Niagara Mohawk®

March 31, 2000
NMP2L 1949

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

RE: Docket No. 50-410
LER 00-03

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i)(B), we are submitting Licensee Event Report 00-03, "Pre-outage Review of Previous Outage Inspection Data on Feedwater Nozzle to Safe-end Weld Revealed an Indication".

Very truly yours,

Michael F. Peckham
Plant Manager - NMP2

MFP/SHC/tmk
Attachment

cc: Mr. H. J. Miller, NRC Regional Administrator, Region I
Mr. G. K. Hunegs, NRC Senior Resident Inspector
Records Management

IE22

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES:

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Nine Mile Point Unit 2	0 5 0 0 0 4 1 0	01 OF 04

TITLE (4) Pre-outage Review of Previous Outage Inspection Data on Feedwater Nozzle to Safe-end Weld Revealed an Indication

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE(7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
03	03	00	00	03	00	03	31	00	N/A	
									N/A	

OPERATING MODE (9): 3

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check one or more of the following)* (11)

POWER LEVEL (10): 0%

☐ 20.2201(b)	☐ 20.2203(a)(2)(v)	☒ 50.73(a)(2)(i)	☐ 50.73(a)(2)(viii)
☐ 20.2203(a)(1)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(i)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(iii)	☐ 73.71
☐ 20.2203(a)(2)(ii)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iv)	☐ OTHER *(Specify in Abstract below and in Text, NRC Form 366A)*
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(1)	☐ 50.73(a)(2)(v)	
☐ 20.2203(a)(2)(iv)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Steve Geier - Manager Unit 2 Engineering	(315) 349-7887

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
☐ YES *(If yes, complete EXPECTED SUBMISSION DATE)*	☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines)* (16)

On March 3, 2000, the ultrasonic data recorded during Refueling Outage 6 (RFO6) (1998) inservice inspection (ISI) on feedwater nozzle (N4D) to safe end weld (2RPV-KB20) was reanalyzed using improved analysis software. An indication had been identified in the safe-end butter of that weldment for three outages (RFO1, RFO4 and RFO6). The RFO6 indication had been evaluated as a conforming condition according to criteria established by American Society of Mechanical Engineers (ASME) Section XI, 1989 Edition, IWB-3640, and was believed to be an original fabrication defect because of its location. The reanalysis of the RFO6 data identified another recordable indication immediately above the known indication. Code rules for proximity required that a combined size of the two indications be analyzed as a single defect. The new combined size exceeded the acceptance requirements given in ASME Section XI, 1989 Edition, IWB-3640, Appendix C 3320 which required the indication to be defined as a non-conforming condition.

The cause for the inspection results difference was the application of new previously unavailable technology to analyze digital ultrasonic test data.

Nine Mile Point, Unit 2 was shutting down for RFO7 at the time the indication was discovered. A weld overlay repair was designed and implemented to restore full structural margins to the component. The component operability was evaluated in terms of design margins for the component with full consideration for potential growth by intergranular stress corrosion cracking during the time interval between RFO6 and RFO7. It was determined that the component maintained ASME Section XI Code safety factor margins even with a conservative estimate for the indication to have grown through-wall. The use of improved inspection technology is considered a proactive approach to safety, but always presents a finite potential for discovery of new indications.

I. DESCRIPTION OF EVENT

On March 3, 2000, while in operational condition 3 shutdown, Niagara Mohawk Power Corporation received the results from reanalysis of ultrasonic testing (UT) on 17 dissimilar metal welds. These welds had previously been evaluated by General Electric Nuclear Energy at Nine Mile Point, Unit 2 (NMP2) using Tomoscan analysis software. The reanalysis made use of Tomoview Version 1.4 Rev 3 software to compare results previously analyzed with the Tomoscan software. Feedwater nozzle (N4D) to safe-end weld number 2RPV-KB20 was the only weld that exhibited significant change.

The feedwater nozzle to safe end weld configuration employs a plain carbon steel (SA 508 C1 1) safe end welded to a low alloy steel (P3) nozzle. The ends of both the nozzle and the safe end were buttered with Inconel 182 and a consumable insert and Inconel 82 filler wire was used to join the components.

A recordable indication was identified during the Refueling Outage 6 (RFO6) (1998) examination using Tomoscan analysis software. The indication was located in the Inconel 182 weld butter deposit adjacent to the safe-end and was sized with a depth of 0.29 inches and a length of 5.3 inches. This indication also had been detected in RFO4 (1995), and reported a length of 2.55 inches but no depth using the analysis software available in 1995. The RFO4 data was reanalyzed for comparison with the RFO6 results. This reanalysis resulted in a size that was identical to the size measured in the RFO6 examination. The defect was evaluated and determined to be acceptable for the next cycle of operation according to fracture mechanics criteria in American Society of Mechanical Engineering (ASME) Section XI, Subparagraph IWB-3640 (1989 Edition with no Addenda). The fact that the indication had not changed in size suggested that the defect may have been related to a fabrication during the original safe-end buttering.

A reanalysis of the UT data set collected in RFO6 was performed prior to starting the RFO7. Updated Tomoview software (Version 1.4 Rev. 3) was used for the reanalysis because it represents state-of-the-art analysis technology. The results indicated an additional recordable indication centered over the original indication and located approximately 0.25 inches above the known indication. The indication is sufficiently close to the original defect that IWB-3500 evaluation rules require the indications to be combined for analytical purposes. Thus the total assumed depth of the new indication is the original 0.29 inches, plus a separation ligament of 0.25 inches, and plus the new indication depth of 0.20 inches for a total of 0.74 inches. The combined defect size exceeds the acceptability criteria given in ASME Section XI, (1989 Edition) Subparagraph IWB-3500, Table IWB-3514-2. The RFO7 inspection results indicated a small increase in flaw depth of 0.84 inches (using the same analysis software). Therefore, a repair was required because flaw size considerations projected by the end of the next operating cycle would exceed requirements given in ASME Section XI, (1989 edition) IWB-3642.

II. CAUSE OF EVENT

The cause in the indication size differences measured in weld 2RPV-KB20 between RFO6 and the reanalysis performed at the beginning of RFO7 (March 3, 2000) are the results of using two different types of analysis software Tomoscan and Tomoview. The version used in RFO6 was Tomoscan, which improved both detection and sizing capabilities over the analytical software used in RFO4. Comparing the reanalyzed RFO4 UT data with the results obtained during RFO6 using the Tomoscan software produced improved sensitivity and consistency. The same effect was seen with the reanalysis of the RFO6 UT data using the state-of-the-art Tomoview Version 1.4 Revision 3 software. Improved sensitivity and resolution were displayed in this case as well.

III. ANALYSIS OF EVENT

This event is reportable in accordance with 10CFR50.73(a)(2)(i)(B), "Any operation or condition prohibited by the plants Technical Specifications", in that the requirements of Technical Specification 3.4.8.a., "With the structural integrity of the ASME Code Class 1, component(s) not conforming to the above requirements, restore, the structural integrity of the affected component(s) before increasing the reactor coolant system temperature more than 50° F above the minimum temperature required by NDT considerations.", were not met during plant operation after startup from Refueling Outage 6.

An analysis was performed to determine the operability status for the component during the time period that the size of the indication was larger than believed. To do this, an evaluation was performed to demonstrate that the presence of the indication in weld 2RPV-KB20 did not result in a condition that jeopardized the structural integrity of the weld, and thus plant safety. The evaluation examined the effects of the indication based upon the analyzed inspection data from RFO7 and assumed a through-wall indication of the same length. Safety factors were computed in both cases and compared to the ASME Section XI safety factor for the limiting condition. It was found that the safety factor of the assumed through-wall indication bounded the measured defect, and was significantly higher than the required code safety factor. Therefore, there were no safety concerns from operating with the indication during the past operating cycle.

A Probablistic Risk Assessment analysis concluded that if the code required combined indication (5.3 inches wide and 0.84 inches deep) had resulted in a through-wall leak, the change in risk would not have been significant.

The other 16 Category D dissimilar metal nozzle/safe-end weldments (Generic Letter 88-01) were evaluated using the same UT inspection techniques and software analyses without identifying any non-conforming conditions.

The use of new and advanced inspection technologies always presents a potential for redefining indications from prior inspections. This is to be expected because the analytical tools with which to make the determination have been improved. The differences seen in the interpretation of UT inspection data sets does not reflect an analysis error of the test data, but rather a commitment to the proactive use of improved technology.

Based on the information provided above, the failure to meet the requirements of Technical Specification 3.4.8.a did not adversely affect the health and safety of the general public and plant personnel.

IV. CORRECTIVE ACTIONS

1. A planned RFO7 ISI of the vessel nozzle (N4D) to safe end (2RPV-KB20) weld has been performed and evaluated using the improved Tomoview analysis software.

2. A weld overlay repair plan has been prepared and submitted to the NRC for approval.

3. Field installation of the full structural weld overlay repair was released for implementation.

4. Acceptance examinations of the weld overlay repair and required pressure leak test will be completed according to the repair plan.

V. Additional Information

A. Failed Components: None

B. Previous Similar Events: None

C. Identification of components referred to in this LER:

Component	IEEE 803A Function	IEEE 805 System ID
Nozzle	NZL	SJ
Feedwater System	N/A	SJ