEKARANJ	SENA	NED	02/01/2000
Accepted By:	SENA	GLASSJ	NED	02/01/2000
Approval Assigned To:	GLASSJ	GLASSJ	NED	02/01/2000
Due Date:	03/02/2000			

V. Reportability/Investigation

Responsible Group: RCL Status: Open

Problem Reportable:

Reportable Per:

Comments:

	<u>Indiv</u>	<u>Team</u>	<u>Group</u>	<u>Date</u>
Due Date:	03/22/2000			
Assigned To:	NANCES	DEPUYDTM	RCL	02/21/2000

Investigation Report:

Responsible Group:

Investigator:

Investigation Report Due: / /