

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

REPORT/DOCKET NOS.: 50-410/93-19

LICENSE NO.: NPF-69

LICENSEE: Niagara Mohawk Power Corporation

FACILITY NAME: Nine Mile Point 2

INSPECTION AT: Scriba, New York

INSPECTION DATES: September 20 - 24, 1993, and November 15 - 19, 1993

INSPECTORS: P. Patnaik 12/13/93  
Prakash Patnaik, Reactor Engineer  
Materials Section, EB, DRS Date

P. Patnaik 12/13/93  
for Robert A. McBrearty, Reactor Engineer  
Materials Section, EB, DRS Date

APPROVED BY: Michael C. Modes 12/13/93  
Michael C. Modes, Chief  
Materials Section, EB, DRS Date



Areas Inspected: Review of inservice inspection (ISI) program, scope of ISI work, erosion/corrosion monitoring program for high energy systems, and observation of work related to ISI during the outage.

Results: The licensee's ISI program and the scope of ISI work during the third refueling outage complied with the 1983 edition of ASME Code, Section XI, including the summer 1983 addendum. The results of visual examination performed on the core shroud and the steam dryer were satisfactory. The video tape record of visual inspection of these components were of excellent quality. The licensee conducted an extensive erosion/corrosion monitoring by examining 365 components during the outage. The examination results correlated closely with the predictive analysis.



## DETAILS

### 1.0 INSERVICE INSPECTION (ISI) (73753)

#### 1.1 Scope

The conduct of inservice inspection using ultrasonic, magnetic particle and liquid penetrant examinations ensures integrity of the pressure boundary. During this inspection, reviews of the ten-year ISI plan, the scope of work for the outage, a sampling of inservice inspection data from the previous outage, and observation of work activities were performed to ascertain if the requirements of the applicable ASME Code, Section XI, and the technical specifications were met.

#### 1.2 Findings

Niagara Mohawk Power Corporation (NMPC), the licensee for Nine Mile Point Unit 2 conducted an ISI during the third refueling outage of the unit, in accordance with the ASME Code, Section XI, 1983 edition, including the summer 1983 addendum. The unit is in the second inspection period of the first inspection interval, and the ongoing (third) refueling outage is the last outage of the second period. The inspector reviewed the ten-year ISI plan, and the relief requests to the NRC on welds which are impractical to examine in accordance with the applicable code. Within the scope of the review, the inspector did not find any discrepancy.

The inspector reviewed the outage summary reports for 1990 and 1991 pertaining to ISI of the reactor pressure vessel. There were two N-9 nozzle safe ends (KB 29 and KB 30) of the reactor vessel that were examined only volumetrically, contrary to the Code requirement of volumetric and surface examination. However, the licensee provided documentation of having scheduled the surface examination during the third period of the current inspection interval. The licensee's scope of ISI work for the current outage was found to comply with the ten-year ISI plan and met the requirements of the ASME Code, Section XI, including the summer 1983 addendum.

The licensee has instituted a quality assurance surveillance program as described in QAP-ASU-18.20, Rev. 00 to perform surveillances of ISI activities. The licensee also uses an elaborate and systematic method of reporting, evaluating, and dispositioning unresolved non-destructive examination indications as detailed in NIP-ECA-01, Rev. 6. The level of staffing to implement the ISI program was found to be adequate.

#### Visual Examination (IP73753)

The inspector viewed the video tapes of the underwater remote visual inspection of the core shroud and the steam dryer. The observation was performed to ascertain that the rate of camera movement, picture clarity, and image focus was sufficient to assess the quality of the welds in the areas of inspection.



### Core Shroud Examination

Information Notice 93-79 was issued by the NRC on September 30, 1993, to inform the industry of core shroud cracking that was detected at a BWR nuclear plant in the United States. The General Electric Company issued Services Information Letter (SIL) No. 572, Revision 1, on October 4, 1993, regarding the same subject.

For all plants with Type 304 stainless steel shrouds with six or more years of power operation, and for all plants with L-Grade stainless steel shrouds with eight more years of power operation, General Electric recommended visual examination of accessible areas on the I.D. and O.D. surface of the core shroud at the next scheduled refueling outage. General Electric further recommended that the inspections be performed with an enhanced VT-1 system that can resolve a one mil (.001") diameter wire on the inspection surface. The SIL notes that an acceptable alternative to visual examination is a qualified ultrasonic examination of accessible shroud welds from the outer surface. Criteria for prioritizing the shroud welds for the visual examinations are included in the SIL, as are recommendations for future actions based on examination results.

Although the Nine Mile Point Unit 2 core shroud had not seen the minimum power operation recommended in the General Electric SIL, the licensee scheduled the visual inspection of the shroud during the ongoing 1993 refueling outage.

The core shroud examination was performed by General Electric Company visual examination personnel using remotely operated closed circuit video equipment, underwater lighting, camera-mounted lighting, and VHS videotape recording equipment. Resolution capability of the hand-held camera was verified with a one mil diameter wire, attached to a holding fixture. The resolution was verified each time an equipment change was made and at the beginning of each tape. Portions of welds H-1, H-2, H-3, H-4, H-5, and H-7 were inspected at accessible locations not obstructed by guide blades. The inspections were performed on the O.D. and I.D. weld surfaces when possible.

A portion of the tape showed gradual worsening of the picture quality, resulting from using the camera in proximity to high levels of radiation in the vessel. The camera was replaced, one mil resolution was verified, and the questionable areas were re-examined. Picture quality was restored to an acceptable level.

### Steam Dryer Examination

Underwater visual examinations performed during a previous refueling outage revealed cracks in the steam dryer drain channel #4 vertical weld. The examinations that were performed during the current refueling outage were intended to monitor those cracks and determine whether they had propagated during the last operating cycle. The latest examinations were performed using the same equipment that was used for the core shroud inspection, including use of a one mil diameter wire to verify camera resolution capability. The previously detected cracks were again detected and were determined to have no discernible change in length since the previous inspection. Based on the inspection results, the licensee concluded that the steam dryer was acceptable for continued service.





## Conclusions

The video tape record of visual inspection results associated with the underwater remote visual examination of the core shroud and the steam dryer were of excellent quality and capable of providing a permanent record for comparison to future results of the inspection of those components. The inspector agreed with the licensee's conclusion that each component was acceptable for continued service.

### Review of Inservice Inspection Data (IP 73755)

Data associated with the following welds were selected for inspection:

- Weld #2 RCS-64-00-FWB020, 12" diameter pipe to safe end
- Weld #2 RCS-64-00-SW045, 24" diameter elbow to pipe weld
- Weld #2 RCS-64-00-SW094, 12" diameter pipe to elbow weld
- Weld #2 RCS-64-00-SW093, 12" diameter pipe to elbow
- Weld 2 RCS-64-00-SW008 through SW011, pipe to lug weld

The data were inspected to ascertain that the examination results were properly recorded, sufficient information was included to assess the weld condition, and, when necessary, the inspection sample was expanded to comply with Code requirements.

Weld 2 RCS-64-00-SW008 was examined using the liquid penetrant method, and one 5/8" long linear indication was detected. The licensee's evaluation of the indication determined that it was a rejectable condition that required repair. Deviation Event Report (DER) No. 2-93-2238 was issued on October 9, 1993, to track the followup actions, including the examination of additional welds in Code Examination Category B-K-1. The rejectable condition on SW008 was removed by grinding, the examination area was penetrant-tested to assure that the defect was removed, and the remaining wall thickness was verified to be within acceptable limits. Twelve additional Category B-K-1 welds were penetrant-tested and found to be acceptable. The twelve welds represented all of the remaining B-K-1 welds on the system, and, therefore, all Code requirements regarding sample expansion were complied with. The remaining welds listed above were examined using the liquid penetrant and ultrasonic examination methods, and were all determined to be acceptable.

## Conclusion

The data included in the inspection were complete and clearly documented. The actions taken by Niagara Mohawk, in response to the rejectable liquid penetrant indication on weld 2 RCS-64-00-SW008, verified the staff's knowledge of Code requirements and their application.



### Licensee Action on Previous Inspection Findings

Unresolved Item (UNR) 93-80-01 was opened in regard to two Deviation/Event Reports (DER) issued by Niagara Mohawk QA to address self-identified weaknesses observed in implementing the licensee's Root Cause Evaluation (RCE) procedure. Closure of the UNR is pending the licensee's disposition of the DERs.

At the time of this inspection, the licensee had developed procedures to correct the identified weaknesses. Those procedures were in the licensee's review process, and completion was anticipated by the end of January 1994.

This item remains open pending completion of the licensee's actions.

Unresolved Item (UNR) 93-80-02 was opened in regard to the licensee's long-term corrective actions for service water system degradation. The licensee was investigating various long-term options for system improvement or changes to prevent continuous service water flow and cooler degradation. The licensee agreed to formally present to the NRC its decisions on the recommended course of actions with the implementation schedule for the long-term resolution of flow degradation.

The Sergeant and Lundy Company was contracted by the licensee to develop a plan to correct the situation. That plan has been provided to the licensee and is being reviewed by cognizant licensee staff. A meeting of the licensee and NRC is scheduled for January 1994, when the licensee will present its conclusions to the NRC.

This item remains open pending the licensee's presentation at the scheduled meeting with the NRC.

## 2.0 EROSION/CORROSION PROGRAM

### 2.1 Scope

The mitigation of erosion/corrosion in high energy piping is important at nuclear power plants to maintain structural integrity of piping and components. During this inspection, licensee's criteria for selection of susceptible components for inspection, non-destructive examination of components for thickness measurement, erosion/corrosion data, and their acceptance criteria were reviewed.

### 2.2 Findings

The selection of susceptible components to erosion/corrosion was based on NUMARC and EPRI guidelines. In addition, the licensee selected a number of components based on industry and plant operating experience, and engineering judgment. During this outage, the licensee examined 365 components from various systems. Two hundred forty-five components were examined during the previous outage, and were re-examined during the current outage in accordance with licensee's program. The licensee has modelled the susceptible systems using CHECMATE, but has not finalized the components based on the



computer modelling. However, the preliminary results indicated that the components selected for examination were of high priority from CHECMATE analysis. The components in the following systems were examined for wall thinning due to erosion/corrosion during the third refueling outage.

- Condensate
- Cold Reheat
- Moisture Separator
- Extraction Steam
- Feedwater
- Feedwater Recirculation
- Turbine Piping
- High Pressure Drains
- Low Pressure Drains
- Main Steam
- Feedwater Heater Vents/Drains
- Turbine Miscellaneous Plant Drains
- Offgas
- Zinc Injection

The inspector reviewed the design input and assumptions made for CHECMATE modelling of feedwater and feedwater recirculation systems and found them to be correct. The inspector also noticed good correlation of results between the calculated erosion rate using CHECMATE and the measured erosion rate.

### 3.0 EXIT MEETING

The findings of this inspection were presented to and discussed with members of the licensee's management at the exit meeting on November 19, 1993. The licensee concurred with the findings of the inspection. A list of attendees of the exit meeting on November 19, 1993, is attached to this report as Attachment 1.



ATTACHMENT 1

Exit Meeting Attendees

Niagara Mohawk Power Corporation

C. Beckham	Manager, Quality Assurance
L. Dick	Supervisor, NDE
T. McCormick	General Manager, S.A.L.T.
J. Mueller	Plant Manager, Unit 2
D. Richardson	Manager, Maintenance, Unit 2
J. Swenszkowski	Quality Assurance
J. Wadsworth	E/C Program Manager
K. Ward	Manager, Engineering
A. Zallnick	Supervisor, Site Licensing

U.S. Nuclear Regulatory Commission

R. McBrearty	Reactor Engineer
B. Norris	Sr. Resident Inspector

