

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-244/91-13

Docket No. 50-244

License No. DRP-18

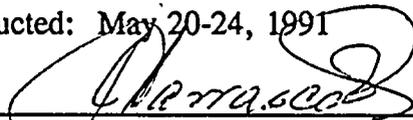
Licensee: Rochester Gas and Electric Corporation
49 East Avenue
Rochester, New York 14649

Facility Name: R. E. Ginna Nuclear Plant

Inspection At: Ontario, New York

Inspection Conducted: May 20-24, 1991

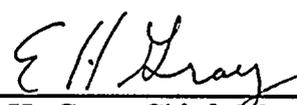
Inspector:



J. E. Carrasco, Materials Section,
Engineering Branch, DRS

JUN 7 1991
Date

Approved by:



E. H. Gray, Chief, Materials Section,
Engineering Branch, DRS

6/20/91
Date

Inspection Summary: Inspection on May 20-24, 1991 (Report No. 50-244/91-13)

Areas Inspected: The engineering disposition for the over-elongated stud of the manway, Steam Generator "A" cold leg was reviewed.

The Advanced Digital Feedwater Control System (ADFCS) design/installation, and operational test was reviewed.

Results: No violations or deviations were identified. However, the inspector noted that surface examination by PT or MT is usually not performed on the S/G's manway cover studs before their reuse.



DETAILS

1.0 Persons Contacted

Rochester Gas and Electric Corporation

* R. Mecredy	Vice-President Ginna Nuclear Production
* P. Wilkens	Department Manager Nuclear Engineering Services
* C. Forkell	Manager of Electrical Engineering
* L. Rochino	Lead Mechanical Engineer
* D. Baker	Lead Electrical Engineer
* R. Carter	Mechanical Engineer
* G. Voci	Manager of Mechanical Engineering
* J. Dunne	Mechanical Engineer
* N. Oliva	Electrical Engineer
* B. Bryan	Liaison Engineer-EWR 4773
* T. Marlow	Superintendent-Support Services
* T. Harding	Modification Support Coordinator
* S. Adams	Technical Manager
* J. Widay	Superintendent-Production
T. Wieand	Construction Engineer
L. Dipzinski	Construction Engineer
G. Croney	Consultant
J. Martin	Corrective Action

* denotes those who attended the exit meeting

2.0 Review of the Engineering Disposition for Nonconformance Report (NCR #91-268)

Background

Each of the two steam generators (S/Gs) at R. E. Ginna Station have hot and cold leg manways for access to the inlet and outlet plenums for maintenance and inspection purposes. Each manway has a cover which is installed against the S/G as a flange bolted connection. These bolted connections are essential for maintaining the integrity of the pressure boundary of the Reactor Coolant System (RCS). Therefore, it is necessary to apply a closing force greater than the loads caused by static water head and steam pressure during operation.

Each manway closure consists of a flexitallic gasket, a stainless steel insert plate, a carbon steel cover plate and sixteen 1-7/8" studs, flat washers and nuts. All the sixteen manway closure studs are tensioned simultaneously using an EG&G tensioner mechanism which contains annular type hydraulic jacks around each of the sixteen studs, and provides for sequential tightening of the stud nuts.



Event that Triggered the Preparation of NCR #91-268

During the tensioning of the manway studs in S/G "A" cold leg at the end of the 1991 outage, the licensee observed that fifteen of the sixteen studs were outside the specified elongation range of 7.0 to 10.6 mils. Subsequently, all studs outside this range were successfully adjusted to be within the range using provisions of the approved tensioning procedure, except for stud #5, which exhibited a final elongation of about 12 mils. The licensee concluded that interference between the pistons and mechanical stops had prevented uniform stud extension during tensioning. Consequently, the closure was disassembled, stud #5 was replaced, and a new flexitallic gasket was installed.

The licensee reassembled the closure and established tension of the studs in accordance with the approved procedure. All measured stud elongations were within the allowable range after tensioning except for stud #8, which had an average measured elongation of 18.5 mils which is about twice the allowable. At this point the licensee originated NCR #91-268, for the disposition of stud #8.

Review of the Technical Basis for the Engineering Disposition of NCR #91-268

The licensee's disposition for NCR #91-268 as "Use as is" was based on the technical evaluation prepared by Dominion Engineering, Inc., of Mclean, Virginia.

The inspector reviewed the technical evaluation including the finite element analysis, also prepared by Dominion Engineering, Inc. This technical evaluation consists of two analyses, the first was a probable cause of measured over-elongation of stud #8, and the second was to determine the effect of operating with stud #8 failed.

Based on Dominion Engineering's report, the licensee concluded that the probable cause of the elongation of stud #8 was plastic deformation of the upper (non-load carrying) part of the stud as a result of misalignment between the piston and the reaction nut, during the final attempt at tensioning.

Angular misalignment between the piston and reaction nut can produce high bending stresses in the reduced diameter upper (non-load carrying) part of the stud which can cause the maximum stress in the portion of the stud to exceed yield, and the stud to elongate.

The inspector agreed with this finding based on visual observation of the S/G mock-up, the studs, and the tensioning ring.

The inspector inquired about the validity of the coefficients of friction of 0.5 used as an upper boundary in the analysis to determine the effect of friction between the manway cover and the S/G shell flange on the stress developed in the studs during heatup. The licensee contacted Dominion Engineering, Inc., who stated that $\mu=0.5$ is a reasonable value. To support this statement, Dominion Engineering referenced the Standard Handbook of Lubrication Engineering, McGraw-Hill, New York, NY, 1968 edition. In this reference, a range of friction coefficients for clean unlubricated surfaces was given as 0.3 to 0.5. The inspector found this answer acceptable.

The inspector asked the licensee if any surface examination such as magnetic particle (MT) or penetrant test (PT), was performed for the studs before their mounting, the licensee indicated that no MT or PT was performed on these studs and added that according to their established Quality Assurance manual for S/G bolts, studs and nuts of two inches in diameter or less only visual examination is required. The inspector verified this statement on page 48 of the licensee's quality assurance manual. Action item 2 of the IEB 82-02 required inspection of closure fasteners (manway studs) by visual and surface examination (IWA 2210 and 2220) prior to reuse. The licensee stated that they would review inspection practices of primary side fasteners where these are to be reused.

In conclusion, the inspector found the technical evaluation prepared by Dominion Engineering, Inc., acceptable. Therefore, the disposition for NCR 91-268 of "use as is," is adequate, since stud #8 remained functional and capable of carrying the load.

3.0 Advanced Digital Feedwater Control System (ADFCS)

Inspection of the ADFCS was initiated during Inspection No. 50-244/90-29, conducted on November 26-30, 1990. Inspection 90-29 was performed to review the conceptual design, preliminary drawings, engineering specifications, and installation procedures affecting the modification.

3.1 Scope of the Present Inspection

The inspector reviewed the seismic analysis of the main control board (MCB) to ensure that the structural integrity of the MCB is not compromised by the changes which were required by the modification. The inspector also reviewed the mechanical design and installation of the new S/G wide range level transmitters, associated sensing lines, and instrument valves. In addition, the category I instrumentation sensing lines for the valves associated with the new main steam flow transmitters were included in the present inspection. The inspector witnessed the startup testing of the new installed system.

3.2 Findings

The inspector reviewed the seismic evaluation of the main control panel (control room) and found it acceptable. The inspector discussed the verification of a computer program used by URS/John A. Blume & Associates, the contractor, in the seismic reevaluation of the Main Control Board.

This computer program named "FSC" was used to generate floor response spectra directly from input ground spectra. The licensee's contractor showed evidence that this computer program was verified in accordance with established quality assurance procedures. The inspector found this computer program verification acceptable.

3.3 Review of the Design Analysis of the Tubing for the ADFCS Modification EWR 4773

The inspector reviewed the technical basis for determining generic span lengths, offsets and support loads for various instruments and a sample tubing design layout for the modification. Licensee document titled, "Design Analysis Ginna Station Generic Design Qualification of Tubing," clearly outlines the analysis used to qualify spans for instrument and sample tubing lines to ANSI B31.1, "Power Piping," 1973 Edition with addenda thru Summer 1973 code.

This analysis used simple beam equations found in the manual of steel construction to determine maximum tubing spans for deadweight, pressure and seismic loading conditions along with the offset lengths required to satisfy thermal expansion and anchor displacements.

Fortran computer program Version 2.0 was used for this analysis to organize the results in a tabular format. The inspector found this tabulation easy to follow and readily useable for the design of safety-related tubing. These tabulations enable the licensee to design safety related tubing without performing detailed individual calculations.

In conclusion, the inspector found the generic design qualification of tubing acceptable for this modification.



3.4 Startup Testing of the ADFCS

Startup testing of the newly installed ADFCS included four tests to be performed during power ascension to ensure the proper operation and setpoint adjustment of the ADFCS. Four types of testing and data acquisition were performed: Open loop (manual), closed loop (automatic), monitoring of normal plant startup transient operations, and data acquisition under steady-state or quasi-steady-state conditions.

The inspector observed a portion of the test in progress, and interviewed the contractor and the Westinghouse engineer. The test was conducted in accordance to procedure No. SM-4773.30, titled, "Advanced Digital Feedwater Control System Startup Test Procedure". No problems were detected and the system successfully performed during the test.

In conclusion, the ADFCS modification had a firm technical basis and was done in accordance with written procedures. The licensee has displayed a solid technical ability as well as good project management skills in the performance of this task.

4.0 Exit Meeting

The inspector met with licensee representatives (see paragraph 1) at the end of the inspection on May 24, 1991. The inspector summarized the purpose and scope of the inspection and identified the inspection findings.

