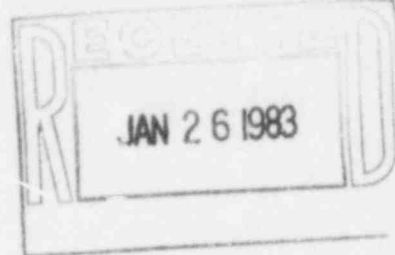




Public Service Company of Colorado

P. O. Box 840, Denver, Colorado 80201

January 11, 1983  
Fort St. Vrain  
Unit No. 1  
P-83022



58-267

Mr. Robert A. Clark, Chief  
Operating Reactors Branch #3  
Division of Licensing  
Nuclear Regulatory Commission

SUBJECT: Masonry Block Walls

REFERENCE: G-82377

Gentlemen:

The following is Public Service Company of Colorado's response to your letter of November 19, 1982 requesting additional information on masonry block walls.

ITEM 1

Since no quality assurance records are available the Licensee is requested to confirm that Dur-O-Wall exists in the walls as specified in the design. Also provide available data to justify the yield strength of Dur-O-Wall used in the analysis. In addition, provide verification to assure proper anchorage of Dur-O-Wall at the boundary and proper bonding between Dur-O-Wall and mortar. Further, justify the use of Dur-O-Wall as a reinforcing element considering the fact that this is not normally used in such capacity. Include applicable test data in your justification.

PSC RESPONSE

All of the 22 walls, which were qualified by relying on the strength of Duro-O-Wall, were investigated to verify that Dur-O-Wall does exist. A total of 17 walls had Dur-O-Wall as originally specified. This was verified by means of a metal detector and by removing mortar in various locations to check the Dur-O-Wall size and

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bond. A total of five walls were noted to have discrepancies with the installation of the Dur-O-Wall from what was originally specified.

Each of the walls and the corresponding discrepancies are as follows:

- |          |   |
|----------|---|
| Wall 49  | Dur-O-Wall was missing from one course of block                       |
| Wall 51  | Dur-O-Wall was missing from the upper half of the masonry block wall. |
| Wall 95  | Dur-O-Wall was missing from the lower half of the masonry block wall. |
| Wall 100 | Dur-O-Wall was not found.   |
| Wall 101 | Dur-O-Wall was found to be missing from one course.                   |

Reanalysis of wall number 51, which has a very short span length, showed that there is adequate strength in the masonry to resist the various loads and that Dur-O-Wall, in fact, would not be required as originally specified to maintain wall integrity. The remaining walls, numbers 49, 95, 100, and 101 will require modifications to provide adequate reinforcement.

The yield strength of the Dur-O-Wall can be justified since a maximum stress of 40,000 psi was used in the analysis of the Dur-O-Wall steel. The normal cold-drawn steel wire used for Dur-O-Wall has a minimum yield point strength of 64,000 psi (See Ref. 2 below). Therefore, the values used in the masonry block wall analysis are conservative, and justifiable. No test data on the Fort St. Vrain Dur-O-Wall reinforcing is available.

No credit was taken for the Dur-O-Wall at the boundary support. The shear strength of mortar is sufficient in resisting the seismic loads. An evaluation of the bond between the boundary and the masonry block mortar joint is currently being performed by PSC. Results of this evaluation will be available upon review and evaluation by PSC.

The bonding between the Dur-O-Wall and mortar was found to be sufficient through engineering judgement upon inspection of the walls in which mortar was removed to expose the Dur-O-Wall.

Dur-O-Wall is justified as a reinforcing element in the following references:

- 1) Reinforced Masonry Engineering Handbook. By James Amrhein, 1973 Edition, Page 242.

- 2) A Comprehensive Data File on Masonry Wall Reinforcement, By W.H. Bartlett, 1962, Page 33.

Based on this information, PSC feels that it is justifiable to use Dur-0-Wall as a reinforcing element.

ITEM 2

Provide data to justify the strength of the bar straps used in wall modifications.

PSC RESPONSE

PSC feels that data is not required to justify the strength of the bar straps used in the wall modifications since ASTM A36 steel was used in the analysis. ASTM A36 is a low strength steel and any steel used would have as a minimum the tensile strength properties of ASTM A36 steel.

ITEM 3

Verify whether load combinations used are in compliance with the plant FSAR.

PSC RESPONSE

The FSAR does not address load combinations on masonry block walls, however, Design Criteria: Structures - General (System 70) discusses concrete load combinations which were used in the analysis of the masonry block walls.

ITEM 4

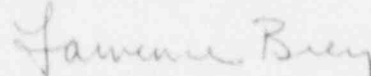
Indicate the number of walls which were qualified by relying on the strength of Dur-0-Wall and that of bar straps. Also, provide the status of wall modifications.

PSC RESPONSE

Twenty-two masonry block walls were originally qualified by relying on the strength of Dur-0-Wall. Sixteen masonry block walls were qualified by use of bar straps attached to the walls.

All wall modifications with regard to the 16 masonry block walls requiring bar straps were completed approximately one year ago. The modifications to the four walls which had dur-o-wall discrepancy will be completed by March 15, 1983.

Very truly yours,



H. L. Brey, Manager  
Nuclear Engineering Division

HLB:pa