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U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
REGION IV

Report No. 99900509/80-01 Program No. 51200

Company: Stone and Webster
Engineering Corporation
P. O. Box 2325
Boston, Massachusetts 02107

Inspection at: Boston, Massachusetts

Inspection Conducted: March 10-14, 1980

Inspectors: _____ _____
D. G. Anderson, Principal Inspector Date
Vendor Inspection Branch

Approved by: C. J. Hale 3-27-80
C. J. Hale, Chief Date
Program Evaluation Section
Vendor Inspection Branch

Summary

Inspection on March 10-14, 1980 (99900509/80-01)

Areas Inspected: Implementation of 10 CFR 50, Appendix B criteria in the areas of followup on regional requests. The inspection involved thirty-two (32) hours on site by one (1) USNRC inspector.

Results: In the areas inspected, no deviations or unresolved items were identified.

## DETAILS SECTION

(Prepared by D. G. Anderson)

### A. Persons Contacted

*R. W. Ackley, Assistant Project Engineer
*J. P. Allen, Chief Structural Engineer
J. A. Adam, Project Engineer
*R. B. Bradbury, Project Engineer
*N. B. Cleveland, Vice President, Quality Assurance
*R. E. Foley, Assistant Chief Mechanical Engineer
B. F. Jones, Senior Power Engineer
*B. J. Kiley, Lead Structural Engineer
J. E. Krechting, Lead Power Engineer
M. D. Lynch, Project Support Engineer
J. A. McGraw, Support Engineer
G. P. M. Milley, Lead Mechanical Engineer
T. C. O'Connor, Project Engineer
R. E. Roemer, Lead Mechanical Engineer
R. E. Vanasse, Supervisor, Radiation Protection
F. S. Vetere, Lead Geotechnical Engineer
R. P. Wessel, Chief Mechanical Engineer

*Indicates attendance at the exit meeting.

### B. Followup on Regional Requests

In this area of the inspection, three (3) regional requests related to items identified as 10 CFR 50.55(e) or as 10 CFR 21 reportable events and applicable to Stone and Webster were reviewed and evaluated by the inspector. Other items identified by Stone and Webster in problem reports and which could result in 10 CFR 21 reportable events were also reviewed and evaluated by the inspector for reportability. In reviewing these items, the inspector assured that the following objectives were accomplished:

1. Objectives

   a. Determination of how the item was identified.

   b. That followup actions were conducted under the requirements and procedures of the Stone and Webster Quality Assurance Program.

   c. Determination of the status of corrective action and preventive action to assure that the item is satisfactorily resolved.

d. Determination of the generic effects on other plants and notification of the affected utilities.

e. Determination of the accuracy, applicability, and timeliness of reporting to the NRC.

2. Method of Accomplishment

The inspector reviewed the following Stone and Webster procedures which establish the requirements that implement the activities related to the identification, evaluation, notification and reporting of items which are tracked in the Problem Report system:

QS-16.1, Stone and Webster Problem Report System, October 24, 1979.

QS-16.2, Notifying Clients of Potentially Reportable Deficiencies Under 10 CFR 50.55(e), October 31, 1979.

QS-16.3, Identifying and Reporting Defects and Failures to Comply Under 10 CFR 21, October 31, 1979.

EAP-16.1, Problem Report System, August 16, 1979.

EAP-16.2, Notifying Clients of Potentially Reportable Deficiencies Under 10 CFR 50.55(e), October 31, 1979.

EAP-16.3, Identifying and Reporting Defects and Failures to Comply Under 10 CFR 21, October 31, 1979.

Project Manual VEPCO, Project Procedure 1.13, Identifying and Reporting Defects and Failures to Comply Under 10 CFR 21, February 12, 1980.

The inspector verified the implementation of these procedures to assure that the following deficiencies meet the above noted objectives:

a. Omission of Orifices from Piping Diagrams

The inspector reviewed the following documentation related to this item:

(1) Sketch # 12179-P-P-515, Details of Flow Restrictor Rework, January 8, 1980.

(2) Problem Report dated December 14, 1979.

(3) Piping Drawing #12179-EP-107P-3, September 7, 1978.

(4) Flow Diagram #12179-FSK-27-3B, May 10, 1978.

(5) NES-21626, 10 CFR 50.55(e) Missing Flow Restrictor Orifice, Millstone Nuclear Power Station, Unit 3, January 23, 1980. (documents corrective and preventive action)

(6) AEC-MP3-205, Millstone Unit 3, Reporting of Deficiencies in Design and Construction, February 25, 1980.

(7) Telecopy dated 3/7/80, Drawing Corrections For Fabricated Spools, Stone and Webster to Northeast Utilities Service Company.

This item was identified by Millstone Unit 3 on January 25, 1980. This safety concern is that during a LOCA, caused by failure of downstream sample line, normal charging and makeup requirements would be exceeded. Stone and Webster reviewed all Milstone 3 piping diagrams and determined that 19 of 125 orifices (flow restrictors) had been omitted. The error occurred in the transfer of information from flow drawings to design drawings. Fourteen of the one hundred and twenty-five flow restrictors had been released for fabrication, but only five had been fabricated and required rework. Stone and Webster has corrected all piping diagrams and all fabrication drawings will be corrected by April 30, 1980. Generic review is presently in progress and is expected to be completed by April 30, 1980.

b. Overstress Condition-Component Cooling Water System Piping

The inspector reviewed the following documentation related to this item:

(1) IPR 50469, NRC IE Bulletin 79-14, which includes Design Change Request 79-574, November 19, 1979.

(2) PR-P-120, Incorrect Weight for Swing Check Valves, Bulletin 79-04, February 4, 1980 and October 24, 1979.

(3) 11715-MSK-118C5-5, Stress Load Summary, June 18, 1979.

(4) 11715-MSK-118C1-9, Isometric Drawing - Component Cooling North Anna Unit 1.

This item was reported by VEPCO, North Anna Unit 1 on December 20, 1979, as a result of followup required by IE Bulletin 79-14. VEPCo had originally identified

problems with valve weights for Velan valves as a result of IE Bulletin 79-04, but did not address this problem generically to other vendors at that time. For those utilities for which Stone and Webster has responsibility and for which incorrect valve weights were identified, Stone and Webster has performed a reanalysis. The following systems (North Anna Unit 1) had valve weights where differences greater than 10% were identified:

Main Steam, Auxiliary Feedwater, Component Cooling, Safety Injection, Recirculation Spray, Decay Heat, Service Water, Quench Spray, Chemical and Volume Control, Fuel Pit Cooling, Containment Vacuum, Refueling Purification, Screen Wash, and Reactor Coolant.

Several lines in the Component Cooling System had to be provided with additional restraints or supports after analysis showed overstress conditions. Review and comparision of valve weights on drawings with actual weights resulted in 161 valves being either over or underweight by more than 10%. The 250/380 lb. butterfly valve reported by VEPCo required modification of the pipe supports on the line when analysis indicated an increase of 1500 to 2500 on support bolt pullout loads. Stone and Webster has completed all analyses, drawing revisions, and fabrication drawings for supports. At the last refueling for North Anna Unit 1, November-December 1979, all but two supports/ hangers/ lines had been modified. The resident NRC inspector reviewed and approved the modifications and North Anna Unit 1 is back at 100% full power. This item has been determined to be generic to other projects and is in the process of review, corrective action, etc., on those identified projects/systems.

c. Rock Anchor Design Error

The inspector reviewed the following documentation related to this item:

(1) NES 21391, Potential Reportable Deficiency-Service Building Substructure Millstone Unit 3, November 29, 1979.

(2) IPR 50561, Auxiliary Building Shear Wall Design, February 15, 1980.

(3) Engineering Assurance Audit Plan 39-4, Millstone 3 Structural-Concrete Calculations (Including Audit Report #29) February 9, 1979.

(4) P-5-2495, E&DCR Rock Anchor Addition on Service Building, November 2, 1979.

(5) Calculation C.7.67, Service Building Stability, January 26, 1979.

(6) Calculation C.7.155-180, Reanalysis Service Building Stability, November 8, 1979.

(7) Drawing 12179-EC-7A-7, Service Building Foundation, Floor, Walls, Tunnel, Plans and Details.

(8) NES-21807, Potentially Reportable Deficiency Service Building Substructure Millstone Nuclear Power Station Unit 3, February 20, 1980.

(9) Calculation C.35.1-192, Shear Wall Discontinuities in Auxiliary Building and Turbine Building.

This item was reported under the requirements of 10 CFR 50.55(e) by Millstone Unit 3 on January 3, 1980. A faulty assumption as to building stiffness (Service Building) had led to an insufficient number of rock anchors being included in the design. This item was identified by Stone and Webster as a result of an Engineering Assurance Audit. The utility was notified on November 29, 1979. This particular item is not generic to other plants, however, in the review of this problem, shear wall discontinuities were discovered in the auxiliary building and in the turbine building. A hold on concrete pouring was imposed at Millstone Unit 3. This item has been discussed with NRR/NRC and has been determined to be generic to other plants under the scope of Stone and Webster. Corrective action and preventive action on the rock anchor problem has been completed by Stone and Webster and this item is closed. Generic review and reanalysis on the shear wall discontinuity problem is in progress at Stone and Webster.

d. PWR Horizontal Feedwater Line Loads

The inspector reviewed the following documentation related to this item:

(1) PR-P-48, PWR Horizontal Feedwater Line Load Problem, including FSD-II-VRA-464 (NAW-2235) VEPCo North Anna-Water Hammer on Operating Plants in the S/G Feedwater Lines, July 9, 1974.

(2) NUREG-0582, Water Hammer in Nuclear Power Plants.

(3) NAS-12232, Main Feedwater Check Valve Transient Analysis, North Anna Unit 2, March 4, 1980.

(4) NSB-3521, Feedwater Line Fluid Transients. VEPCo North Anna Units 3 and 4, May 10, 1979.

(5) NSC-6449, Feedwater Line Fluid Transients, North Anna Units 3 and 4, March 15, 1979.

(6) NCS-4429, Feedwater Line Hydraulic Transients, North Anna Units 3 and 4, February 2, 1979.

(7) NBS-4790, Feedwater Line Water Hammer, August 15, 1979.

(8) Drawing 11715-FP-2A-13, Steam Generator Feedwater RC, September 13, 1976.

(9) Final Safety Analysis Report, VEPCo North Anna Units 1 and 2, Volume III, Amendment 41, Part B, Supplement, Comment 10.21.

(10) NUREG-0291, An Evaluation of PWR Steam Generator Water Hammer, June 1, 1976 - December 31, 1976.

This item was identified by Westinghouse after feedwater line cracks were noted inside of containment. It was determined that this problem results from a water hammer caused by lowering the level in the steam generator below the feedwater rings, filling the ring with steam, and then bringing cold feedwater back into the feedwater lines. Stone and Webster processed this item as a problem report and notified the affected utilities under their scope. Corrective action and preventive action as outlined by Westinghouse has been taken on all plants that are clients of Stone and Webster.

e. Refueling Water Storage Tank Overflow

The inspector reviewed the following documentation related to this item:

(1) NSC-2351, Refueling Water Storage Tank Level Instrumentation, August 6, 1973.

(2) Interoffice Memorandum, Problem Report RWST-Surry, October 23, 1974.

(3) PR-P-56, Refueling Water Storage Tank Overflow, January 15, 1975.

(4) NUS-7069, RWST Overflow Protection-Surry, July 23, 1974.

(5) Design Change 74-1, Refueling Water Storage Tank, January 24, 1974.

This item was identified at Surry Nuclear Plant in October 1974 and related to the accidental overflowing of the contents of the Refueling Water Storage Tank onto the surrounding ground. Originally, only level indicators were provided as instrumentation and since normal level is greater than 100%, the operator continued to fill and overflowed the Refueling Water Storage Tank. Corrective action involved additional level indicators with float alarms installed in the manway of the RWST.

f. Radiation Levels From Fuel Element Transfer Tubes

The inspector reviewed the following documentation related to this item:

(1) Calculation 12179-PR-210, Fuel Transfer Tube Shielding Inside Containment-Final, March 28, 1979.

(2) PR-P-111, Radiation Levels from Fuel Element Transfer Tubes, October 20, 1978.

(3) Calculation 12179-PR-210, Fuel Transfer Tube Shielding in Containment-Thickness Determination of Proposed Steel Blocks, July 18, 1979.

This item was reported by Trojan Nuclear Plant on April 5, 1978, and involved exposure of two individuals in Containment to 27.3 and 17.1 Rem. IE Bulletin 78-08 addressed this problem and was issued on June 12, 1978. Stone and Webster followed up on this item for clients who requested reanalysis of the shield design for the fuel element transfer tubes. The item results from inadequate shield design above the fuel element transfer tubes which results in dose rates of as much as 1000 Rad/hr at three feet from the tubes. These dose rates were found to exist from radiation streaming from the tubes during the transfer of irradiated fuel assemblies. Stone and Webster found this item to be generic to eleven (11) plants under contract, construction, or in operation.

3. Findings

In this area of the inspection, no deviations or unresolved items were identified.

C. Exit Meeting

An exit meeting was conducted with management representatives of Stone and Webster at the conclusion of the inspection on March 14, 1980. Those individuals indicated by an asterisk in section A of the Details Section of this report were in attendance. In addition, the following were also present:

F. B. Baldwin, Assistant Quality Assurance Manager
W. R. Curtis, Lead Engineer
E. P. Doherty, Supervising Engineer
W. M. Eifert, Assistant Chief Engineer
E. B. Fleming, Senior Program Administrator
P. A. Gagel, Program Administrator
A. P. Haller, Attorney
S. B. Jacobs, Chief Licensing Engineer
J. W. Kelly, Program Administrator
R. B. Kelly, Manager, Quality Assurance
W. J. L. Kennedy, Director of Engineering
D. T. King, Assistant Engineering Manager
E. B. Miczek, Senior Engineering Manager
F. J. Mulligan, Supervisor
L. D. Nace, Chief Engineer
J. S. Searway, Project Manager
P. A. Wild, Senior Engineering Manager

The inspector described the new direction that the Program Evaluation Section of the Vendor Inspection Branch is taking, ie., Quality Assurance Programs, Technical Inspections, and Reactive Inspections. The inspector indicated that this inspection was of the reactive nature and that the scope of the inspection was to follow-up on 10 CFR 50.55(e), 10 CFR 21, and problem reports. Management representatives present acknowledged the comments of the inspector related to the results of this inspection.