

USNRC DEPT OF ENERGY

VIRGINIA ELECTRIC AND POWER COMPANY

RICHMOND, VIRGINIA 23261

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July 24, 1979

Mr. James P. O'Reilly, Director
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Serial No. 146/030879C
PSE&C/RHW, III:mac:wang

Docket No. 50-280

License No. DPR-32

Dear Mr. O'Reilly:

Our letter of June 4, 1979 (Serial No. 146/030879A) provided our initial response to I.E. Bulletin 79-02 "Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts." In this letter, we stated that an inspection program would be conducted for the seismic Category I systems. Our letter of June 8, 1979 (Serial No. 458) to Mr. Harold R. Denton included additional information on a sampling program. The initial program was based on using MIL STD 105D in conducting a statistical sampling plan to show that the anchor bolts were installed in accordance with the manufacturer's installation criteria. The program shows that the bolts are capable of performing their intended function although not installed in strict compliance with the manufacturer's criteria. Based on these findings, this letter provides an interim report on I.E. Bulletin 79-02, Revision I and includes the justification for operating Surry Unit 1 on an interim basis.

The results of the anchor bolt testing program show that the gross defects which prompted the issuance of the Bulletin were not present for Surry Unit 1. No structural failures of piping supports for safety equipment as found at Millstone Unit 1 were observed. The Bulletin states that "licensee inspection of anchor bolt installations at Shoreham has shown over fifty percent of the bolt installations to be deficient." The testing program conducted at Surry showed that 94.6% of the attributes described below were considered acceptable to ensure safe operation of the plant based on original design criteria.

The testing program conducted for Surry consisted of measuring the installation attributes for a sample of 200 Phillips Red Head Self-Drilling Anchors installed in the seismic Category I systems. Of the attributes measured it was considered that anchor size, initial tightness, thread engagement and a satisfactory proof load test were the attributes necessary to ensure proper performance of the anchor.

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The size of installed anchor bolts was checked against the original design criteria. It was found that 87% of the anchors were of the size indicated on the construction drawings. The remaining 13% of the anchor bolts and associated base plates consists of some base plates where the anchor bolt configuration is different from that shown on the drawings, and other base plates where the configuration is the same. When the as-built effort required by I.E. Bulletin 79-14 is implemented, subsequent reanalysis for full compliance with I.E. Bulletin 79-02 will be provided. For those base plates where the same number of anchor bolts were used but smaller anchor bolts were provided, the design factor of safety based on 3000 psi concrete is reduced from 4 to a minimum of 2 for tension and between 1.7 and 3.5 for shear depending on bolt size. We believe this factor is closer to 2 when the actual concrete strengths are considered.

Of the bolts, 96.5% had some initial tightness indicating that the base plate will not displace before being restrained and the load applied to the bolt. When the plant was constructed, there were no requirements for the bolt to be preloaded by the application of specified torque values. For the sleeve type anchors used, this is not as critical as it is for wedge type anchors where the torque is required to set the anchor.

Of the bolts checked, 98% had a thread engagement of at least 1/2 of the bolt diameter which is sufficient to withstand a load at least equivalent to the design allowable. Therefore, a thread engagement problem does not exist at Surry.

Bolts in the sample were proof torqued to a value equal to a minimum of 1.66 times the allowable tension design load based on 1/4 of the ultimate pull out value for 3000 psi concrete. We believe this factor is closer to 2 when the actual concrete strengths are considered.

Of the bolts proof loaded using the specified torque values, 94.5% were found to be acceptable. Some of the bolts which did not meet this criteria rotated in the hole and would not hold the required torque. Even though the shell turned when the bolt was torqued the bolts were recognized to have some capacity. To better determine how this affected the pull out capacity of the bolt, a test was conducted to compare the pull out capacity of properly installed bolts to those which had the shell turning. Those anchor bolts tested where the shell and bolt were turning together had some pull out capacity greater than the design allowable load. However, due to the limited scope of this test and the variation in results, the reduction in pull out capacity due to the shell and bolt turning together could not be quantified as a percentage of ultimate strength.

Subsequent to the issuance of I.E. Bulletin 79-02, "as-built" drawings of all seismic Category I piping systems and pipe supports are required by I.E. Bulletin 79-14. Considering the interdependency of these two Bulletins and the Order to Show Cause of March 13, 1979, Vepco has integrated the plan for achieving full compliance with both of these bulletins into the program described in Attachment 1 to our letter of June 4, 1979. This will ensure that the installed piping configurations are used to determine the anchor bolt loads which will be used in achieving full compliance with I.E. Bulletin 79-02.

Based on the adequacy of the bolts as demonstrated by the testing program and the seven previous years of operation without the extent of the gross anchor bolt failures as described in the Bulletin, it is felt that interim operation is justified until the steam generator replacement is implemented for Unit 1. More time would be available then to implement the steps necessary to achieve full compliance with I.E. Bulletin 79-02. The deficiencies observed during the sampling program indicate primarily that the safety factor above maximum design load was less than desired, not that the anchors are incapable of carrying design load.

Very truly yours,



W. C. Spencer
Vice President - Power Station
Engineering and Construction

cc: Mr. Victor Stello, Director
Office of Inspection & Enforcement

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation