

REPORT
ON
INSPECTION AND TESTING PROGRAM
FOR
CONCRETE EXPANSION ANCHORS
IN ACCORDANCE WITH
NRC IE BULLETIN 79-02 AND ITS REVISIONS
FOR
CONSUMERS POWER COMPANY
PALISADES NUCLEAR PLANT
SOUTH HAVEN, MICHIGAN

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Revision 0

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INTRODUCTION

This report covers the inspection and testing program pertaining to NRC IE Bulletin 79-02 (and its revisions) performed by Bechtel Power Corporation at the Palisades Nuclear Plant, South Haven, Michigan. This report consists of the following information:

- 1) Overview of NRC IE Bulletin 79-02, inspection and testing program
- 2) Results of the inspection and testing program (for interim plant operation), Attachment 1
- 3) Results and evaluation of tests on Phillips "Red Head" self-drilling expansion anchors, Attachment 2

OVERVIEW OF NRC IE BULLETIN 79-02

INSPECTION AND TESTING PROGRAM

The following is an overview of the work that has been done to satisfy the requirements of NRC IE Bulletin 79-02 relative to the Palisades plant.

Initially the program involved tension testing all of the accessible concrete expansion anchors to a value of twice the design capacity. Inspection was also required for such items as thread engagements, shoulder-to-cone dimensions, and sizes of holes. After completion of testing and inspection, repairs or replacements were generally made, where necessary, to ensure ultimate strengths of four or five times the allowable design capacities for wedge and shell type anchors. Because of the large sample tested and the excellent results of a low failure rate, it has been decided to discontinue tension testing of the anchors. However, a continuing effort is under way to inspect all remaining accessible anchors on piping 2-1/2 inches or larger, and testing is still continuing by use of an installation torque value. The majority of the anchors have been tested to date, and more detailed information is given in Attachment 1.

Several backup test programs have been performed at the jobsite. Extensive testing has been performed to determine the sensitivity of anchor capacity with respect to a variation of the shoulder-to-cone measurement. This testing, together with data obtained from other investigators, has led to information that was used to determine the ultimate anchor capacities and the allowable variation in shoulder-to-cone measurements. Another test program was performed to verify site-specific torque tension relationships for the various expansion anchor sizes used at the plant. A test program was also undertaken to determine the amount of relaxation after preloading. All of these tests are documented in detail in Attachment 2.

The overall program has illustrated a confidence level of 95%, that 95% of the anchors as originally installed could resist a load of twice the design capacity, and the majority could resist a load of five times the design capacity.

As part of NRC IE Bulletin 79-14 work, large piping is being reanalyzed, considering the as-built conditions. As the piping analysis is completed, the anchor bolts and base plates are re-examined to verify that the allowable design capacities are not exceeded. Any anchors not satisfying this requirement will be modified as needed. Information available to date indicates that only a small percentage will need modifications. Further details are given in Attachment 1.