TECHNICAL REPORT NO. CE-0017 REV. 0

SAFETY SYSTEM OUTAGE MODIFICATION INSPECTION

NRC FINDING MC-1

NORTH ANNA POWER STATION, UNIT 2

CIVIL ENGINEERING

POWER ENGINEERING SERVICES

VIRGINIA POWER

AUGUST 7, 1989

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1.0 INTRODUCTION

In February-March, 1989, NRC conducted design portion of the Safety System Outage Modification Inspection (SSOMI) for North Anna Power Station Unit 2.

One of the purposes of the design portion of the SSOMI was to examine the detailed design and engineering that were required to support modifications implemented during the outage. SSOMI was for reviewing planned plant changes and for ascertaining if the as-modified plant remained in accordance with its licensing basis.

NRC SSOMI team identified the following "significant" item:

"A change was made to a pipe support baseplate to enlarge the holes, without proper design justification. (See Appendix C Finding MC-1)."

A copy of the NRC report is attached. See Attachment 1.

2.0 SCOPE

The scope of this report is to document the review of 10 randomly sampled pipe support field change requests as desired by NRC in their finding MC-1. NRC wants VEPCO "to ensure similar problems with design verification are not pervasive." This report also explains the changes that are contemplated to ensure that an adequate design verification is performed for future modification.

Mr. C. A. Zalesiak reviewed NRC finding MC-1. His comments are appended. See Attachment 2.

3.0 METHODOLOGY

As directed by the NRC, 10 pipe support field change requests were randomly selected. See Attachment 3. These change requests were individually investigated. The resulting findings are documented as follows:

4.0 VERIFICATION AND RESULTS:

4.1 Design Change No. 84-71-1, Revision No. 61:

Paragraph 2.1 of the field change provides adequate engineering justification for the change. An examination of SWEC calculation no. 14938.02-NM(B)-451-JC and applicable design drawing no. N8471-1-1FV69A confirmed the adequacy of the justification. See Attachment 4.

4.1.1 Design justification is determined to be adequate.

4.2 Design Change No. 84-71-1, Revision No. 68:

An engineering evaluation was performed at the time of dispositioning the field change. The baseplate of the revised design is installed. However, no structure is attached to it. This design change has not been fully implemented. The calculation covering this FC is in progress and will be completed by the time the design change is closed out. See Attachments 5, 6 and 7.

4.2.1 Result

Design justification is determined to be adequate.

4.3 Design Change No. 87-13-1, Revision No. 13:

With the help of this FC, (8) pipe supports were added. The lines are non-safety and non-seismic and are small bore (2" dia.) lines. The pipe support locations were designed by keeping in mind the requirement of ANSI B31.1 code. The pipe supports were designed according to NAS-1009.

4.3.1 Result

Design justification is determined to be adequate.

4.4 Design Change No. 88-12-2, Revision No. 36:

This field change deals with (4) changes. The first change pertains to "damaged threads on the end of the bolt outside the nut." The evaluation of this modification is adequately described in the field change.

The second change relates to two maximum dimensions that were exceeded by 1" or less. This condition was analyzed by SWEC in their calculation no. 14938.50-NZ(B)-002-ZB, page 17. See Attachment 9. The analysis demonstrated that the change was acceptable.

The third change pertained to a tighter clearance in the lateral direction between the pipe and the restraining strap. Because the pipe is cold (design temperature = 150°F), lack of clearance does not affect the pipe support. There would be no thermal loads and no consequential frictional forces to contend with. The changed design is therefore, acceptable.

The fourth change involved rotating member no. 3 in order to accommodate the pipe slope. This was accomplished by interposing a plate between the two member no. 3. Because members are closed sections and interposed with a ½" thick plate that has been fillet welded all around, the change is acceptable.

4.4.1 Result

Design justification is determined to be adequate.

4.5 Design Change No. 88-12-2, Revision No. 18:

Evaluation of this change is documented in SWEC calculation no. 14938.50-NZ(B)-002-ZB page 2.10. See Attachment 9.

4.5.1 Result

Design justification is determined to be adequate.

4.6 Design Change No. 88-11-1, Revision No. 25:

This change in the structure is documented in SWEC calculation no. 14938.50-NZ(B)-004-ZB-010. See Attachment 10.

4.6.1 Result

Design justification is determined to be adequate.

4.7 Design Change No. 88-11-1, Revision No. 21:

This FC involved (3) changes. The first change related to the baseplate, which got distorted as a result of excessive heat of welding during installation. The baseplate "lifted up" around its periphery outside the bolt pattern. Discussions with SWEC representative, Mr. Gary E. Modzelewski, confirmed that there were no gaps between the back of the baseplate and the wall. Just to improve the aesthetics of the pipe support, shims were added along the top and bottom edges of the baseplate.

The second change had to do with using Hilti Kwik bolts of a bigger size than what had been specified. It was confirmed with SWEC representative that there were no other concrete fasteners near these bolts resulting in a reduction of the load carrying capacity of these bolts. Therefore, substituting the bigger bolts netted a higher load carrying capacity for the pipe support. This situation is acceptable.

The last change involved attaching a support no. H-28 to an existing restraint baseplate. The pipe support design is based on a generic SWEC standard. A review of their calculation no. 14938.50-NZB-004-ZB-003 (Attachment No. 13) confirmed the validity of the pipe support design. The attachment of the pipe support to pipe rupture restraint 1-RC-PRR-34 is documented in SWEC calculation no. 14938.50-S-4. See Attachment no. 11.

4.7.1 Result

Design justification is determined to be adequate.

4.8 Design Change No. 85-11-1; Revision No. 6:

This change pertained to (2) Hilti Kwik bolts out of a total of (4) specified. The change: the final embedment was 3½" as compared to 4" specified in the drawing.

SWEC calculation 14938.62-NZ(B)-003-ZB documents the use of Hilti Kwik Bolts with 3½". See Attachment 12.

4.8.1 Result

Design justification is determined to be adequate.

4.9 Design Change No. 89-01-3; Revision No. 1:

This change was concerned with using certain baseplates having over sized holes for anchor bolts. In order to conserve time and material, washers with the correct size holes were welded on top of the

baseplate, at the location of oversize holes in the baseplate. The engineering justification is recorded in the calculation CE-0629 R/0, sub calc. no. 15.

4.9.1 Result

Design justification is determined to be adequate.

4.10 Design Change No. 86-02-1; Revision No. 6:

The change and its engineering evaluation are well described in the FC.

4.10.1 Result

Design justification is determined to be adequate.

5.0 CONCLUSIONS

As documented in this report, a review of the 10 randomly selected field changes was conducted. The design justification, in some cases, was described in the body of the field change. In the remaining cases, the evaluations were either recorded in the calculations or could be reasoned out with a little effort. In all of the cases, the adequacy of the design justification was determined to be acceptable.

It is also concluded that in all the cases examined, the as-modified plant remained in accordance with its licensing basis.

However, in order to enhance the system, NDCM procedure no. 3.7, titled "Calculations," should be revised. It should not be adequate to just state "OK BY ENGINEERING JUDGMENT" or any such words. The revised procedure should ask for documenting the rationale behind any engineering judgment calls. There should be a clear documented traceability of the justification for "buy-offs" of field changes.

6.0 REFERENCES

Nuclear Design Control Manual, Procedure NDCM 3.11 Rev. 2 - Technical Reports.

7.0 ATTACHMENTS

1. NRC letter of 6/29/89 to Mr. W. R. Cartwright.
2. Mr. C. A. Zalesiak comments on NRC discussion of EWR 87-671.
3. Memorandum from Mr. J. E. Wroniewicz to Mr. C. E. Sorrell dated July 13, 1989.
4. Drawing no. N8471-1-1FV69A Rev. 9.
   SWEC Calculation 14938.02-NM(B)-451-JC
5. Memorandum from Mr. V. M. Bhargava to Mr. Bob Bain dated July 31, 1989.

6. Drawing no. N8471-1-M-64 Rev. 1.

7. Drawing no. 738941/841-M-54 Rev. 3.

8. SWEC calculation no. 14938.02-NP(B)-001-ZB Rev. 1, Change letter A.

9. SWEC calculation no. 14938.50-NZ(B)-002-ZB Rev. 0, Change letter A.

10. SWEC calculation no. 14938.50-NZ(B)-004-ZB-010 Rev. 0

11. SWEC calculation no. 14938.50-S-4 Rev. 0

12. SWEC calculation no. 14938.62-NZ(B)-003-ZB Rev. 0.

13. SWEC calculation no. 14938-NZB-004-ZB-003

14. Memorandum from Mr. V. M. Bhargava to Mr. Gary E. Madzelewski dated August 8, 1989.