



Niagara Mohawk Power Corporation
300 Erie Boulevard West
Syracuse, New York 13202

SECOND INSERVICE INSPECTION INTERVAL

THIRD INSPECTION PERIOD

**NUREG 0619 INSPECTION REPORTING
FOR
RPV FEEDWATER AND CRDRL NOZZLE
EXAMINATIONS - 1999 REFUELING OUTAGE (RFO-15)**

Prepared For

**Nine Mile Point Nuclear Power Station Unit 1
P.O. Box 63
Lycoming, New York 13093**

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Prepared by: *Edward L. Anderson*
NMP1 ISI Program Manager

Reviewed by: *Glenn R. Perkins*
Supervisor - ASME Section XI Programs

Approved by: *W. Yeager*
William Yeager - Branch Manager



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1.0 INTRODUCTION

This report provides the United States Nuclear Regulatory Commission (USNRC) staff with the results of the inspections performed at the Niagara Mohawk Power Corporation (NMPC), Nine Mile Point Nuclear Power Plant Unit 1 (NMP1), during the period from April 6, 1999 through June 16, 1999, during the Fifteenth Refueling Outage (RFO-15). NUREG 0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking" (November 1980), requires NMPC to submit a detailed report to the USNRC discussing the inspections of the Feedwater and Control Rod Drive (CRDRL) Return Line nozzles.

This report is required to be submitted within six months of completing an outage at which an inspection was performed and covers inspection activities which have occurred since the preceding report of the last outage (RFO-14), which ended on May 11, 1997.

2.0 BACKGROUND

NMP1 is a 620 Mwe Boiling Water Reactor (BWR) which began operation in November 1969 and has been in service for approximately 30 years.


During the 1977 Refueling Outage, NMPC removed the originally installed loose fit feedwater spargers and replaced them with an approved design (single-piston ring/flow baffle seal). The four (4) feedwater nozzles were ultrasonically (UT) examined from the reactor vessel exterior using procedures and techniques developed by General Electric (GE). The UT examination established a baseline for subsequent nozzle examinations.

As required by NUREG 0312, "Interim Technical Report on BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking," an inservice UT and dye penetrant (PT) examination of the four (4) feedwater nozzles was performed by GE during the 1979 refueling outage. No significant changes from the baseline examinations were observed. In addition, the Reactor Water Cleanup (RWCU) return line was rerouted to the feedwater lines.

In Niagara Mohawk's response to NUREG 0619, dated December 29, 1980, we committed to a program of periodic inspections of the feedwater and control rod drive return line nozzles. The feedwater nozzle UT inspection was to be performed every other refueling outage and the visual inspection (VT) of the feedwater spargers was to be performed every fourth refueling outage, commencing with the 1981 outage. The PT inspection of the feedwater and control rod drive return line nozzles was to be performed every sixth refueling outage or every 90 startup/shutdown cycles, whichever occurred first. The PT inspection intervals commenced with the 1979 refueling outage, during which the baseline feedwater nozzle PT inspections were made.

During the 1988 Refueling Outage (RFO-11), the NMPC Nuclear Quality Assurance Department generated Corrective Action Request 88.2039-01 to document and resolve discrepancies in previous outages' feedwater nozzle examination data. Also generated during the 1988 outage was the Restart Action Plan (RAP). One of the RAP specific issues addressed the lack of full volume coverage on feedwater nozzles as required by NUREG 0619. All of the corrective actions for both of these issues were identified and implemented during the 1988 outage. The 1988 UT examinations of the feedwater nozzles performed by the Nuclear Energy Services Company (NES) revealed indications that would require monitoring during the following refueling outage.

The UT examinations conducted during RFO 12 in 1993 of feedwater nozzle "A" were performed by General Electric Nuclear Energy (GE-NE). The results of these examinations were presented in NMPC's submittal

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of August 25, 1993 (NMP1L 0777) which indicated no recordable indications and resolved those indications identified in 1988 during RFO-11 as requiring additional monitoring.

Visual examinations (VT) of the feedwater sparger flow holes and welds in sparger arms and tees were performed by GE-NE during RFO-11 in 1988 and again during RFO-12 in 1993. These examinations indicated no reportable indications

By letter dated June 23, 1994(NMP1L 0820), NMPC informed the Commission, and provided technical basis for, utilization of the GE GERIS 2000 automated system (UT) for future examinations in lieu of performing a PT examination. This amended NMPC prior NUREG 0619 commitment. In letter dated January 12, 1995, the USNRC determined that it was acceptable to proceed with the described commitment changes and that NMPC would be advised of the final results of the USNRC review.

The inspections conducted during RFO-13 in 1995 were performed with the Ultrasonic (UT) examination method by GE-NE which indicated no reportable indications. These UT examinations utilized the GERIS 2000 automated system and manual UT pickups of the RPV nozzles on four (4) feedwater and the control rod drive return line nozzles.

The inspections conducted during RFO-14 in 1997 consisted of the Visual examination of the feedwater spargers in accordance with GE-NE procedure VT-NMP-200VO. The examinations were performed utilizing remote underwater television camera systems qualified with specific IVVI resolution requirements. The examination covered the general condition of the feedwater sparger, pipe, sparger welds, nozzle welds, flow holes, end bracket pins, tack welds and end bracket welds. No reportable indications were noted.

3.0 RESULTS OF EXAMINATIONS


During the 1999 refueling outage (RFO-15), an Inservice ultrasonic (UT) examination of the four (4) feedwater nozzles and the control rod drive return line nozzle were performed. The Ultrasonic (UT) examinations were performed by General Electric Nuclear Energy (GE-NE) and indicated no reportable indications (See Appendix C for Description of Ultrasonic Examination Procedure). These UT examinations utilized the GERIS 2000 automated system and manual UT pickups. All of these examination results have been reviewed and approved by a Niagara Mohawk Level III examiner. See Appendix A for Ultrasonic Examination Results Summary.

4.0 MODIFICATIONS AND SYSTEM CHANGES

NUREG 0619 requires licensees to report any additional system changes or changes in operating procedures that will affect feedwater flow or temperature. The effects of these changes are to be considered in predicting future cracking tendencies. There have been no modifications, system changes, or changes in operating since RFO-14 that will affect feedwater flow or temperature. See Appendix B for a history of modifications or system changes.

5.0 STARTUP/SHUTDOWN CYCLES

The feedwater and CRD return line nozzles have experienced 19 startup/shutdown cycles since the last inspection performed at RFO-14 and 190 startup/shutdown cycles since initial plant operation.

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6.0 LEAKAGE MONITORING


NMPC has not installed an on-line bypass leakage monitoring system at NMP1. The thermal sleeve design includes flow baffles that prevent mixing of the hot reactor water and colder feedwater in the nozzle annulus. NUREG 0619, Section 4.3.2.4 specifically exempts NMP1 from this requirement.

7.0 SUMMARY

The nondestructive examinations performed during the 1999 Refueling Outage, RFO-15, identified no reportable indications that will require monitoring in accordance with NUREG 0619. NMPC anticipates to continue utilizing an automated inspection method such as the GE GERIS 2000 for future outages.


TABLE 1

NUMBER OF STARTUP/SHUTDOWN CYCLES AT NINE MILE POINT UNIT 1		
PERIOD	NUMBER OF CYCLES	
	DURING PERIOD	CUMULATIVE
1969 Initial Startup 1977 Refueling Outage	95	95
1977 Refueling Outage 1979 Refueling Outage	13	108
1979 Refueling Outage 1981 Refueling Outage	17	125
1981 Refueling Outage 1983 Refueling Outage	2	127
1983 Refueling Outage 1986 Refueling Outage	14	141
1986 Refueling Outage 1987 Feedwater Transient Outage 1988 Refueling Outage	8	149
1988 Refueling Outage RFO-11 1993 Refueling Outage RFO-12	17	166
1993 Refueling Outage RFO-12 1995 Refueling Outage RFO-13	5	171
1995 Refueling Outage RFO-13 1997 Refueling Outage RFO-14	12	183
1997 Refueling Outage RFO-14 1999 Refueling Outage RFO-15	7	190

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8.0 REFERENCES

1. BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking, NUREG 0619, US Nuclear Regulatory Commission, November 1980.
2. NMPC commitment to implement NUREG 0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking", dated December 29, 1980.
3. NMPC Letter, D.P. Dise to R. C. Haynes, US Nuclear Regulatory Commission, dated January 4, 1982 (Subject: Inservice Inspection of Feedwater Nozzles and Spargers Performed During the 1981 Refueling Outage).
4. NES Letter, T. J. Koch to T. W. Roman, dated March 4, 1983, (Subject: February, 1983 Feedwater Nozzle Inner Radius Exams).
5. NES Letter, W. R. Downs to T. W. Roman, dated June 27, 1984 (Subject: April, 1984 Feedwater Nozzle Inner Radius Exams).
6. NMPC submittal to the USNRC, dated December 23, 1986, letter number NMP1L 0119 (Subject: 1986 RFO-10 Feedwater Nozzle Examination Results).
7. NMPC submittal to the USNRC, dated March 21, 1989, letter number NMP1L 0374 (Subject: 1988 RFO-11 Feedwater Nozzle Exam Results/NMPC Plans for Future Examinations and Evaluation of Identified Indications).
8. USNRC Letter, dated May 1, 1989, (TAC No. 72944) (Subject: Summary of April 18, 1989 Meeting to Discuss Feedwater Indications at NMP1).
9. NMPC submittal to the USNRC, dated May 5, 1989, letter number NMP1L 0394 (Subject: Feedwater Nozzle Indication Fracture Mechanics Analysis).
10. USNRC Safety Evaluation of Ultrasonic Test Indications in the Feedwater Inlet Nozzle "A" Near a Nozzle Safe End (TAC 72944), dated 09/26/89.
11. NMPC submittal to the USNRC, dated January 11, 1991, letter number NMP1L 0560 (Subject: 1988 RFO-11 Feedwater Nozzle Examination Results).
12. NMPC Internal Correspondence to UNIT 1 Licensing File from N. A. Spagnoletti, dated March 1, 1993, File Code 003631GG (Subject: Notes of Telecon with USNRC Regarding Feedwater Nozzle "A" UT Inspection).
13. NMPC submittal to USNRC, dated August 25, 1993, letter number NMP1L 0777 (Subject: 1993 RFO-12 Feedwater Nozzle "A" Examination Results).
14. NMPC Nuclear Engineering Report No. NER-IM-006 "Nine Mile Point Unit 1 Feedwater Nozzle Fatigue Evaluation," dated May 1994, (Reference MPR-1484, Revision 0).
15. NMPC Nuclear Engineering Report No. NER-IM-007 "Nine Mile Point Unit 1 Control Rod Drive Return Nozzle Fatigue Evaluation," dated May 1994, (Reference MPR-1485, Revision 0).

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16. NMPC submittal to USNRC, dated June 23, 1994, letter number NMP1L 0829 (Subject: Amend NUREG 0619 Commitment from PT to Automated UT Inspection).
17. USNRC Letter, dated January 12, 1995, (TAC No. M89792) (Subject: Amend NMPC's NMP1 NUREG 0619 Commitment utilizing the GERIS 2000 System for Automated UT Inspections).
18. NMPC submittal to USNRC, dated November 6, 1997, letter number NMP1L 1263 (Subject: NUREG 0619 Inspection Reporting for NMP1 Feedwater and CRDRL Nozzle Examination, 1997 RFO-14).
19. NMPC submittal to USNRC, dated September 4, 1998, letter number NMP1L 1357 (Subject: Notification of NMPC decision to modify its commitment as contained in letters dated June 23, 1994 (NMP1L 0829) and December 15, 1995 (NMP1L 1014). NMPC as an alternate proposed to conduct feedwater nozzle inspections using USNRC approved recommendations of BWROG Report GE-NE-523-A71-0594.
20. USNRC Safety Evaluation of alternative inspections regarding NUREG 0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking", dated February 5, 1999, TAC No. M89792).



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**APPENDIX A
 FEEDWATER NOZZLE INSPECTION RESULTS**


COMPONENT DESCRIPTION	OUTAGE YEAR	EXAM METHOD	RESULTS
Nozzle N4B	1977(1) 1979 1981(2) 1983* 1984* 1986(RFO10) 1988(RFO11) 1993(RFO12)1 1995(RFO13) 1999(RFO15)	UT, PT, VT UT, PT UT, PT, VT UT UT UT UT, VT VT UT AUT	NRI, NRI, NRI NRI, NRI 1 1/2"LONG X 3/4" DEEP GEOMETRIC, 8 SURFACE IRREGULARITIES, NRI 5 1/2"LONG X 0.8" DEEP AMPLITUDE INCREASE OF 30% DISPOSITIONED AS GEOMETRIC GEOMETRIC GEOMETRIC, NRI NRI NRI NRI
Nozzle N4A	1977(1) 1979 1981 1983* 1984* 1986(RFO10) 1988(RFO11) 1993(RFO12) 1995(RFO13) 1999(RFO15)	UT, PT, VT UT, PT UT, VT UT UT UT UT, VT UT, VT UT AUT	NRI, NRI, NRI NRI, NRI GEOMETRIC, WELD REPAIRED CRACK IN BRACKET PIN GEOMETRIC GEOMETRIC GEOMETRIC GEOMETRIC & NON-GEOMETRIC, NRI NRI, NRI NRI NRI
Nozzle N4C	1977(1) 1979 1981 1983* 1984* 1986(RFO10) 1988(RFO11) 1993(RFO12) 1995(RFO13) 1999(RFO15)	UT, PT, VT UT, PT UT, VT UT UT UT UT, VT VT UT AUT	NRI, NRI, NRI NRI, NRI GEOMETRIC, NRI GEOMETRIC ACCEPTABLE INCLUSION GEOMETRIC GEOMETRIC & ACCEPTABLE NON-GEOMETRIC, NRI NRI NRI NRI
Nozzle N4D	1977(1) 1979 1981 1983* 1984* 1986(RFO10) 1988(RFO11) 1993(RFO12) 1995(RFO13) 1999(RFO15)	UT, PT, VT UT, PT UT, VT UT UT UT UT, VT VT UT AUT	NRI, NRI, NRI NRI, NRI GEOMETRIC, NRI 2 NON-GEOMETRIC 25% FSH NRI GEOMETRIC GEOMETRIC, NRI NRI NRI NRI

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**APPENDIX A
FEEDWATER NOZZLE INSPECTION RESULTS**


COMPONENT DESCRIPTION	OUTAGE YEAR	EXAM METHOD	RESULTS
N9 Nozzle - Vessel	1977(1)	PT	NRI
	1979	UT	NRI
	1981	-	N/A
	1983*	-	N/A
	1984*	-	N/A
	1986(RFO10)	-	N/A
	1988(RFO11)	-	N/A
	1993(RFO12)	-	N/A
	1995(RFO13)	UT	NRI
	1999(RFO15)	UT	NRI

- Not required by NUREG 0619. Performed for information only. The 1983 Safe-End replacement outage is not considered a refueling outage by NMPC.
- NRI** No Reportable Indications
UT Ultrasonic Examination
PT Liquid Penetrant Examination
VT Visual Examination
(1) No reportable indications either before or after sparger replacement.
(2) Sparger pulled for evaluation of indications. New sparger installed.

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**APPENDIX B
MODIFICATION OR SYSTEM CHANGES
AFFECTING FEEDWATER FLOW OR TEMPERATURE**

- 1977 Feedwater nozzle cladding removed and spargers replaced with improved design.
- 1979 Reactor Water Cleanup return line rerouted to the feedwater line in accordance with 4.2 of NUREG 0619.
- 1981 Replaced southeast sparger after evaluation of UT indications.
- 1983 The feedwater low flow control valves were replaced with new valves designed to improve control at low flow conditions. In addition, a six-inch recirculation line was installed to provide improved flow control of the feedwater system. These modifications were previously described in our letter dated 09/08/81.
- 1984 In response to NUREG 0737, Action Item II.D.1, instrument and control equipment were installed to provide a high reactor level trip of the motor-driven feedwater pumps. In addition, the HPCI control system was modified to add annunciator alarms for loss of HPCI failure signal in standby mode.
- 1986 The following changes were made to improve the reliability of the feedwater system:
 - 1. Modified high level trip circuit seal in logic.
 - 2. Modified main flow valve lockup circuits to withstand momentary power interruptions.
 - 3. Modified logic to close 6-inch recirculation valve on pump start signal for runout protection.
 - 4. Modified logic to close low flow control valves on HPCI initiation.
- 1988 No additional modifications or system changes that affect feedwater flow or temperature
- 1993 Turbine driven feedwater pump flow control valves were replaced by a single flow control valve; this change had no affect on feedwater flow or temperature.
- 1995 No additional modifications or system changes that affect feedwater flow or temperature.
- 1997 No additional modifications or system changes that affect feedwater flow or temperature.
- 1999 No additional modifications or system changes that affect feedwater flow or temperature.

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APPENDIX C
DESCRIPTION OF ULTRASONIC EXAMINATION PROCEDURES

A. Nuclear Energy Services (NES) Procedure

The NES feedwater nozzle UT examination procedure was first used at Nine Mile Point Unit 1 in 1981. This procedure divided the nozzle inner radius and bore surfaces into two zones. NES Zone 1 examinations are performed from the reactor vessel shell; NES Zone 2 examinations are performed from the nozzle barrel. NES Zone 1 and Zone 2 examinations overlap at the inside radius surface of the nozzle.

Examinations performed from the reactor vessel shell are performed by attaching a specially designed lucite wedge, which conforms to the reactor vessel outside radius, to an ultrasonic transducer such that the longitudinal beam angle is fixed.

Examinations performed from the nozzle barrel are performed using compound angle beam shear wave techniques. In this case, a number of specially designed fixed compound angle lucite wedges which conform to the outside radius of the nozzle barrel are used.

In 1988, additional scans and scanning angles were used on the safe-end core, nozzle bore, and the inner radius to ensure optimal interrogation of the required volumes.

Recording criteria was updated for more uniformity when comparing data from each outage. A new template was designed and built to facilitate shell-side exams.

B. General Electric (GE) Examination Procedure

The GE feedwater nozzle UT examination procedure was used for the 1977 baseline and the 1979 inservice inspections at NMP1. This procedure divides the nozzle inner radius and bore surfaces into three zones.


The GE Zone 1 examination is performed by attaching an ultrasonic transducer to a specially designed lucite wedge, which conforms to the reactor vessel outside radius, such that the longitudinal beam angle and the circumferential beam angle are fixed.

The GE Zone 2 examination is performed by attaching an ultrasonic transducer to a specially designed lucite wedge, which conforms to the outer diameter blend radius of the nozzle, such that the longitudinal beam angle and the circumferential beam angle are fixed.

The GE Zone 3 examination is performed by attaching an ultrasonic transducer to a specially designed lucite wedge, which conforms to the outside radius of the nozzle barrel, such that the circumferential beam angle are fixed.

C. Niagara Mohawk Power Corporation (NMPC) Examination Procedure

NMPC's NDE Examination Procedure (No. NDEP-UT-6.07) was used to ultrasonically examine nozzle "A" (N4A) Zones 1, 2, 3, and 4 during the 1993 refueling outage (RFO-12). This procedure utilized manual techniques and equipment which are similar and equivalent to those used by NES during the 1988 refueling outage (RFO-11). The ultrasonic techniques employed are the same as those used for the RFO-11 examinations, other than, the calibration standard was modified to include Code allowable 10% notches as well as the previously used 5% notches for the safe-end bore examination. These examinations were performed by General Electric Nuclear Energy (GE-NE) personnel.

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D. Description of GE-NE GERIS-2000 Automated UT Inspection System (RFO-13)

The GERIS-2000 UT Imaging System is an automated ultrasonic data acquisition and imaging system. Automated scanners interfaced to the GERIS-2000, moved UT transducers radially and circumferentially around the outside surface of the nozzle and adjacent surfaces of the safe-end and reactor pressure vessel. UT data was collected and stored in digital format. The complete RF waveform was digitized and recorded on optical disks for analysis.

The GERIS-2000 UT subsystem is a multiplexed logarithmic UT flaw detection instrument. For each channel, the complete RF A-scan was digitized and stored on optical disks. The system stores the RF signal in logarithmic format that has an instantaneous dynamic range that is greater than 85 dB. The logarithmic UT system allows the recording of the peaks of low and high amplitude UT signals at the same time without clipping UT signals, such as would occur with linear systems that have an instantaneous dynamic range generally less than 45 dB.

The analysis of the GERIS-2000 data utilized advanced interactive color graphics to evaluate and assist in characterizing indications from service, fabrication and geometric related UT reflectors. Coordinated A-, B-, C-, volumetric side-view-, volumetric end-view-, and 3D- scans are provided on a high resolution (1280 by 1024 pixels) color display. Several channels may be displayed at one time to correlate indications from different channels. These graphic displays have an adjustable color scale that provides the best resolution of flaw detection and characterization down to the material noise.


NMPC submittal of June 23, 1994 [Reference #13] included Enclosure 1, Section II, "Ultrasonic Inspection Techniques", which provided a description of the GERIS UT techniques, UT instrumentation and scanning equipment in detail.

Amplitude-based recording and reporting criteria is not used with the GERIS-2000 for nozzle inner radius and bore examinations. All UT data is recorded and evaluated. Any UT data that has signal-to-noise ratios of greater than 2-to-1, has echo-dynamic characteristics of cracking and can be confirmed from 2 directions or accompanied by tip-diffracted signals are called cracks.

The GERIS-2000 system is capable of detecting and sizing axial flaws 0.250 inches or less in depth in feedwater nozzle inner radius and bore regions. The capability of the GERIS-2000 system for defect detection and sizing was demonstrated and included in NNMPC submittal June 23, 1994 [Reference #13] in Enclosure 1, Section III, "Ultrasonic Technique Qualification Plan", which provided a detailed description of EDM notches and fatigue-crack implants that are used to demonstrate the capability of the GERIS-2000 system.

When obstructions limited automated scanning coverage, supplemental manual examinations were performed. In both cases, full ID coverage was obtained from at least one direction. When automated scanning cannot be performed from both directions, manual techniques utilizing the same techniques as the automated examinations were used. The entire ID surface of zones 1 through 5 (see Figure 1 below) were examined for axial flaws from at least 1 direction with either automated or manual techniques. Areas examined were fully documented in the inspection results.

The method used to ensure that the NMP1 feedwater nozzles are examined with equivalent techniques is through the use of modeling. The modeling used was where the UT beam paths are predicted using ray tracing algorithms with predetermined beam angle parameters. The beam paths are used to determine the incident angles of the beam on the ID surfaces. The incident angles of the UT beam on the ID surfaces used on the NMP1 feedwater nozzle were comparable to the GE qualification mockups. Multiple angle-beam transducers designed from "as built" and fabrication were used to fully examine zones 1 through 5.

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E. Revised Commitment NUREG 0619 – BWR Feedwater and Control Rod Drive Return Line (CRDRL) Nozzle Cracking, Generic Letter 81-11 and GE NE-523-A71-0594

USNRC Generic Letter 81-11 forwarded NUREG 0619 and corrected a footnote in the guide. This regulatory guide describes the technical issues associated with the discovery of cracking in feedwater nozzles and control rod drive return line nozzles. The NUREG also describes technical studies and analysis performed by the General Electric Company and the USNRC staff, the staff's technical positions based on these studies, and the staff's requirements for licensee implementation of the technical positions.

NMP1 initial response, dated December 29, 1980, committed to a program of periodic ultrasonic examinations every other refueling outage, visual inspections of the Feedwater spargers every fourth refueling outage, and liquid penetrant examinations every sixth refueling outage or every 90 startup/shutdown cycles, whichever ever occurs first. Subsequent responses amended the examination methods and included the use of the General Electric Nuclear Energy (GE-NE) GERIS 2000 automated System (UT) in place of performing dye penetrant examinations. The USNRC, in their letter dated February 5, 1999, accepted the examination program submitted in the NMPC latest submittal, dated September 4, 1998. This submittal identifies the NMP1 commitments for the Refueling Outage (RFO-15) and the third inservice inspection interval, and summarized as follows:

The USNRC, in a letter dated June 5, 1998, forwarded the safety evaluation that accepted, with modifications, the Boiling Water Reactor Owners Group (BWROG) report GE-NE-523-A71-0594, "Alternate BWR Feedwater Nozzle Inspection Requirements." Subsequently, in the September 4, 1998 NMPC letter, NMPC revised its commitment for NMP1's feedwater (FW) and control rod drive return line (CRDRL) nozzle inspections. The revised commitment for the FW nozzle inspections would be in accordance with the BWROG report GE-NE-523-A71-0594, dated October 1, 1995, subject to the modifications in the related USNRC safety evaluation report dated June 5, 1998.

Control Rod Drive Nozzles

Also in the September 4, 1998 letter NMPC revised its commitment for CRDRL nozzle inspections by replacing periodic liquid penetrant (PT) with less frequent ultrasonic testing (UT). The examination techniques will be in accordance with the requirements of ASME Code using the GE GERIS-2000 system to perform contact pulse-echo UT examinations. The GERIS-2000 system inspection is performed with sensitivity for detecting flaws that is more sensitive than ASME Code requirements. These revised inspections were accepted by the USNRC in the February 5, 1999 letter.

Feedwater Nozzles

The following is the list of modifications in the USNRC safety evaluation report, Section 5.0, which modify the requirements in the BWROG report:

1. The UT techniques should have the ability to reliably detect axially oriented flaws from a depth equal to 0.25 inches for each of the Zones 1 through 3 and axially and radially oriented flaws in the area of the nozzle-to-safe end welds located in Zone 5 (Figure 1). The nozzle-to-safe end butt weld in Zone 5 is required to be inspected according to paragraph IWB 2500-1 of the ASME Code.
2. The PT may be eliminated from FW nozzle examinations, provided that the UT techniques satisfy the requirements of the 1986 or later approved editions of ASME Code or the objectives of Appendix VIII. UT techniques that do not satisfy the 1986 or later approved editions of ASME Code or the objectives of Appendix VIII shall follow the PT frequency shown in Table 2.

3. The automated UT (gated peak threshold recording) multiplication factors shall be those shown for manual UT in Table 3, Method 1. Automated UT (gated peak threshold recording) techniques qualified according to the objectives of Appendix VIII may use multiplication factors in Table 3, Methods 2 or 3.
4. The automated UT (no threshold recording) multiplication factors in Table 3, Method 3 are adequate, provided that the UT techniques are qualified according to the objectives of Appendix VIII.
5. The inspection of Zone 3 shall be at the same frequency as Zones 1 and 2, except that licensees using triple sleeve with double piston ring design sparger may follow the proposed inspection frequency for Zone 3, but not less than one inspection every ASME Code interval.

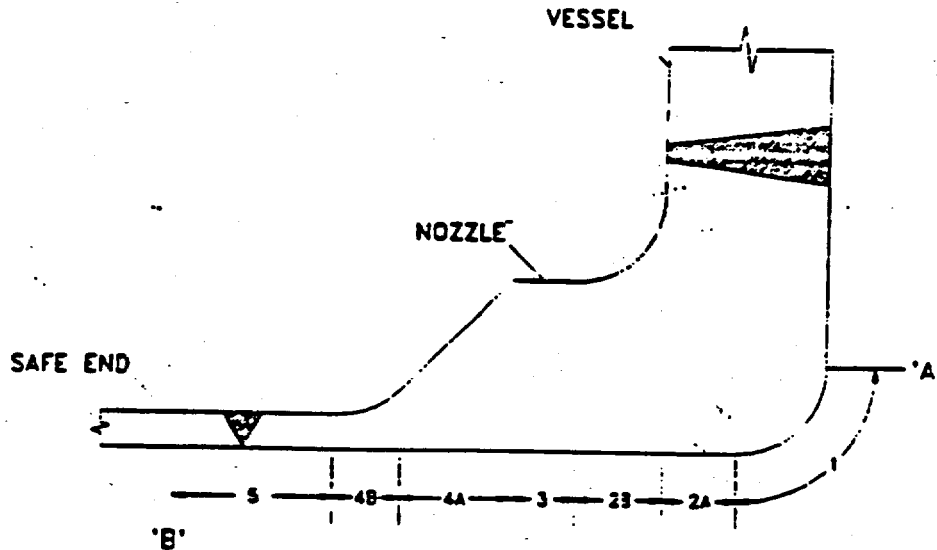
Table 2 Routine Inspection Intervals Refueling Cycles			
Configuration	UT	Visual Inspection of Sparger	Routine PT
Nine Mile Point has clad removed, significantly modified spargers have been installed)	Calculated in table 2	4	May be eliminated, Ultrasonic examinations are performed in accordance with PDI and the intent of Appendix VIII of the Code.

Table 3 Feedwater Nozzles/Sparger Inspection Recommendations (1)				
Thermal Sleeve/Sparger Design Configuration	UT Inspection Interval Factor (2) for Zones 1 and 2			Visual Inspection of Sparger (4)
	Method 1 (3)	Method 2 (3)	Methods 3 and 4	
Oyster Creek and Nine Mile Point 1 (unclad nozzle)	0.10	0.17	0.33	4

- Notes: (1) The inspection interval is to begin at the time when a qualified inspection plan that meets the requirement of this report is established and implemented. The need for routine PT exams is eliminated.
- (2) For each inspection configuration, the maximum inspection interval is defined by a fraction of the time until a 0.25 inch or greater depth crack reaches the appropriate allowable value, as obtained from a plant-specific fracture mechanics analysis following the recommendations of Section 5.6 of this report. For example (when Method 3 is used):
- Sparger Design = Triple Sleeve
Fracture Mechanics Result = 0.25 inch crack grows to allowable depth in 30 years
Required UT Inspection Interval = allowable time x Factor
= 30 x 0.33 = 10 years
- For Zones 1 and 2, in no case shall the maximum allowable time between inspections exceed 10 years. For Zone 3 the inspection intervals can be twice the value

recommended for Zones 1 and 2. The inspection frequency is not required to be more often than every second cycle regardless of interval factor.

- (3) The UT methods are defined as follows:
 - Method 1 = Manual
 - Method 2 = Automated, Threshold Recording
 - Method 3 = Automated, Full RF Recording (No Threshold)
 - Method 4 = Phased Array (No threshold)
- (4) Visual inspection of flow holes and welds in sparger arms and sparger tees. These requirements are the same as those specified in NUREG-0619.



**Figure 1
 FEEDWATER NOZZLE EXAMINATION ZONES**



Nine Mile Point Nuclear Power Station
Unit 1
SECOND INSERVICE INSPECTION INTERVAL

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