NRC-83-135

WISCONSIN PUBLIC SERVICE CORPORATION

P.O. Box 1200, Green Bay, Wisconsin 54305

July 14, 1983

Mr. J. G. Keppler, Regional Administrator
Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Keppler:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
IE Bulletin No. 82-02: Degradation of Threaded Fasteners in the Reactor Coolant Pressure Boundary of PWR Plants

This report is submitted in response to Action Item 4 of IE Bulletin 82-02. In accordance with the requirements of Action Item 2, an inspection of threaded fasteners was conducted during the 1983 Refueling Outage. This examination was performed in accordance with the requirements of the ASME Boiler and Pressure Vessel Code Section XI, 1974 Edition up to and including Summer 1975 Addenda.

The inspection included the threaded fasteners of those reactor coolant pressure boundary components which were disassembled as a result of previously scheduled maintenance. The following fasteners were examined:

1. Reactor vessel closure head studs, nuts, and washers
2. Steam generator 1A primary manway bolting
3. Steam generator 1B primary manway bolting
4. Pressure retaining bolting on the flanged connection of the six-inch pressurizer safety valve (PR-3B)
5. The bonnet bolting of the following valves:

a. RHR-2A, eight-inch gate valve

b. RHR-11, 10" x 8" x 10" gate valve

c. SI-21A, twelve-inch check valve

d. SI-22A, twelve-inch check valve

e. SI-303A, six-inch check valve

All bolting was inspected after component disassembly.

The inspection results are summarized below:

I. Reactor Vessel Closure Head

A. Studs: (48) 6"-8UN-2A x 56 5/8" LG.

1. There were no reportable indications found via an ultrasonic examination.

2. Twenty-four of the forty-eight studs were found to have various surface imperfections (i.e.; scratches and dents) by visual examination. These imperfections ranged in size from 1/4 inch to 1-3/4 inch in length. They were caused by repeated handling and were not service-induced.

*3. No reportable indications were discovered by magnetic particle testing.

B. Nuts

1. Ultrasonic inspection revealed no reportable indications.

2. A visual inspection revealed that seven of the forty-eight reactor vessel nuts had various surface imperfections. These varied from 1/16 inch to two inches in length. Again, these imperfections are a result of repeated handling during past refueling outages.

*3. No reportable indications were observed by magnetic particle examination.

C. Washers

1. No reportable indications were found by visual examination.

*The magnetic particle examination was limited due to surface imperfections, which in some cases resulted in false indications.

II. Steam Generator 1A

A. Hot Leg Manway Bolts: (16) 1-7/8"-8UN x 8" LG.

1. Ultrasonic examination did not detect any reportable indications.

2. Visual examination revealed that bolt AH-4 had an axial linear indication beginning 1-3/8 inch from the bolt head for a length of 2-5/8 inches. This bolt was subsequently replaced. Also observed were minor dents and scratches on the shafts and threads; the bolt heads had rough surfaces.

*3. Magnetic particle testing also revealed the linear indication on bolt AH-4, along with a similar indication on bolt AH-12 which ran the full length of the threads. Bolt AH-12 was also replaced. The remainder of these bolts had no reportable indications.

B. Cold Leg Manway Bolts: (16) 1-7/8"-8UN x 8" LG.

1. No reportable indications were discovered by ultrasonic examination.

2. A visual inspection revealed various surface imperfections (i.e.; scratches, dents, roughness of bolt head) caused by repeated handling.

*3. No reportable indications were found by magnetic particle examination.

III. Steam Generator 1B

A. Hot Leg Manway Bolts: (16) 1-7/8"-8UN x 8" LG.

1. One of the sixteen bolts became damaged while being used to swing the manway aside. This bolt was not inspected since it was necessary to drill it out. The bolt was replaced during reassembly.

2. No reportable indications were discovered via the ultrasonic examination.

3. A visual inspection detected surface imperfections which were consistent with those found on the Steam Generator 1A manway bolts. Bolt BH-1 was replaced after being reported as unsatisfactory due to excessive wear on the shaft (located 5/8 inch from bolt head).

*4. No reportable indications were revealed by the magnetic particle examination.

*The magnetic particle examination was limited due to surface imperfections, which in some cases resulted in false indications.

B. Cold Leg Manway Bolts: (16) 1-7/8"-8UN x 8" LG.

1. One of the bolts was badly galled during manway removal and therefore was not examined. The bolt was drilled out and subsequently replaced.

2. Ultrasonic examination revealed no reportable indications.

3. Minor dents and scratches on the shaft and threads were found by visual examination. Also, rough surfaces on the bolt heads were observed. These surface imperfections can be attributed to repeated disassembly and assembly during previous outages.

*4. No reportable indications were found by magnetic particle inspection.

IV. Pressurizer Safety Valve, PR-3B

A. Flanged Pressure Boundary Connection Studs: (12) 1-3/8"-8UN x 11 1/4" LG.

1. Ultrasonic examination detected no reportable indications.

2. Visual examination revealed the existence of minor dents and nicks on the studs. Also noted were several reportable linear indications (see below).

3. Magnetic particle inspection revealed that four of the twelve studs had reportable indications. Three of the four studs had single axial linear indications that ran the entire bolt length of 11.25 inches. The fourth stud had two indications that were 1/4 inch apart. Both were axial linear indications; one was 11.25 inches long and the other was 7.75 inches long. All four studs were replaced.

V. Valve Bonnet Bolting

A. RHR-2A: (16) 1-3/8"-8UN-2A x 8 1/2" LG.

1. No reportable indications were detected by means of visual, ultrasonic, or magnetic particle examinations.

B. RHR-11: (16) 1-7/8"-8UN-2A

1. No reportable indications were found by ultrasonic, visual, or magnetic particle inspections.

*The magnetic particle examination was limited due to surface imperfections, which in some cases resulted in false indications.

C. SI-21A: (16) 1-3/4"-8UN-2A x 8-1/2" LG.

1. Ultrasonic inspection revealed no reportable indications.

2. Visual examination revealed that all studs have minor nicks on the threads.

3. No reportable indications were observed by magnetic particle inspection.

D. SI-22A: (16) 1-3/4"-8UN-2A x 8-1/2" LG.

1. There were no reportable indications found via an ultrasonic inspection.

2. No reportable indications were observed by visual examination.

3. Five studs were found to have reportable indications by magnetic particle inspection. Each of the studs had a single axial linear indication. The length of the indications ranged from 17/32 inches to 6-7/8 inches. All five studs were replaced.

E. SI-303A: (12) 1-1/4"-8UN x 6-1/2" LG.

1. Ultrasonic testing revealed no reportable indications.

2. A visual examination detected minor nicks on the threads of two studs.

3. No reportable indications were found by magnetic particle examination.

All of the axial linear indications reported in the above summary were manufacturing defects (i.e.; very thin laps or seams). These indications existed only on the stud surface; none were detectable by ultrasonic examination. All studs identified with these indications were subsequently replaced. No boric acid corrosion wastage was found on any of the fasteners that were examined.

In accordance with the requirements of Action Item 1, a general maintenance procedure has been written in order to provide guidance for proper bolting practices. The procedure includes provisions for maintenance personnel training, component isolation for maintenance, cleaning of threaded fasteners, gasket installation, application of thread lubricant, recommended torque patterns, and progressive torque iterations. General bolting techniques and proper tool usage were not proceduralized as they are part of the mechanics' training and background. This procedure is presently under review and will be issued prior to July 29, 1983. The procedural review is being conducted at this time so that the effective maintenance practices employed during the past outage can be included in the text of the procedure. Also, in this manner, any problems identified in our bolting practices can be resolved prior to issuing the procedure.

Adequate Quality Control measures for the selection and use of fastener lubricants are in place at the Kewaunee Nuclear Power Plant. Lubricants are ordered in accordance with established QA practices. For QA-1 applications, the lubricant is required to be furnished with certification. Strictly nickel-based lubricants are used on reactor coolant pressure boundary components; lubricants formulated with copper or molybdenum disulfide are avoided. No injection sealant compounds are used on primary side components.

The staff time required to perform the requested inspection was approximately 850 man-hours. This estimate includes the actual inspection time as well as the time required to perform the additional stud cleaning. The total radiation exposure received by all inspection personnel was no more than one rem. The staff time expended to prepare this report and the required maintenance procedure was approximately 125 man-hours.

Very truly yours,

Carl W. Giesler
Vice President - Nuclear Power

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cc - Mr. S. A. Varga, US NRC
Mr. Robert Nelson, US NRC
Director, Office of I&E - US NRC

Subscribed and Sworn to
Before Me This 14th Day
of July 1983

Jeanne M. Stein
Notary Public, State of Wisconsin

My Commission Expires:
June 28, 1987