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Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038 609/339-4700
Thomas M. Crimmins, Jr. Vice President - Nuclear Engineering

JUL 24 1989
NLR-N89140

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

**EROSION/CORROSION INDUCED PIPE WALL THINNING
NRC GENERIC LETTER 89-08
SALEM AND HOPE CREEK GENERATING STATIONS
DOCKETS NO. 50-272, 50-311, AND 50-354**

Public Service Electric and Gas Company (PSE&G) hereby provides a response to your May 2, 1989 letter which requires verification that we have implemented, or plan to implement, a long term erosion/corrosion monitoring program.

PSE&G has instituted an erosion/corrosion monitoring program for Salem Units 1 & 2 and Hope Creek Unit 1 to preclude the potential for catastrophic failures. This program is formatted using the recommendations of the NUMARC Technical Subcommittee Working Group on Piping Erosion/Corrosion dated June 2, 1987 and related NRC comments dated June 12, 1987.

A review of the PSE&G erosion/corrosion monitoring program has verified that administrative controls are in place to assure the long-term implementation of this program. A discussion of our program is provided in the attachment to this letter.

Please contact us if you have any questions with regard to this transmittal.

Sincerely,

Attachment

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PDR ADDCK 05000272
PDC

ADD
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The Energy People

NLR-N89140

C Mr. J. C. Stone
Licensing Project Manager - Salem

Ms. K. Halvey Gibson
Senior Resident Inspector - Salem

Mr. C. Y. Shiraki
Licensing Project Manager - Hope Creek

Mr. G. W. Meyer
Senior Resident Inspector - Hope Creek

Mr. W. T. Russell, Administrator
Region I

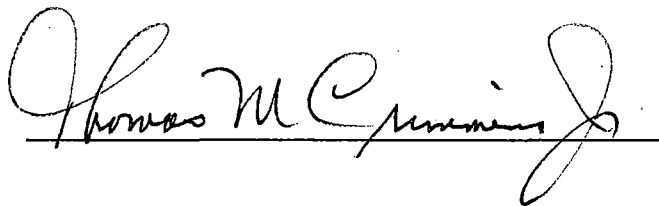
Mr. Kent Tosch, Chief
New Jersey Department of Environmental Protection
Division of Environmental Quality
Bureau of Nuclear Engineering
CN 415
Trenton, NJ 08625

REF: NLR-N89140

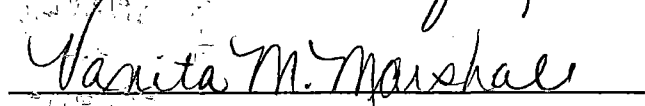
STATE OF NEW JERSEY)
) SS.
COUNTY OF SALEM)

T. M. Crimmins, Jr., being duly sworn according to law deposes and says:

I am Vice President - Nuclear Engineering of Public Service Electric and Gas Company, and as such, I find the matters set forth in our letter dated _____, concerning the Salem Unit Nos. 1 and 2 and Hope Creek Generating Stations, are true to the best of my knowledge, information and belief.



Subscribed and Sworn to before me
this 24th day of July, 1989



Notary Public of New Jersey

My Commission expires on _____
VANITA M. MARSHALL
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires May 6, 1993

ENCLOSURE

RESPONSE TO NRC GENERIC LETTER 89-08
SALEM AND HOPE CREEK GENERATING STATIONS
DOCKETS NO. 50-272, 50-311 AND 50-354

After the Surry catastrophic pipe failure of December 1986, PSE&G initiated wall thickness inspections of single-phase systems, such as, feedwater, condensate and heater drain piping at Salem Units 1 & 2 (Westinghouse PWRs). Hope Creek Unit 1 (GE BWR) had just started producing electricity in December 1986; therefore, no single-phase wall thickness inspections were performed.

All three plants had previously initiated a two-phase wall thickness inspection program in accordance with INPO SER 41-82. The Hope Creek readings were considered to be baseline data.

As a result of NRC Bulletin 87-01, a formal program was initiated at Salem Units 1 & 2 and Hope Creek Unit 1 to inspect certain systems for the erosion/corrosion phenomenon. The existing two-phase inspection program was subsequently incorporated into this program. An erosion/corrosion inspection is currently being performed during every refueling outage (RFO).

The guidelines for these inspections are incorporated in an engineering evaluation, which is formally issued by the Engineering and Plant Betterment Department (E&PB) to the erosion/corrosion team members. Each Station, Salem Unit 1, Salem Unit 2, and Hope Creek Unit 1, has their own unique program incorporated into a specific engineering evaluation.

Each engineering evaluation contains all of the locations to be inspected, the grid size and patterns for UT inspections, Code nominal wall thickness and Code minimum wall thickness. Construction/fabrication isometric drawings are reviewed by E&PB to select areas of highest concern and these areas are further reviewed against our EPRI generated CHEC computer program. The engineering evaluation and a marked up copy of the isometric drawings are then sent to the respective station where they are further reviewed by our on site system engineers and the inservice inspection (ISI) engineers. The total number of fittings selected for UT inspection after all reviews have been completed is about one hundred (100) per station unit.

The respective station ISI group is responsible for development of the UT inspection procedure. Outside contractors, qualified in accordance with ASNT Standard TC-1A, are used for the inspections. Evaluation of inspection data is performed by ASNT certified Level II or Level III inspectors. The data is further reviewed by the site systems engineer and ultimately by the E&PB piping engineer. Replacement pipe or fittings, if warranted, are upgraded to 2 1/4% chromium, 1% molybdenum (2 1/4 Cr, 1 Mo). Backing rings are not used and were generally not originally specified in the high energy systems inspected for erosion/corrosion.

The high energy systems inspected at Salem Units 1 & 2 are:

- Condensate
- Feedwater
- Heater Drains
- Steam Generator Blowdown
- Extraction Steam

The high energy systems inspected at Hope Creek Unit 1 are:

- Condensate
- Feedwater
- Heater Drains
- HPCI
- RCIC
- Extraction Steam

The grid patterns are permanently affixed to the intended inspection areas by paint stick for inspection repeatability and these locations inspected for a minimum of three (3) successive RFO. All of this information is included in the E&PB engineering evaluation, independently verified by the system engineer, and approved by the Nuclear Mechanical Engineering Manager.

Prior to the initiation of the erosion/corrosion monitoring program, PSE&G replaced several NSSS supplied carbon steel extraction steam nozzles at Salem Units 1 & 2. The replacement nozzles were upgraded to either 1 1/4 Cr, 1/2 Mo or 2 1/4 Cr, 1 Mo to match the connected pipe, which was originally specified, purchased and installed by PSE&G. Review and Root Cause Evaluations were made by a department metallurgist and material samples were sent to an independent laboratory to confirm material content and mode of failure.

Since embarking on our formal erosion/corrosion program, PSE&G has replaced the Salem Unit 1 & 2 Steam Generator Feed Pump recirculation piping from the recirculation control valve to the condenser from ASTM A106 GR. B carbon steel to ASTM P335 P22 (2 1/4 Cr, 1 Mo) piping. We will continue to monitor this piping to ensure the erosion problem has been eliminated in these areas.

During the same time period, PSE&G also replaced two (2) carbon steel 14 X 12 concentric reducers on Salem Unit 1 feedwater piping with 2 1/4 Cr, 1 Mo concentric reducers. Upon removal of the reducers, however, it was determined that the minimum wall thicknesses were attributed to initial faulty counterbores rather than the erosion/corrosion phenomenon.

At Hope Creek Unit 1, PSE&G replaced one (1) carbon steel 18 X 14 extraction steam eccentric reducer with 2 1/4 Cr, 1 Mo material. This wall reduction was also attributed to initial faulty counterboring. The identical sister train fittings were also inspected and no wall reduction was observed.

PSE&G has presently completed two (2) RFO erosion/corrosion inspections at Salem Unit 1 and one (1) each on Salem Unit 2 and Hope Creek Unit 1.