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January 19, 1983
IPN-83-6

Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing

Subject: Indian Point 3 Nuclear Power Plant
Docket No. 50-286
Response to NRC Request for Information Concerning
Steam Generator Girth Weld Repair Program

Dear Sir:

Attachment A to this letter provides responses to NRC questions concerning the girth weld repair program of the Indian Point 3 steam generators. Authority and Westinghouse personnel, and NRC staff discussed the aforementioned questions at a meeting held at the Indian Point 3 site on December 20, 1982.

Should you or your staff have any questions, please contact Mr. P. Kokolakis of my staff.

Very truly yours,

C. M. Wilverding

for J. P. Bayne
Executive Vice President
Nuclear Generation

Att.

A001

cc: Resident Inspector's Office
Indian Point Unit 3
U.S. Nuclear Regulatory Commission
P.O. Box 38
Buchanan, New York 10511

ATTACHMENT A

RESPONSE TO NRC
REQUEST FOR INFORMATION
CONCERNING GIRTH WELD REPAIR PROGRAM

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286
JANUARY 1983

ITEM 1

Provide the dose base line estimates by major task and the actual doses received to date.

RESPONSE

Table 1.1 provides the dose estimates per task for the girth weld repair program. The above table includes the dose estimates for the Authority and all other contractor personnel involved in the repair program. As of December 31, 1982 the total dose was 96 man-rem, which represents 26% of the estimated total for the repair. With 25% of the girth weld repair complete the original dose estimate is not expected to be exceeded.

TABLE 1.1

GIRTH WELD EXPOSURE ESTIMATES

Task	Man-Rem/Inch	Total Man-Rem
Grinding/Penetrant Testing	0.103	124
Welding	0.206	248
Sub Total Repair		372
Post Weld Heat Treatment and Final QA Inspections		59
Total		431

The exposure estimates were based on the following assumptions and bases:

a. Estimates include In process - QA/Engineering Support.

b. Assumes approximately 1200 linear inches of defective weld.

c. Based on information that suggests welding takes twice as long as grinding.

d. These figures are based on preliminary exposure information.

ITEM 2

Provide a discussion on the ALARA program that is being used for the Girth Weld Repair Program.

RESPONSE

The attached report 2.1 discusses the Girth Weld ALARA Program.

S/G GIRTH WELD REPAIR ALARA REPORT 2.1

I. INTRODUCTION

The repair program for the Indian Point 3 steam generators includes the cone upper girth weld repair of approximately 1200 linear inches of defective welds in the 4 steam generators. Since the repair program will involve substantial personnel radiation exposure, this report has been prepared to discuss the considerations for reducing exposure to personnel to a level which is as low as is reasonably achievable (ALARA).

II. GIRTH WELD ALARA PROGRAM

The program for keeping exposures ALARA will be conducted in view of the requirements of Regulatory Guide 8.8. The ALARA philosophy and the practical application of dose reduction techniques are considered in the light of the current state of technology and the economics of improvements to reduce dose.

A. Responsibilities

The responsibility for implementation and documentation of the ALARA Program is with the Senior Radiological Engineer, who is assisted by a radiological engineer. However, as with any quality ALARA program, the Health Physics Supervisors and the Health Physics Technicians are a very substantial part of the program, both in planning and in operational exposure reduction.

An organization control chart for the coordination of the complete Steam Generator repair ALARA program is presented in Attachment 1.

B. Training

In addition to the normal basic radiation protection and respiratory protection training, the following training is also provided:

1. Job Specific - Welders and Grinders receive training to get the "big picture" of the girth weld process and associated problems to familiarize them with the job. This includes training on a sample of a properly ground out crack, and examples of an acceptable penetrant test. In addition the welders must qualify to PASNY weld procedures. Also, pictures of the inside of the steam generators (secondary side) are shown to orientate the workers before entry.

   Girth Weld Workers are made aware of the radiation levels that are representative of the secondary side and receive training in specific IP3 Health Physics practices. The workers are also informed that there is water below the platforms for shielding.

C. Radiation Protection Program

1. Planning

All girth weld work will be performed under the control of a Radiation Exposure Authorization (REA). The REA provides health physics input into job planning so the job can be performed in a radiologically safe manner with the least practicable exposure. In addition, it is possible to obtain the man-rem exposure by REA.

2. Operations

Based on the potential man-rem expenditure, specific steps were or will be taken as necessary to keep doses to the minimum practicable exposure level. The following general methods are applicable:

a. H.P. Technicians dedicated to Girth Weld Repair will inform workers of radiation levels, stay times, respiratory and dosimetry requirements and any other necessary additional requirements.

b. Temporary Shielding

Temporary lead shielding is used as necessary to reduce radiation fields around the girth weld circumference. Four foot long blankets were hung from the inside of the feed water ring to provide shielding from the primary tube bundle. The blankets hang down and overlap the wooden platform upon which the boilermakers work. The maximum of 4000 lbs is not exceeded.

The secondary side is flooded to a level just beneath the work platforms, this standing water shield is used to provide a maximum amount of shielding from the tubes.

c. Local Ventilation

Each steam generator is ventilated by providing suction and supply via the secondary side manways and flexible ducting. This ventilation is provided for industrial hygiene purposes.

III. CONCLUSION

This report has discussed the various ALARA aspects of the steam generator girth weld repair program at IP3, and it is felt that the preparation and management attention given to the project will allow the girth weld operations to be performed with a reasonably low total man-rem expenditure, consistent with the amount of work performed.

ITEM 3

What are the Authority's commitments to the use of the appropriate codes?

RESPONSE

The steam generators will be repaired, inspected and tested in accordance with the applicable sections of the following codes:

1. ASME Boiler and Pressure Vessel Code, Section III, 1965 edition with Summer Addenda.

2. ASME Boiler and Pressure Vessel Code, Section IX, 1980 edition.

3. ASME Boiler and Pressure Vessel Code, Section XI, 1974 edition with 1975 Summer Addenda.

ITEMS 4

References to plant procedures to be used for grinding and welding.

RESPONSE

The Steam Generator Girth Weld Repair Planner and the Maintenance Procedure, Steam Generator Weld Repair, 3-CM-FS-8, provide the technical guidance and procedures to be used for the grinding and welding operations used in the the Girth Weld Repair Program.

ITEM 5

Provide an evaluation of cause/failure mechanism.

RESPONSE

The Authority's letter to the NRC dated November 17, 1982, (IPN-82-74) from J. P. Bayne to Darrell G. Eisenhut, provided our evaluation of the cause/failure mechanism for the girth weld cracking based on metallurgical data provided in the aforementioned submittal.

This evaluation hypothesized that the cracking is associated with nucleation sites which were mild corrosion pits in a highly stressed weld. The evidence suggests that this condition may be attributable to a less than adequate heat treatment when the vessel was manufactured. The cracks propagated under the normal cyclic loads in the presence of the high residual stress. The process was enhanced by the presence of corrosion mechanisms.

As of this date, no new information has been obtained that conflicts with the above hypothesis.

ITEM 6

Proposed future augmented monitoring if failure mechanism cannot be clearly identified.

RESPONSE

The Authority believes that the failure mechanism has been identified as outlined in the response to item 5, but the following is the ISI requirement that will be fulfilled prior to the units returning to operation. Thereafter, the requirements of Section XI will serve to monitor the vessels during the operation of the plant.

Base Line UT

a. The base line inspection will be performed after the vessel repair work has been accepted in accordance with ASME Section III, 1965 Edition, Summer 1965 Addenda.

b. Based on Section XI, Code requirement IWC-2100, para. "a" and Table 2520, a minimum of one hundred and five (105) inches of steam generator weld number six (6) is required to be inspected to establish a new base line. The 105 inches minimum can be inspected on any combination of the four steam generators (the initial preservice inspection consisted of 140", equally divided between steam generator 31 and steam generator 33). To establish a meaningful base line, both originally acceptable areas and repaired areas, at a length approximately equal to the previous baseline, will be selected. Follow-up inspection of the entire

weld number 6 baseline will be conducted at the proposed mid-cycle steam generator tube inspection and also the next refueling outage. Thereafter, the Authority will revert to the normal ISI inspection schedule.

ITEM 7

Discuss the test method to ensure steam generator integrity upon completion of the repair.

RESPONSE

(1) Upon completion of all welding, the weld circumference shall be inspected visually to determine uniform and proper fill-in of all repair welded grooves. In addition, a liquid penetrant examination of the entire girth weld ID surface will be performed.

(2) Upon completion of the visual and liquid penetrant examinations, a radiographic examination of the entire girth weld will be performed.

(3) Upon acceptance of the above inspections a post weld heat treatment of the girth weld will be performed.

(4) Upon completion of the post weld heat treatment, the steam generator will be hydrostatically tested.

(5) The entire circumference shall then be inspected by magnetic particle examination to confirm the absence of linear defects caused by weld or base metal cracking.

In-Service Inspection

(6) Final base line inspection shall be ~~performed by ultrasonic examination~~ in accordance with Section XI, 1974 edition, with the 1975 summer addenda.

ITEM 8

What methods will be used to qualify the 7018 weld metal used in the repair of the girth weld.

RESPONSE

All the lots of 7018 electrode to be used in the girth weld repair will be qualified in accordance with the 1980 ASME code, Section II part C, SFA 5.1. Although not required by the code, a second test assembly will be stress relieved at 1150 ± 25°F for one hour prior to performing the same tests as specified in SFA 5.1.