U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-244/89-09

Docket No. 50-244

License No. DPR-18

Licensee: Rochester Gas and Electric Company
49 East Avenue
Rochester, New York 14649

Facility Name: R. E. Ginna Nuclear Power Plant

Inspection At: Ontario, New York

Inspection Dates: April 24-28, 1989

Inspector: R. W. Winters, Reactor Engineer, MPS, EB, DRS, Region I — date 6/8/89

Approved by: S. Chaudhary, Chief, Materials & Processes Section, Engineering Branch, DRS, RI — date 6/8/89

Inspection Summary: Routine unannounced inspection on April 24-28, 1989 (Report No. 50-244/89-09).

Areas Inspected: The inservice inspection program was reviewed including the ten year plan, steam generator eddy current testing, primary and secondary water chemistry results, and the erosion - corrosion control program.

Results: No violations or deviations were identified.

## DETAILS

### 1.0 Persons Contacted

Rochester Gas and Electric Company

* J. C. Bodine, Nuclear Assurance Manager
* D. L. Filkins, Health Physics and Chemistry Manager
* W. Goodman, Health Physics Foreman
  P. Gorski, Supervisor, Inservice Inspection
* A. Herman, Health Physicist
* R. Marchionda, Director of Outage Planning
* W. L. McCoy, Director, Research and Science
* R. C. McCredy, General Manager, Nuclear Production
* J. St. Martin, Corrective Action Coordinator
* M. J. Saporito, Supervisor, Materials Engineering
* J. F. Smith, Manager, Materials Engineering
* S. M. Spector, Plant Manager
  K. Wachter, Inservice Inspection Engineer

Combustion Engineering Corporation

R. Maurer, Supervisor, Eddy Current Testing

United States Nuclear Regulatory Commission

* T. Dragoun, Region I, Inspector
* K. Kolaczyk, Reactor Engineer, Region I
* N. Perry, Resident Inspector

* Denotes those attending the exit meeting.

The inspector also contacted other administrative and technical personnel during the inspection.

### 2.0 Scope

The scope of this inspection was the review and observation of activities in the following areas:

-- the ten year inservice inspection (ISI) program

-- steam generator eddy current examination

-- the erosion-corrosion (E/C) control program

-- NDE examiner certification program

-- primary and secondary water chemistry results

## 3.0 Inservice Inspection Program Review

R. E. Ginna station is in the third period of the second ten year inspection interval at this time. This inspection interval is based on the ASME Code, Section XI, 1974 Edition, Summer 1975 Addenda. The visual examination program for supports is based on the ASME Code, Section XI, 1977 Edition, Summer 1977 Addenda. This interval is scheduled for completion in December 1989. The next inspection interval will be based on the ASME Code, Section XI, 1986 Edition with no addenda.

The inspector discussed the ISI program and reviewed the status with the cognizant licensee personnel and determined that the inspections for the second interval were scheduled for completion during the present outage and therefore no extension request as allowed by the ASME Code was expected to be required.

### Conclusions

The licensee has maintained adequate control of the ISI program and has completed the required inspections in a timely manner without recourse to an extended outage.

## 4.0 NDE Examiner Certification Program

In addition to the licensee's staff, contractors are used for various types of NDE associated with ASME Section XI inspections, the E/C program and steam generator eddy current inspections. The licensee's staff was technically capable of performing their assigned duties, and the staff size appeared adequate to meet the scheduled work load. The inspector selected a representative sample of qualification - certification records for both licensee personnel and contractors for review. All of the records reviewed were found to be acceptable.

The inspector reviewed Quality Research and Science Procedure QR&S911, Revision 2, Qualification of Visual Examination Personnel, and determined that this procedure exceeds the ASME Code requirements. This procedure is the basis for the training program the licensee has established for visual examiners. This program includes the use of mock-ups of systems using piping components removed from the plant. The mock-ups include pipe sizes from 1 inch diameter to 14 inch diameter and each mock-up can be configured in several ways to provide flexibility in the training and testing of individuals. Forty hours of training is given for certification to level I in visual examination, and an additional 80 hours is provided for certification to Level II in visual examination. This is substantially in excess of the required 16 hours training required for certification to Level II.

### Conclusions

The licensee has developed a training program for qualification and certification of visual examiners that exceeds the ASME Code requirements and includes hardware mock-ups of actual plant equipment.

## 5.0 Steam Generator Eddy Current Inspection

The licensee established an inspection plan prior to the examination for both the 'A' and 'B' steam generators. The hot leg plan included 100% examination of tubes from the tube end to the first support plate. In addition 40% of these tubes were inspected full length. Of the 40%, 20% were to complete the 100% full length inspection plan and the other 20% were a random sample as recommended by the EPRI guidelines. All tubes with previous indications greater than 20% through wall were examined at the location of the indication. All row 1 U-bend regions were examined with the motorized rotating pancake coil (MRPC) between the number 6 hot and cold top support plates. The results of this inspection are shown in Table 1.

TABLE 1

| Defect Type | Steam Generator 'A' | Steam Generator 'B' | Total |
|---|---|---|---|
| PWSCC | 139 | 109 | 248 |
| SCC | 6 | 104 | 110 |
| IGA | 16 | 136 | 152 |
| PWSCC and SCC or IGA | 2 | 28 | 30 |
| OD Indications | 4 | 0 | 4 |
| | 167 | 377 | 544 |
| Tubes Unplugged | 10 | 64 | 74 |
| Total Defective | 177 | 441 | 618 |

The eddy current examination was performed using the Zetec Miz-18 Digital Data Acquisition System at frequencies of 400, 200, 100, and 25 kHz operated in both the differential and absolute modes. The examination was performed using standard 0.740 or 0.720 O.D. bobbin coil probes with smaller diameter coils used for the smaller radius U-bends and dented regions.

The tubes in the Ginna Station's steam generator are partially rolled into the tubesheet and seal welded, leaving approximately a 19 inch crevice in the 22 inch thick tubesheet. From hot functional testing in November 1969 until the secondary water treatment was converted to all volatile in November 1974 the secondary water chemistry control was phosphate buffering. During this period an aggressive environment was concentrating in the sludge saturation zone and the crevices of the tubesheet. The current problems were likely initiated during this period of the plant operation.

The licensee had determined that tubes with defects in this region were to be sleeved. To assure that the insertion and welding of the sleeves

was acceptable the licensee developed a means to insert preformed sleeves into the tubes on the periphery of the steam generators. These sleeves were formed to allow for the curvature of the bottom head and were straightened as they were inserted. Autogenous welding was then performed from the inside of the sleeve. The inspector observed several of the welds made at the mock up and the fixture for this tube insertion technique. The mock-up was extensively used to train the operators in each of the operations required for sleeve insertion and welding. The operations required for the sleeving process included marking the locations to be sleeved, verifying these locations, cleaning the inside of the tubes, cleaning the area to be welded on the existing tube end, inserting the sleeve, welding the top of the sleeve to the existing tube from the inside, seal welding the sleeve end to the tube at the tubesheet, and inspecting both welds. The licensee had designed the operations to minimize personnel exposure by using automation as much as practical, monitoring by the use of cameras, and controlling the functions from a remote location. The sequence of the operations was also designed to minimize the number of tool changes, i.e. cleaning was performed on all tubes that could be reached by the fixture, followed by sleeve insertion etc.

Conclusions

The licensee performed a 100% inspection of all active tubes in both steam generators to assure that the true condition of the steam generators was determined. As a result of this inspection and the removal of 10 plugs in steam generator 'A' and 64 plugs from steam generator 'B', a total of 544 tubes were to be sleeved in both steam generators. Due to the multiple operations required to sleeve the tubes this was a slow process. The licensee recognized the importance of minimizing exposures and provided adequate training on the mock-up and the maximum effective automation for the sleeve insertion and welding.

## 6.0 Data Analysis

Data analysis was performed by two parties independently. One party used the Zetec Computer Screening (CDS) system with a manual review of the CDS calls. The other party performed the analysis manually using the Zetec DDA-4 Digital Data Analysis System. The results of these analysis were then compared for differences using the TUBAN computerized data management system. Differences were resolved by one or more Level III individuals. In addition, all tubes reported by either or both teams as requiring repair were reviewed by one or more Level III individuals. The removal of a tube from the repairable list required the concurrence of at least two Level III individuals.

Conclusions

The inspector was satisfied that the method of analyses was satisfactory to assure that defective tubes were identified, and that no single

individual could determine that a defective tube could be removed from the defective list.

7.0 Westinghouse Mechanical Plugs

The inspector reviewed the Westinghouse Mechanical Plug data with cognizant licensee personnel and determined that in both steam generators there were a total of 183 Westinghouse plugs. The information for these plugs is shown in Table 2.

TABLE 2

| Installation Date | Heat Number | S/G-A Plugs | S/G-B Plugs | EFPM (1) |
|---|---|---|---|---|
| December 1979 | NX9789 | 0 | 16 | 87.24 |
| April 1980 | NX9789 (2) | 2 | 65 | 84.00 |
| February 1982 | NX1660 | 0 | 32 | 67.42 |
| October 1982 | NX2386 | 2 | 66 | 63.60 |
| Total | | 4 | 179 | |

(1) Effective Full Power Months
(2) Based on one removed plug and assuming that all other plugs installed at that time are the same heat.
(3) Hot side temperature = 602°F
(4) Cold side temperature = 545°F

Conclusions

The licensee in conjunction with Westinghouse has determined that no plugs from heats that have been determined susceptible to stress corrosion cracking have been used in these steam generators.

8.0 Erosion-Corrosion Control Program (IN 86-106)

The licensee initiated their erosion - corrosion program in 1983. Since that time the program has been expanded so that approximately 400 to 450 components are inspected each outage. This includes approximately 150 components that are reexamined to establish the erosion rate and those that are approaching the replacement conditions. During this outage approximately 25-30 components were replaced due to wall thinning. The bulk of these replaced items were in the two phase steam extraction system.

The inspector selected several components and verified the locations of the wall thickness measurements. The data for these components were reviewed by the inspector to determine the condition of these components. The results of this review are shown in Table 3.

TABLE 3

| Component | Nominal Wall | Measured Wall | Remarks |
|---|---|---|---|
| MSR 90° Sweep Elbow | 0.432 | 0.377 | Rescheduled 1991 Original Installation |
| MSR 2nd pass drain | 1.219 (1) | 1.221 | 24 inch diameter |
| MSR RHTR Level Tank | 0.500 | 0.487 | 20 inch diameter |
| MSR Downcomer Steam Extraction to Preseparator | 0.500 | 0.345 | NCR MDG-9,April 27,1989 |

(1) Nominal thickness is the published standard thickness for this size component

Conclusions

The licensee has an extensive erosion - corrosion control program that is used to monitor a large number of components in Ginna Station. The proportion of reexaminations (approximately 150 of 450) indicates that data for trending erosion - corrosion is available for future analyses and planning. The relatively large number of component replacements (25-30) indicates the program is effective.

9.0 Water Chemistry - Primary and Secondary

Water chemistry data were reviewed as part of this steam generator inspection and maintenance inspection. The methods of collecting and verifying the accuracy of these data were not included in the scope of this inspection.

Reactor Coolant System Results

The Reactor Coolant System water chemistry as reported by the licensee for the period from June 1988 through January 1989 has been stable except for approximately two days in July 1988 when there was a one day plant shutdown. The values reported are shown in Table 4.

TABLE 4

| Parameter | Range | Specification | Remarks |
|---|---|---|---|
| Lithium (ppm) | 0.5 - 2.9 | | Gradual reduction |
| Conductivity (uHmos) | 30 - 14 | | Gradual reduction |
| Boron (ppm) | 800 - 125 | | Reduction in period |
| pH | 6.8 - 7.1 | | |
| Oxygen (ppb) | 5 | 100 | Stable |
| Fluorine (ppm) | 0.02 | 0.15 | Stable |
| Cloride (ppm) | 0.1 | 0.15 | Stable |

Secondary Water Chemistry Results

The secondary water system results measured in the steam generator blowdown also were stable during the period from April 1988 through December 1988. However, this chemistry more strongly reflected the power transients experienced by the plant during this period due to hideout return in the steam generators. The values reported are shown in Table 5.

TABLE 5

| Parameter | Results | Specification |
|---|---|---|
| Conductivity (uHmos) | 0.15-0.14 | 0.15 |
| Chloride (ppb) | 3 | 5 |
| Sulfate (ppb) | 2.5 | 5 |
| Sodium (ppb) | 2 | 5 |

Note: Not reflecting power transients

Conclusions

The stability of the water chemistry analysis indicate that the licensee has good control of the variables affecting water quality.

10.0 Licensee's Actions on Previous NRC Concerns

(Closed) Bulletin (78-BU-12): Atypical weld material in reactor pressure vessel welds.

Bulletin 78-12 pertained to the discovery of an off chemistry condition in a reactor vessel surveillance specimen for the Crystal River 3 Project. An extensive generic investigation was conducted by the material manufacturer, the vessel designer, and the vessel fabricator to determine if similar conditions existed in other reactor vessels. As a result of this investigation it was determined that part of a lot of submerged arc welding wire manufactured from heat number 72105 was found to be off chemistry. No other off chemistry anomalies were found in any heats of submerged arc welding wire used for reactor vessel fabrication.

The inspector reviewed the fabrication records for the R. E. Ginna Nuclear Power Plant reactor vessel and determined that this vessel had been shipped from the fabricator prior to any of heat 72105 being received by the fabricator.

This Bulletin is closed.

(Closed) Unresolved Item (50-244/88-04-01): Failure to maintain qualification records and to perform practical exam using representative parts.

The inspector reviewed the qualification records of licensee personnel for visual examination and determined that these records were maintained in a manner similar to the requirements of SNT-TC-1A. In addition, the licensee gave the inspector photographs of the mock-ups now used for the practical test of visual examiners. There are four mock-ups made up of various parts of piping systems removed from the plant. During the examination the candidates are required to photograph the defects they find and then mark these photographs and indicate their analysis of each defect found.

This item is closed.

## 11.0 Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items or violations. Unresolved items are discussed in paragraph 10.0.

## 12.0 Management Meetings

Licensee management was informed of the scope and purpose of the inspection at the entrance interview at the start of the inspection. The findings of the inspection were discussed with licensee representatives during the course of the inspection and presented to licensee management at the April 28, 1989 exit interview (see paragraph 1 for attendees).

At no time during the inspection was written material provided to the licensee by the inspector. The licensee did not indicate that proprietary information was involved within the scope of this inspection.