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50-220

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A. Schwencer
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NRC Participants
ACRS (16)
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J. R. Buchanan
D. Thompson

MEMO 4

DISTRIBUTION:
See attached list

JUL 6 1977

MEMORANDUM FOR: G. Lear, Chief, Operating Reactors Branch #3, DOR

FROM: S. J. Nowicki, Project Manager, Operating Reactors Branch #3, DOR

SUBJECT: MEETING ON NINE MILE POINT UNIT NO. 1 FEEDWATER NOZZLE INSPECTION AND REPAIR, JUNE 3, 1977

Introduction

A meeting was held on June 3, 1977 with representatives of Niagara Mohawk Power Corporation (NMPC) and NRC to discuss the results of the Feedwater Nozzle Inspection and Repair program completed by NMPC during their current refueling outage at Nine Mile Point Unit No. 1 (NMP-1). NMPC was asked to address five basic questions included in enclosure 1. NMPC provided a written outline (enclosure 2) of their presentation. Their presentation addressed all of the five questions presented by the staff. The staff requested and received several documents used by NMPC during their presentation. These documents listed in enclosure 3 were transmitted to the DOR engineering branch for final review of the nozzle reinforcement calculation.

After we receive the NMPC written report, we will need to set a requirement for a reinspection interval to assure that cracks doenot reappear in the deep grindouts.

A list of the attendees is given in enclosure 4.

Original signed by

Stanley J. Nowicki, Project Manager
Operating Reactors Branch #3
Division of Operating Reactors

Enclosures:
1. Feedwater Nozzle and Control Rod Drive Return Line Nozzle Inspection Program Questions
2. Outline of presentation
3. Documents used by NMPC in their presentation

not required
final conclusions were removed
SJN 7/5/77

*SEE PREVIOUS YELLOW FOR CONCURRENCE

OFFICE➤	ORB#2	EB	ORB#3 SJN			
SURNAME➤	*RSnaider	NRandall	SNowicki:acr			
DATE➤	6/ 28 /77	7/ /77	7/ 5 /77			

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As a result of our review of the Feedwater Nozzle Inspection and Control Rod Drive Return Line Nozzle Inspection program we agree with NMPC's findings that the inspection and repair program does not invole an unreviewed safety question.

A list of the attendees is given in enclosure 4.

Stanley J. Nowicki, Project Manager
Operating Reactors Branch #3
Division of Operating Reactors

Enclosures:
1. Feedwater Nozzle and Control Rod Drive Return Line Nozzle Inspection Program Questions
2. Outline of presentation
3. Documents used by NMPC in their presentation

OFFICE	ORB#2	EB	ORB#3			
SURNAME	RSnaider	NRandall	SNowicki:acr			
DATE	6/ 28 /77	6/ /77	6/ /77			

[illegible]

ENCLOSURE 1

JUNE 3, 1977 MEETING
FEEDWATER NOZZLE AND CONTROL ROD DRIVE RETURN
LINE NOZZLE INSPECTION PROGRAM FOR NINE MILE POINT UNIT NO. 1

Meeting Purpose:

To discuss results of FWN and CRD return line nozzle inspection and repair program performed during spring outage of 1977.

Questions to be Answered:

1. What effect has deep crack removal had on nozzle integrity?

   a. Has the reinforcement limit been exceeded?

   b. What are the details of final nozzle configuration?

   c. What, if any, fatique analysis has been done on existing nozzles?

   d. Will deep cavities interfere with sparger operation?

2. What discussion can be presented concerning operation of new sparger design?

   a. Will new sparger inhibit any new propolgation of cracks?

3. Why did NMPC think that the deep cracks in the SE & SW nozzle had been removed only to find them later? Is there assurance that other cracks have been completely removed?

4. What results have been obtained for future UT exams? Anything of value learned?

5. What were results of CRD return line nozzle inspection? How large an area was actually examined? What are results?

June 2, 1977

FEEDWATER NOZZLE PROGRAM

I. Historical Outline

A. All old spargers removed

1. Rectangular box design

2. No evidence of damage or failure

3. Preload of arms was apparently still effective

B. SE nozzle PT'd and UT'd with clad in place. Only clad portion of nozzle was PT'd. See Table 1 for results.

C. Clad plus nominal 3/16-inch base metal removed.

D. All nozzles PT'd after machining completed. See Table 1 for results.

E. Defects ground out. Blending was deferred until later time after sparger fitup.

F. Spargers were fit up with dummy thermal sleeves.

G. Sparger parts final machined and thermal sleeves welded on.

H. In parallel with G, above, nozzle defect cavities were ground to obtain required blend.

I. Final acceptance PT exam was performed.

J. Sparger trial fit with thermal sleeves and flow shrouds in place.

K. Sparger thermal sleeves deformed to elliptical shape, piston rings installed.

L. Spargers installed.

II. Final Machined Nozzle Configuration

III. Evaluation of Repair Cavities - See Table 2

IV. Final Installed Sparger Configuration

V. Control Rod Drive Nozzle Examination

TABLE 1

SUMMARY OF EXAMINATION RESULTS

A. Before Clad Removal Machining

	SE	SW	NE	NW
Number of significant linear indications -	Over 25	NA	NA	NA

Note: Only clad portion of nozzle was examined.

B. After Clad Removal Machining

	SE	SW	NE	NW
Number of linear indications -	5	1	0	0

C. Final Cavity Sizes after Defect Removal

	SE	SW	NE	NW
Number of cavities -	4	1	0	0
Maximum length of cavity -	10.62	9.62	---	---
Maximum depth of cavity -	1.47	1.30	---	---

TABLE 2

EVALUATION OF DEFECT CAVITIES

Criteria

Cavities are acceptable per Section XI, IWB-4300, provided:

- Vessel and nozzle minimum wall thicknesses are met.
- Nozzle reinforcement requirements are met.
- Cavities are blended such that the fatigue life of the nozzle is acceptable.

Results

A. Nozzle Wall Thickness

- No cavities which infringe on vessel wall.
- Minimum nozzle wall thicknesses for worst defect is $\geqslant 3.0$ in. Minimum required thickness is 0.3 in.

B. Nozzle Reinforcement

	Required Area (in^2)	Available Area (in^2)	Excess (in^2)
Before clad removal	55.1	78.8	23.7
After removal of clad and 1/4" base metal	57.7	75.8	18.1
Area available per side of nozzle for defect removal (in^2) -			9.05
Largest cavity area in any plane (in^2) -			6.50
		Excess	2.55

C. Blending Requirements

Blend all cavities smoothly into surrounding base metal. Main criteria is that radius at bottom of cavity be ≥ depth of cavity.

For lartest cavities, blend results are:

	SE	SW
Depth (in.) -	1.47	1.30
Minimum required radius (in.) -	1.47	1.30
Actual minimum radius (in.) -	1.50	1.50

Conclusion: All requirements are met.

NOTE:

1. Worst cavity locations are in nozzle bore, not in blend radius where peak stresses occur. (These peak stresses were used for analysis.) Actual peak stresses at location of deepest cavity are no more than 80% of values in blend radius area.

2. Average primary hoop stress due to pressure at location of maximum defects is ~ 5300 psi.

ENCLOSURE 3

DRAWINGS AND DOCUMENTS TRANSMITTED DURING THE JUNE 3, 1977 MEETING

	Document	Number	Title
1.	MPR Drawing	SK-1083-60-526 Sheet 1, Rev o	Defect Removal Evaluation Nine Mile Point Unit No. 1 FW Nozzle (S. W. Nozzle)
2.	MPR Drawing	SK-1083-60-525 Sheet 1, Rev 1	Defect Removal Evaluation Nine Mile Point Unit No. 1 SE. FW Nozzle
3.	MPR Drawing	1083-60-02 Rev F Sheets 1 & 2	Feedwater Sparger Details Assembly & Installation
4.	Xerox at E-231-566		Feedwater Nozzle Assembly
5.	Hand Drawing	From John Johnson MPR To Dick Wood NMPC	Contour Geometry for Crack at 1 O'clock in SE Nozzle
6.	Inspection Report	4577-050 6/1/77 13 pages	Measure and documentation the final configuration of the Nozzle after blending

ENCLOSURE 4

ATTENDEES
JUNE 3, 1977 MEETING

Name	Organization
S. J. Nowicki	NRC
R. E. Johnson	NRC
G. A. Walton	NRC
R. P. Snaider	NRC
R. W. Klecker	NRC
J. Crooks	NRC
F. Clemenson	NRC
W. Hazelton	NRC
G. Lear	NRC
R. M. Wood	Niagara Mohawk Power Corp.
Bill D'Angelo	Niagara Mohawk Power Corp.
T. V. Perkins	Niagara Mohawk Power Corp.
John Johnson	MPR Assoc. Inc.
W. R. Schmidt	MPR Assoc. Inc.
R. E. Schaffstall	GE
Frank Hill	Combustion Engineering
Jim Bass	Combustion Engineering