

FINAL REPORT

ON

CRANE WALL AND CUBICLE WALL REINFORCING BARS

BEAVER VALLEY POWER STATION - UNIT NO. 2

NOTE: Revisions are underlined.

1.0 SUMMARY

During the construction of the reactor containment crane wall and a contiguous cubicle wall, forty-eight No. 11 reinforcing bars and seventy-eight No. 4 reinforcing bars, as shown on the Engineers' drawings, were omitted from a concrete placement.

2.0 IMMEDIATE ACTION TAKEN

A Nonconformance and Disposition Report was initiated and all construction work in the vicinity of the affected area was stopped. The Nuclear Regulatory Commission was informed of the deficiency by telephone on November 2, 1979.

3.0 DEFICIENCY

The reactor containment crane wall is a reinforced concrete cylindrical wall, 106 ft. outside diameter, extending from the fourteen columns which support it at Elev. 714'-0" to top of wall at Elev. 815'-5". Its major functions are (1) to provide a support for the polar crane (2) to enclose one side of the three steam generator cubicles and the pressurizer cubicle (3) to provide radiation shielding for the annular area between it and the reactor containment exterior wall and (4) to support various piping, instrument, and electrical components. Its thickness varies from 2'-0" to 2'-9" with local areas further thickened in the vicinity of major pipe restraints. There are various doorways and openings through the crane wall and integral beams within the wall where required. Full or partial floor slabs frame into and are supported by the crane wall at elevations 718'-6", 738'-10" and 767'-10". Cubicle walls oriented approximately radially also frame into the crane wall. Below elevation 767'-10", these cubicle walls vary in thickness from 3'-0" to 3'-3". All of the major components in the reactor containment are located inside the crane wall with the annular area outside the wall being used for access and interconnecting these components.

The area of concern is located between horizontal construction joints at Elev. 755'-10" and Elev. 762'-5", in the crane wall between azimuths 97° and 134° (an arc length of about 34 ft.) and in the adjacent cubicle wall for a length of 10 ft. During the construction of this area, twenty-eight No. 11 vertical bars, approximately 20 ft. long, twenty No. 11 dowels, approximately 12 ft. long, and seventy-eight No. 4 shear bars, approximately 4 ft. long were omitted. The omission was discovered while preplanning placement of reinforcement for the area immediately above El. 762'-5".

#### 4.0 ANALYSIS OF SAFETY IMPLICATIONS

A review of the design in the area of the nonconformance was performed. The crane wall and cubicle wall sections that include the area where the reinforcing was omitted have been analyzed twice, once assuming the reinforcing as shown on the Engineers' drawings and once assuming the absence of the omitted bars. These walls were analyzed as a part of the elastic analysis of the pressurizer cubicle using the computer program STRUDL. The capacities of the walls for each case were determined in accordance with PSAR requirements.

The results of these analyses indicate that, with the absence of the omitted bars, the remaining reinforcing in this local area would be subject to design stress levels in excess of yield if subjected to one or more of the required loading combinations. Also, the design allowable shear stress carried by the concrete would be exceeded. With all reinforcing in place as shown on the Engineers' drawings, the design stresses remain within allowable limits under the applicable loads and required loading combinations.

A failure analysis was not performed. However, it was assumed that some degree of structural failure might occur under certain accident conditions if the omitted reinforcing were not in place.

#### 5.0 CORRECTIVE ACTION TO REMEDY DEFICIENCY

The dowels omitted from the section of cubicle will be mechanically (cadweld) spliced to the protruding vertical reinforcement. The concrete in the area of the crane wall where reinforcing was omitted will be removed as necessary and rebuilt, incorporating reinforcement equivalent to that originally shown on the Engineers' drawings.

Detailed procedures will be developed and/or revised as necessary to implement performance, inspection and documentation requirements relative to removal operations, replacement of reinforcement and embedments, and concrete placement.