CENTRAL FILES

NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

November 10, 1980

Office of Inspection and Enforcement
Region I
Attn: Mr. Boyce H. Grier, Director
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Dear Mr. Grier:

Re: Nine Mile Point Unit 1
Docket 50-220
DPR-63

In our July 8, 1980 letter we indicated that a re-evaluation of masonry walls at Nine Mile Point Unit 1 in accordance with Inspection and Enforcement Bulletin 80-11 (Item 2b) would be submitted by November 8, 1980. The attachment to this letter addresses that re-evaluation.

The information contained in the attachment to this letter demonstrates that continued operation of Nine Mile Point Unit 1 does not present an undue safety hazard to the public.

Very truly yours,

NIAGARA MOHAWK POWER CORPORATION

T. E. Lempges
Vice President - Nuclear Generation

MGM:ja
Attachment
cc: NRC Office of Inspection and Enforcement
Division of Reactor Operating Inspection
Washington, D. C. 20555

State of New York)

County of Onondaga) ss:

THOMAS E. LEMPGES, being duly sworn, says:

I am Vice President, Nuclear Generation of Niagara Mohawk Power Corporation. I have read the foregoing letter and the fact contained in the letter and attachment are true to the best of my knowledge, information and belief.

Thomas E. Lempges

Sworn to before me on this
10th day of November, 1980

Notary Public

CYNTHIA A. PETTA
Notary Public in the State of New York
Qualified in Onondaga Co. No. 4682225
My Commission Expires March 30, 19 82

NIAGARA MOHAWK POWER CORPORATION

RESPONSE TO INSPECTION AND ENFORCEMENT BULLETIN 80-11

FOR

NINE MILE POINT UNIT 1

Item 2b

(i) Describe, in detail, the function of the masonry walls, the configurations of these walls, the type and strengths of the materials of which they are constructed (mortar, grout, concrete and steel), and the reinforcement details (horizontal steel, vertical steel, and masonry ties for multiple wythe construction). A wythe is considered to be (as defined by ACI Standard 531-1979) "each continuous vertical section of a wall, one masonry unit or grouted space in thickness and 2 in. minimum in thickness."

(ii) Describe the construction practices employed in the construction of these walls and, in particular, their adequacy in preventing significant voids or other weaknesses in any mortar, grout, or concrete fill.

(iii) The re-evaluation report should include detailed justification for the criteria used. References to existing codes or test data may be used if applicable for the plant conditions. The re-evaluation should specifically address the following:

(a) All postulated loads and load combinations should be evaluated against the corresponding re-evaluation acceptance criteria. The re-evaluation should consider the loads from safety and non-safety-related attachments, differential floor displacement and thermal effects (or detailed justification that these can be considered self limiting and cannot induce brittle failures), and the effects of any potential cracking under dynamic loads. Describe in detail the methods used to account for these factors in the re-evaluation and the adequacy of the acceptance criteria for both in-plane and out-of-plane loads.

(b) The mechanism for load transfer into the masonry walls and postulated failure modes should be reviewed. For multiple wythe walls in which composite behavior is relied upon, describe the methods and acceptance criteria used to assure that these walls will behave as composite walls, especially with regard to shear and tension transfer at the wythe interfaces. With regard to local loadings such as piping and equipment support reactions, the acceptance criteria should assure that the loads are adequately transferred into the wall, such that any assumptions regarding the behavior of the walls are appropriate. Include the potential for block pullout and the necessity for tensile stress transfer through bond at the wythe interfaces.

Response

In general, the masonry walls inside Nine Mile Point Unit 1 serve one or more of the following functions: partition walls, fire walls and/or radiation shielding walls. Approximately ninety percent (90%) of the walls are required to resist only those loads associated with their own seismic inertial force and relative seismic building movements. In no case is a wall required to resist primary building forces. Approximately ten percent (10%) of the walls have components attached to them. In all cases, however, the loads imparted to the wall are either negligible when compared to the wall capacity or attachments have been thru-bolted and collar joint tension is not a consideration.

All masonry units used in the wall construction were either normal concrete block with a density between 130 and 145 pounds per cubic foot or light weight concrete block with a 105 pound per cubic foot unit weight. All horizontal reinforcing was extra-heavy durowall (deformed) with a yield strength of 70 ksi. All vertical reinforcing was deformed bars with a minimum yield strength of 40 ksi. Reinforced cells were filled with grout.

General information as to the construction practices to be used for masonry walls were outlined on the design drawings. In general, standard details and specific references to ASTM standards for material types were specified. Specific information to prevent significant voids or other weaknesses in any mortar, grout, or concrete fill was not specified. However, modifications performed since initial plant construction, where removal of block walls was required, showed no deficiencies in their construction.

The re-evaluation of all masonry walls at Nine Mile Point Nuclear Station Unit 1 has been completed. A total of seventy-five (75) wall systems were re-evaluated (see Table 1). A wall system may be a single wall or a combination of walls in close proximity to each other. For example, an elevator enclosure consisting of four (4) walls forming a box was considered as a single wall system. In some cases, a wall system involved a variety of block types and/or configurations. In the listing shown in Table 1, the configuration and block type listed were the type and configuration most predominant in the system. Horizontal and vertical spans were approximated as being representative of the wall system.

Where specification information related to material strengths was not available, the minimum masonry compressive strength of 700 psi corresponding to a compressive strength on the masonry unit of 1000 psi was used in our analysis. Where specification information related to material strengths was available, the specified material values were used in our analysis. For additional information related to wall configuration, reinforcement details and number of wythes, see Table 1.

Response (Continued)

The load definition in our Final Safety Analysis Report and the design and analysis techniques of ACI 531-79 was used in the re-evaluation of all masonry walls. In performing the re-evaluation, particular attention was paid to actual stresses calculated with respect to the tensile stress on the bed joints for unreinforced walls, the tensile stress on the collar joint and the horizontal beam shear stress on the collar joint. The actual values of tensile stress calculated on the bed joint of unreinforced walls was approximately 7 to 12 psi (13 psi is the ACI 531-79 allowable for the minimum grade mortar). The actual tensile stress on the collar joint was insignificant since only small loads were imparted to this joint by attachments. The actual horizontal beam shear calculated was on the order of 5-6 psi (29 psi is the ACI 531-79 allowable for the minimum grade mortar).

The results of the re-evaluation indicates that modifications will be required on six (6) walls. In five (5) instances (wall ID #'s 31, 44, 45, 59 and 66 as outlined on Table 1) the modification will require the addition of bracing at the top of the wall to provide lateral restraint necessary in resisting seismic forces. The other modification (wall ID # 35 as outlined on Table 1) requires the elimination of a bearing force resulting from a pipe resting on the wall at the point where it penetrated the wall. These modifications will be performed by the end of spring 1981 refueling and maintenance outage.

TABLE 1

Nine Mile Point Unit 1

Masonry Wall Systems Re-evaluated Under

Inspection and Enforcement Bulletin 80-11

Wall I.D. #	Coursing		Deformed Reinforcing			Construction		Thickness	Representative Spans (Ft. & Inches)	
	Running	Stacked	Horizontal	Vertical		Solid (#Wythes)	Hollow Core		Horizontal	Vertical
1	X		Dur-O-Wal	#4 @ 32"			X	8"	10'-4"	21'-6"
2	X		Dur-O-Wal	#4 @ 48"			X	8"	14'-0"	22'-6"
3	X		Dur-O-Wal	#4 @ 16"		X(3)		12"	8'-0"	7'-[redacted]"
4	X		Dur-O-Wal	#4 @ 18"	E.F.	X(7)		36"	9'-9"	21'-[redacted]
5	X		Dur-O-Wal	#4 @ 16"	E.F.	X(7)		36"	5'-6"	4'-0"
7	X		Dur-O-Wal	#4 @ 48"		X(1)		8"	15'-0"	9'-4"
8	X		Dur-O-Wal	None			X	12"	16'-0"	7'-10"
9	X		Dur-O-Wal	None			X	12"	19'-6"	9'-0"
10	X		Dur-O-Wal	None			X	12"	18'-4"	9'-4"
13	X		Dur-O-Wal	None			X	12"	16'-6"	8'-10"
14	X		Dur-O-Wal	None			X	12"	16'-6"	8'-10"
16	X		Dur-O-Wal	None			X	12"	16'-6"	9'-4"
17	X		Dur-O-Wal	None		X(1)		8"	8'-6"	9'-4"
18	X		Dur-O-Wal	#4 @ 32"			X	8"	11'-6"	17'-6"
19	X		Dur-O-Wal	None			X	8"	12'-0"	8'-0"
20	X		Dur-O-Wal	#4 @ 48"			X	8"	8'-0"	8'-0"
21	X		Dur-O-Wal	#4 @ 16"	E.F.	X(8)		42"	15'-6"	16'-6"
22	X		Dur-O-Wal	#4 @ 18"	E.F.	X(4)		16"	23'-0"	18'-6"
23	X		Dur-O-Wal	#4 @ 32"			X	12"	20'-0"	18'-[redacted]
24	X		Dur-O-Wal	#4 @ 48"			X	8"	24'-10"	13'-[redacted]
25	X		Dur-O-Wal	#4 @ 32"			X	8"	26'-0"	9'-0"
26	X		Dur-O-Wal	#4 @ 16"	E.F.	X(4)		18"	15'-0"	8'-0"
27	X		Dur-O-Wal	#4 @ 32"			X	12"	60'-0"	15'-4"
28	X		Dur-O-Wal	None			X	12"	14'-10"	15'-0"
29	X		Dur-O-Wal	#4 @ 32"			X	12"	20'-0"	19'-4"
30	X		Dur-O-Wal	#4 @ 32"			X	12"	20'-0"	18'-0"
31	X		Dur-O-Wal	#4 @ 16"		X(3)		12"	40'-0"	18'-10"
32	X		Dur-O-Wal	#4 @ 16"			X	12"	18'-0"	14'-2"
33	X		Dur-O-Wal	#4 @ 32"			X	8"	18'-0"	7'-4"
34	X		Dur-O-Wal	None			X	12"	30'-0"	16'-0"
35	X		Dur-O-Wal	#4 @ 32"			X	12"	20'-0"	30'-0"
36		X	Dur-O-Wal	#3 @ 16"		X(3)		12"	13'-6"	8'-0"

TABLE 1 (Continued)

Nine Mile Point Unit 1

Masonry Wall Systems Re-evaluated Under

Inspection and Enforcement Bulletin 80-11

Wall I.D. #	Coursing		Deformed Reinforcing		Construction		Thickness	Representative Spans (Ft. & Inches)	
	Running	Stacked	Horizontal	Vertical	Solid (#Wythes)	Hollow Core		Horizontal	Vertical
37	X		Dur-O-Wal	#4 @ 32"		X	8"	16'-0"	10'-0"
38	X		Dur-O-Wal	#4 @ 16"	X(7)		36"	9'-4"	10'-0"
39	X		Dur-O-Wal	#4 @ 48"		X	8"	17'-6"	29'-[illegible]
40	X		Dur-O-Wal	None	X		36"	25'-0"	17'-[illegible]
41	X		Dur-O-Wal	None	X		36"	20'-0"	11'-0"
42	X		Dur-O-Wal	#4 @ 32"		X	8"	11'-9"	17'-0"
43	X		Dur-O-Wal	#5 @ 40"		X	8"	18'-4"	14'-0"
44		X	Dur-O-Wal	#3 @ 16"	X(3)		12"	20'-0"	10'-0"
45	X		Dur-O-Wal	#4 @ 32"		X	8"	25'-4"	12'-3"
46	X		Dur-O-Wal	#4 @ 32"		X	12"	26'-0"	13'-0"
47		X	Dur-O-Wal	#4 @ 32"		X	12"	20'-0"	21'-4"
48	X		Dur-O-Wal	#4 @ 32"		X	8"	10'-0"	14'-0"
49	X		Dur-O-Wal	#5 @ 24		X	8"	25'-4"	20'-10"
50	X		Dur-O-Wal	#4 @ 32"		X	8"	30'-0"	8'-0"
51	X		Dur-O-Wal	#3 @ 16"	X(7)		36"	15'-6"	10'-0"
52	X		Dur-O-Wal	#4 @ 32"		X	12"	20'-0"	20'-0"
53	X		Dur-O-Wal	#4 @ 32"		X	12"	19'-6"	17'-8"
54	X		Dur-O-Wal	#4 @ 32"		X	8"	20'-0"	16'-0"
55	X		Dur-O-Wal	#4 @ 32"		X	8"	10'-0"	14'-[illegible]
56	X		Dur-O-Wal	None	X		36"	20'-0"	17'-[illegible]
57	X		Dur-O-Wal	#4 @ 32"		X	8"	12'-0"	17'-0"
58	X		Dur-O-Wal	#5 @ 40"		X	8"	21'-0"	17'-0"
59		X	Dur-O-Wal	#3 @ 16"	X(3)		12"	32'-0"	12'-8"
60	X		Dur-O-Wal	#4 @ 32"		X	8"	26'-0"	9'-6"
61	X		Dur-O-Wal	#4 @ 32"		X	8"	10'-0"	14'-0"
62	X		Dur-O-Wal	#4 @ 48"		X	8"	23'-6"	11'-7"
63	X		Dur-O-Wal	#4 @ 48"		X	8"	21'-8"	13'-10"
64	X		Dur-O-Wal	#4 @ 32"		X	8"	12'-0"	18'-0"
65	X		Dur-O-Wal	#5 @ 24"		X	8"	21'-0"	20'-3"
66		X	Dur-O-Wal	#4 @ 16"	X		18"	24'-6"	15'-0"
67	X		Dur-O-Wal	#5 @ 24"		X	8"	21'-0"	19'-4"
68	X		Dur-O-Wal	#5 @ 32"		X	12"	20'-0"	19'-4"

TABLE 1 (Continued)

Nine Mile Point Unit 1

Masonry Wall Systems Re-evaluated Under

Inspection and Enforcement Bulletin 80-11

Wall I.D. #	Coursing		Deformed Reinforcing		Construction		Thickness	Representative Spans (Ft. & Inches)	
	Running	Stacked	Horizontal	Vertical	Solid (#Wythes)	Hollow Core		Horizontal	Vertical
70	X		Dur-O-Wal	#4 @ 32"		X	8"	10'-0"	14'-0"
71	X		Dur-O-Wal	#4 @ 48"		X	8"	19'-6"	8'-0"
72	X		Dur-O-Wal	None		X	8"	22'-0"	12'-[illegible]
73	X		Dur-O-Wal	#4 @ 32"		X	8"	9'-0"	13'-[illegible]
74	X		Dur-O-Wal	#4 @ 48"		X	8"	10'-8"	7'-10"
76	X		Dur-O-Wal	#4 @ 48"		X	8"	24'-4"	13'-0"
77	X		Dur-O-Wal	#4 @ 32"		X	8"	9'-0"	16'-0"
90	(Enclosed in Steel)		-	None	X		45"	8'-6"	11'-0"
95	X		Dur-O-Wal	#4 @ 16"	X(4)		18"	7'-9"	11'-0"
104	X		Dur-O-Wal	#4 @ 32"		X	8"	30'-0"	12'-0"
106	X		Dur-O-Wal	#4 @ 32"		X	8"	25'-6"	12'-6"

Note 1: A specific wall # may include several types of walls - that is, a wall # may include running & stacked bond walls, reinforced & unreinforced walls, solid and hollow, various thicknesses and spans. This table was made using the type of wall most representative of each wall system. Less than 20% of all walls were unreinforced vertically. In all cases, horizontal reinforcing was supplied.