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SUBJECT: Forwards response to info requested in NRC Bulletin 87-001, "Thinning of Pipe Walls in Nuclear Power Plants." Plant piping originally designed & fabricated per ASA B31.1 Code for Pressure Piping - 1955 Edition.

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NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/301 PLAINFIELD ROAD, SYRACUSE, N.Y. 13212/TELEPHONE (315) 474-1511

September 14, 1987
(NMP1L 1087)

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Re: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63

Gentlemen:

Please find attached the information on Nine Mile Point Unit 1 as requested in "NRC Bulletin No. 87-01: Thinning of Pipe Walls In Nuclear Power Plants."

Very truly yours,

NIAGARA MOHAWK POWER CORPORATION

C. V. Mangan
Senior Vice President

GAG/pns
3690G/1
Attachment

cc: Regional Administrator, Region I
Mr. R. A. Capra, Director
Mr. R. A. Benedict, Project Manager
Mr. W. A. Cook, Resident Inspector

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	]	
	]	
Niagara Mohawk Power Corporation	]	Docket No. 50-220
	]	
(Nine Mile Point Unit 1)	]	

AFFIDAVIT

C. V. Mangan, being duly sworn, states that he is Senior Vice President of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

C V Mangan

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Onondaga, this 14th day of September, 1987.

Mary Frateschi
Notary Public in and for
Onondaga County, New York

My Commission expires:

MARY FRATESCHI
Notary Public in the State of New York
Qualified in Onondaga County No. 4797550
My Commission Expires June 30, 1989

NINE MILE POINT UNIT ONE

1. **Identify the codes or standards to which the piping was designed and fabricated.**

The Nine Mile Point Unit One plant piping was originally designed and fabricated in accordance with ASA B31.1 Code for Pressure Piping - 1955 Edition. All piping from the reactor vessel connections to the external isolation valves was designed and fabricated in accordance with ASA B31.1 - 1955 Edition, and ASME Boiler and Pressure Vessel Code Section I - 1962 Edition and Articles N460 to N469 of ASME Section III - 1965 Edition.

Subsequent piping modifications and additions were designed and fabricated in accordance with then applicable editions of ASME Boiler and Pressure Vessel Code, Sections III, XI, and ANSI B31.1 Power Piping, including the latest addenda.

2. **Describe the scope and extent of your programs for ensuring that pipe wall thicknesses are not reduced below the minimum allowable thickness. Include in the description the criteria that you have established.**

The Nine Mile Point Unit 1 Erosion-Corrosion Review Program has been expanded in scope to include our recently developed single-phase Erosion-Corrosion Review Program. This is an addition to our existing ongoing Two-Phase Flow Erosion-Corrosion Review Program established in 1981. The program's purpose is to review the material deterioration of piping systems transporting single and two-phase fluids.

The program reviews include piping system designs, as-built installations, testing and operating history.

The NUMARC Summary Report on Piping Erosion-Corrosion dated June 11, 1987 and other creditable publications (e.g. EPRI-CHECK, ANSI/ASME CODES, UTILITY REPORTS, UNIVERSITY RESEARCH REPORTS) are used as guidance documents in establishing sample selection, selection points, sample expansion, inspection techniques, measurement frequency and repair replacement decisions.

The guidance criteria being used are:

(a) Measurement Locations - The six attributes listed in Action Request Number 3 plus the additional attribute of steam quality for two-phase flow are considered in selecting review locations.

(b) Inspection Frequency - Inspection frequency is dependent upon material conditions, erosion-corrosion rates established and estimated meantime to minimum wall condition.

(c) Measurement Methods - Measurement Methods are dependent upon the established location and field conditions. R.T. or U.T. (internal/external) may be employed where initial review is planned. UT (external) may be employed where evidence or potential evidence of erosion-corrosion is present. Disassembly and actual measurements of wall thickness is also an available option.

(9327I)

(d) Repair/Replacement - Codes/standards compliance establishes the action taken. Our policy is to repair or replace piping which is below the Code/Standard minimum wall thickness allowable.

3. For liquid phase systems, state specifically whether the following factors have been considered in establishing your criteria for selecting points at which to monitor piping thickness.

Factors 3(a) through 3(f) stated in the Commission action item list are included in our program.

4. Chronologically list and summarize the results of all inspections that have been performed, which were specifically conducted for the purpose of identifying pipe wall thinning, whether or not pipe wall thinning was discovered, and any other inspections where pipe wall thinning was discovered even though that was not the purpose of that inspection.

4a. Briefly describe the inspection program and indicate whether it was specifically intended to measure wall thickness or whether wall thickness measurements were an incidental determination.

During 1979, 1981, 1984 and 1986 refueling outages, erosion-corrosion inspections were instituted to monitor the status of potentially susceptible piping systems for material deterioration. Their purpose was to identify pipe wall thinning caused by two-phase flow erosion and corrosion. In 1981 an erosion-corrosion review program for turbine cycle piping was developed by SWG Consulting Engineers and implemented by Niagara Mohawk Inservice Inspection (ISI) personnel. This program measures wall thickness for the wear effects of erosion-corrosion on the cold reheat, hot reheat and wet drain piping installed in Nine Mile Point Unit One.

These inspections are on record as part of the Nine Mile Point Unit One Inservice Inspection Program.

4b. Describe what piping was examined and how; (e.g. describe the inspection instruments, test method, reference thickness, locations examined, means for locating measurement points in subsequent inspections).

The following Nine Mile Point Unit One locations were examined during the 1981 turbine cycle erosion-corrosion program:

- Extraction steam piping to all feedwater heaters (1st through 5th).
- Extraction steam line drains.
- Turbine Building - Misc. steam piping, reheaters, air ejector, regulator and turbine bypass.
- Cold reheat steam to reheaters from high pressure turbine to moisture separators.
- Wetdrain lines.

During the Nine Mile Point Unit One 1984 and 1986 refueling outages, portions of the following systems were examined for pipe wall thinning:

- Main Steam Injection Lines
- Turbine Building Wet Drains
- Northwest and Northeast Moisture Separators
- Main Condenser Water Boxes
- Torus
- Feedwater Drain Piping to Condensers
- Main Steam Pipe Bends
- Reheater Drain Piping

Thickness examinations for the above listed locations were performed using ultrasonic pulse echo dual element transducer techniques applied to the outside surfaces (O.D.) of the pipe, fittings, and components. Each pipe, fitting, or component was ultrasonically examined in a "band" 360° around the circumference in at least three locations. The test equipment used consisted of two search units (i.e. 2.25 MHZ, .375" diameter, duel element and 5.0 MHZ, .250" or .375" diameter. Ultrasonic examination personnel were certified in accordance with ASNT, SNT-TC-1A, 1980 Edition.

The reference thickness used to compare against measured thickness is the nominal pipe wall thickness.

Subsequent inspections will be performed based on the results of benchmark or initial inspections. The locations and timing of subsequent inspections would be based on the predicted erosion-corrosion rates, calculated using the benchmark inspection data and related acceptance criteria.

4c. Report thickness measurement results and note those that were identified as unacceptable and why.

The 1981 Nine Mile Point Unit One pipe wall inspections yielded acceptable UT thickness measurements. All of the approximate two hundred locations examined had measurements which exceeded the calculated minimum wall code requirements of the system. The most susceptible locations of wall thinning indicated measurements between 10%-12% below nominal wall thickness. These measurements are acceptable per code allowable mill tolerances of $\pm$ 12-1/2% of nominal wall thickness. One measurement taken on a 10" extraction steam piping section to the 4th feedwater was 15% below nominal wall thickness. The code calculated minimum wall thickness for the 10" section is 0.117".

The thickness measurements performed during the 1984 and 1986 outages, as a part of the Inservice Inspection Program, exceeded the minimum wall requirements for the systems involved. Some discrepancies existed between the 1984 and 1986 data at various locations and the results were considered to be inconclusive. These areas will be re-examined during the 1988 outage.

The results of 1984 and 1986 inspections are given in the Nine Mile Point Unit One Inservice Inspection Reports.

4d. **Describe actions already taken or planned for piping that have been found to have a nonconforming wall thickness.**

Inspections of the wet steam drains in 1981 revealed some wall thinning at the two-inch elbows of the four (4) turbine stop valve lower seat drain lines. The action taken was to replace the piping and elbows. Monitoring of these installed materials has not produced any indication of material deterioration.

5. **Describe any plans either for reviewing the present or for developing new or additional programs for monitoring pipe wall thickness.**

The single-phase erosion-corrosion part of the Nine Mile Point Unit One Erosion-Corrosion Review Program has recently been developed and is currently being implemented. The first single-phase plant piping examinations are scheduled for 1988 refueling outage. Future refueling outages will include single and two-phase carbon steel piping wall thickness measurements. Additional plans will be dependent upon the results of the data obtained during the 1988 refueling outage.