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HL-1636
001544

May 20, 1991

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

PLANT HATCH - UNIT 2
NRC DOCKET 50-366
OPERATING LICENSE NPF-5
IGSCC FLAW EVALUATIONS AND WELD OVERLAY DESIGN
UNIT 2 SPRING 1991 MAINTENANCE/REFUELING OUTAGE

Gentlemen:

During the Spring 1991 Unit 2 refueling outage, Georgia Power Company (GPC) inspected intergranular stress corrosion cracking (IGSCC) susceptible welds per our commitments to Generic Letter (GL) 88-01 and NUREG-0313, Revision 2. As a result of these inspections, one 12" feedwater weld was determined to contain reportable indications. We discussed our findings and proposed course of action with the NRC Staff and have completed our repair and inspections associated with reportable indications in this weld. Enclosure 1 provides the information required by GL 88-01 and requested by the NRC Staff. Enclosure 2 is a detailed report on the feedwater flaw evaluation and repair, including weld overlay design and as-built information. This letter satisfies our reporting requirements relative to this issue and GPC is requesting permission, as required by the GL, to restart Unit 2. A full report of the results of inservice inspection (ISI) activities will be submitted in the Owner's Data Report, Form NIS-1.

Please contact this office if you have questions.

Sincerely,

J. T. Beckham, Jr.

GKM/et

Enclosures:
1. Feedwater Weld Flaw Evaluation and Repair
2. "Evaluation and Repair of Flaw Indications in the Feedwater Safe-End to Extension Weld at Hatch Unit 2", SIR-91-028, May 1991

c: (See next page)

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ENCLOSURE 1

PLANT HATCH - UNIT 2
NRC DOCKET 50-366
OPERATING LICENSE NPF-5

FEEDWATER WELD FLAW EVALUATION AND REPAIR

This Enclosure, and the detailed Structural Integrity Associates (SIA) report contained in Enclosure 2, provide information on Unit 2 feedwater weld flaws detected during the current Unit 2 Spring 1991 maintenance/ refueling (M/R) outage.

EXAMINATION SCOPE

There are 21 NUREG-0313 category D circumferential welds at Plant Hatch Unit 2. Twelve are located in the feedwater safe-end configurations (3 associated with each feedwater line), four are located at the Core Spray safe-ends, four are located at the Jet Pump instrument nozzle, and one is the CRD return line nozzle cap. During the Spring 1991 M/R outage 12 category D welds (six of the feedwater welds, two of the core spray welds, and all four of the jet pump instrument nozzle welds) were ultrasonically examined as part of GPC's normally scheduled examinations. Figures 1 through 4 show the location, materials, and shop/field data for the welds associated with the four feedwater lines and Table 1 lists each category D weld initially selected for inspection.

INITIAL EXAMINATION RESULTS

Of the twelve welds examined, feedwater weld 2B21-1FW-12AA-9 (see Figure 1) was determined to have reportable and unacceptable indications. The subject weld material is Inconel 182 and joins an Inconel 600 safe-end extension to an Inconel 600 safe-end. This weldment contains three identified flaws that are axially oriented.

These indications originate near or in the root of the weld and terminate in the weld material on the safe-end extension side. Quantification as to whether the crack originated in the base material near the root of the weld or in the root of the weld is not readily obtainable, since the precise location of the root is ultrasonically indeterminate in the area of the indications.

Using a combination of EPRI NDE Center qualified sizing techniques, the indications were evaluated and sized. The indications are all contained in approximately 2 inches of the circumference (25" to 27" CW from TDC) and have a thru-wall dimension of approximately 50% to 75%, with a length of less than 0.5".

FEEDWATER WELD FLAW EVALUATION AND REPAIR

EXAMINATION TECHNIQUES

All IGSCC inspections at Plant Hatch are performed with equipment and personnel which are appropriately qualified at the EPRI NDE Center. Inconel welds, buttering, and base material are examined using refracted longitudinal (RL) wave transducers to ensure adequate penetration. Stainless steel welds are generally examined using shear wave techniques.

The indications on the subject weld were detected through an automated P-SCAN examination using a 60 degree RL transducer. Verification of the indications was performed using multiple manual RL scans. Sizing was performed manually using several of the EPRI NDE Center qualified tip diffraction methods. All manual techniques are essentially identical to those utilized during the previous examination of this weld.

PREVIOUS EXAMINATION HISTORY

Weld 2B21-1FW-12AA-9 is examined every other outage to meet the requirements of NUREG-0313, Rev. 2, with the most recent past examination having been performed in 1989. During the 1989 examination, manual 45 degree RL transducers were used as the primary technique. Indications were found using the 45 degree RL, in the general vicinity of these new indications. However, they had little or no depth and could not be confirmed using a supplemental 60 degree RL examination, and were subsequently characterized as geometrical in nature.

SCOPE EXPANSION

The remaining nine category D circumferential welds were examined during this outage (See Table 2) and no reportable indications were detected. The recirculation inlet nozzle thermal sleeve attachment (RINTSA) weld deposits located on the ID of each Recirculation System inlet nozzle are also categorized by Georgia Power Company as category D; however, these are attachment welds only which we have conservatively placed in category D. Five of the ten RINTSA welds were examined this outage, with no indications reported. Therefore, we have determined that scope expansion into these welds is not appropriate.

FLAW DISPOSITION

SIA prepared flaw evaluations and a weld overlay repair design. As discussed above, this weld contains three identified flaws which are axially oriented. The flaws were evaluated as if they resulted from IGSCC, since we believe this conservatively bounds weld flaw behavior due to other possible causes, such as thermal fatigue or fabrication defects.

FEEDWATER WELD FLAW EVALUATION AND REPAIR

These flaws did not present a significant structural concern, even if through the original component wall, since they are axially oriented. However, repair was considered to be necessary based upon ASME Section XI and guidance in NUREG-0313, Revision 2. NUREG-0313 Paragraph 4.4.2 notes that a component with axial flaws will generally benefit from weld overlay. Further, because of the observed depth of the flaws (75% max), GPC elected to make a standard weld overlay repair.

REPAIR

Figure 2 of the SIA report (Enclosure 2) represents the repair design utilized for this location. The design basis for this design is the NUREG-0313 Rev. 2 "Standard Weld Overlay" which is based upon an assumed 360 degree "thru-wall" circumferential flaw. This assumption is very conservative for the observed flaws.

The repair includes consideration of several features which are unique to this particular location. These include:

1. The flaws are located on the feedwater inlet piping, upstream of the thermal sleeve annulus. This distinguishes the location from other feedwater flaws that have recently been detected in the industry. The inside surface is exposed to feedwater flow, rather than the nearly stagnant flow in the annular region, so it is unlikely that a crevice chemistry will be established to drive the flaws.

2. The weld material is Inconel 182 and the base metal on either side is Inconel 600 material. The repair was made using ERNiCr-3 weld metal deposited by the gas tungsten arc welding (GTAW) process (the ERNiCr-3 material which was used on this repair is chemically the same as the trade name Inconel 82).

3. The flaws appear to be largely confined to the weld metal.

4. Because of the flaw location, the repair as shown will not impact any carbon steel material, and neither temper bead processes nor post weld heat treatment were required.

As noted above, the design was based upon assuming the NUREG "Standard Weld Overlay" would be required. In addition, the design includes an allowance for continued crack growth into the weld overlay. There is some possibility of IGSCC propagation in Inconel 82 material exposed to sulfur bearing environments. Such environments are not anticipated at this

location in the feedwater system, due to the high normal feedwater flow. However, for additional conservatism in the present design, crack growth in worst case environments is considered in the repair design and analysis. It should be noted that NUREG-0313 considers Inconel 82 material to be resistant to IGSCC, so the design basis for the present repair is conservative with respect to NUREG-0313 requirements.

Because of the thermal sleeve junction on the inside surface and because of the flaws themselves, the welding was sequenced such that all passes began at the safe-end taper, and proceeded toward the feedwater piping end of the repair.

This sequence represents good welding practice and minimizes the risk of blow-throughs and resulting stresses in the region of the thermal sleeve junction. On the safe-end side of the repair, the weld overlay was blended into the transition region. Following repair, surface and volumetric inspections were performed with no reportable indications detected in the weld overlay, and the weldment has been reclassified as category "E" in accordance with NUREG-0313, Rev. 2.

GPC believes that our evaluation and repair of feedwater weld 2B21-1FW-12AA-9 is very conservative for this case with respect to the requirements of NUREG-0313, Rev. 2 and this submittal satisfies our commitment relative to IGSCC reports for the Unit 2 Spring 1991 outage. A full report of the results of Inservice Inspection (ISI) activities will be submitted per the Owners Data Report, Form NIS-1.

TABLE 1

EDWIN I. HATCH UNIT 2
IGSCC CATEGORY D WELD INSPECTIONS
1991 SCHEDULED EXAMINATION

WELD	DESCRIPTION	PREVIOUS EXAM	STATUS
Feedwater Nozzle A (2B21-1FW)			
12AA-8	Carbon Steel Trans. Piece to Inconel Safe-end Ext.	1989	Exam Complete. No reportable indications.
12AA-9	Inconel Safe-end Ext. to Inconel Safe-end	1989	3 Axial Indications primarily in weld material.
12AA-10	Inconel Safe-end to Carbon Steel Trans. Piece	1989	Exam Complete. No reportable indications.
Feedwater Nozzle B (2B21-1FW)			
12AB-11	Carbon Steel Trans. Piece to Inconel Safe-end Ext.	1989	Exam Complete. No reportable indications.
12AB-12	Inconel Safe-end Ext. to Inconel Safe-end	1989	Exam Complete. No reportable indications.
12AB-13	Inconel Safe-end to Carbon Steel Trans. Piece	1989	Exam. Complete. No reportable indications.
Jet Pump Inst. Nozzle (2B31-1RC)			
4JP-A-1	Nozzle 2N8A to Safe-end	1988	Exam Complete. No reportable indications.
4JP-A-2	Safe-end to Penet. Seal	1988	Exam Complete. No reportable indications.
4JP-B-1	Nozzle 2N8B to Safe-end	1988	Exam Complete. No reportable indications.
4JP-B-2	Safe-end to Penet. Seal	1988	Exam Complete. No reportable indications.

Core Spray Nozzle B (2E21-1CS)			
10B-19	Pipe to Safe-end	1988	Exam Complete. No reportable indications.
10B-20	Safe-end to Nozzle 2N5B	1988	Exam Complete. No reportable indications.
Recirc. Inlet Nozzle Attachment Welds			
2N2F,G, H,J,K	RINTSA Welds	1988	Exams Complete. No reportable indications. RINTSA welds on 2N2A-E were examined in 1989 and are scheduled for 1992.

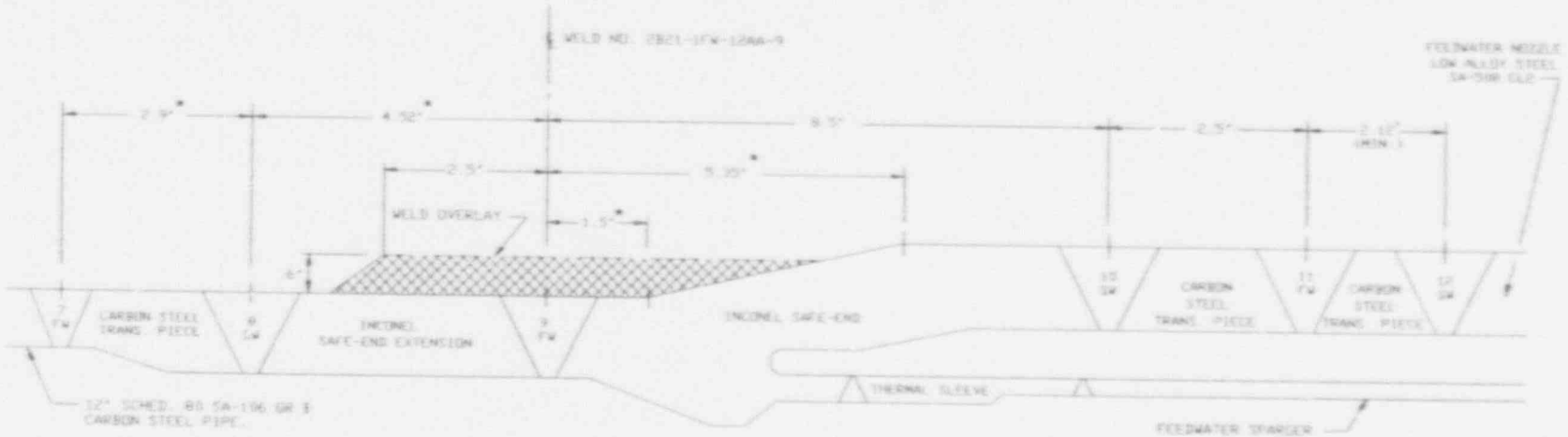
TABLE 2

EDWIN I. HATCH UNIT 2
IGSCC CATEGORY D WELD INSPECTION
EXPANDED SCOPE

WELD	DESCRIPTION	PREVIOUS EXAM	STATUS
Feedwater Nozzle C (2B21-1FW)			
12BC-11	Carbon Steel Trans. Piece to Inconel Safe-end Ext.	1989	Exam Complete. No reportable indications.
12BC-12	Inconel Safe-end Ext. to Inconel Safe-end	1989	Exam Complete. No reportable indications.
12BC-13	Inconel Safe-end to Carbon Steel Trans. Piece	1989	Exam Complete. No reportable indications.
Feedwater Nozzle D (2B21-1FW)			
12BD-8	Carbon Steel Trans. Piece to Inconel Safe-end Ext.	1989	Exam Complete. No reportable indications.
12BD-9	Inconel Safe-end Ext. to Inconel Safe-end	1989	Exam Complete. No reportable indications.
12BD-10	Inconel Safe-end to Carbon Steel Trans. Piece	1989	Exam Complete. No reportable indications.
Control Rod Drive (2C11-1CRD)			
3-R-1	2N9 Nozzle to Cap	1989	Exam Complete. No reportable indications.
Core Spray Nozzle A (2E11-1CS)			
10A-20	Pipe to Safe-end	1989	Exam Complete. No reportable indications.
10A-21	Safe-end to Nozzle 2N5A	1989	Exam Complete. No reportable indications.

FIGURE 1

HATCH UNIT 2 SAFE-END ASSEMBLY
FEEDWATER NOZZLE 2N4A



LEGEND

FW = FIELD WELD
SW = SHOP WELD
* FIELD MEASUREMENT

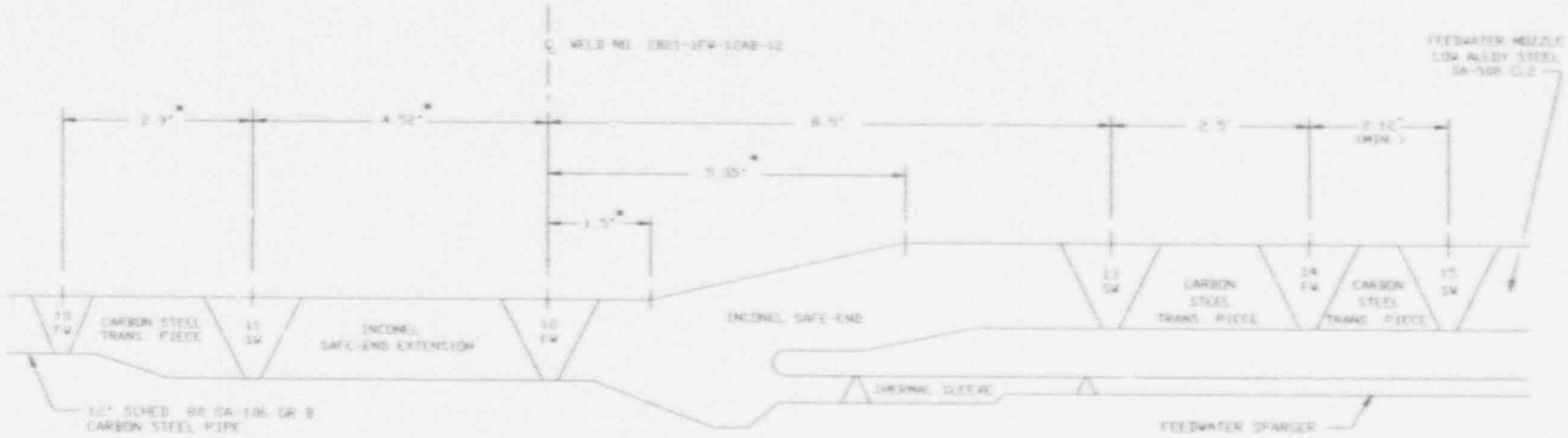
NOTES:

(1) FIELD MEASURED DIMENSIONS (*) APPLY TO 2N4A ONLY. CONFIGURATIONS FOR NOZZLES 2N4B AC AND AD SHOULD BE SIMILAR.

(2) SECTION DIMENSIONS SHOWN MAY VARY SLIGHTLY FROM ACTUAL AS-BUILT CONDITIONS.

FIGURE 2

HATCH UNIT 2 SAFE-END ASSEMBLY
FEEDWATER NOZZLE 2N4B



LEGEND

FW = FIELD WELD
SW = SHOP WELD
* FIELD MEASUREMENT

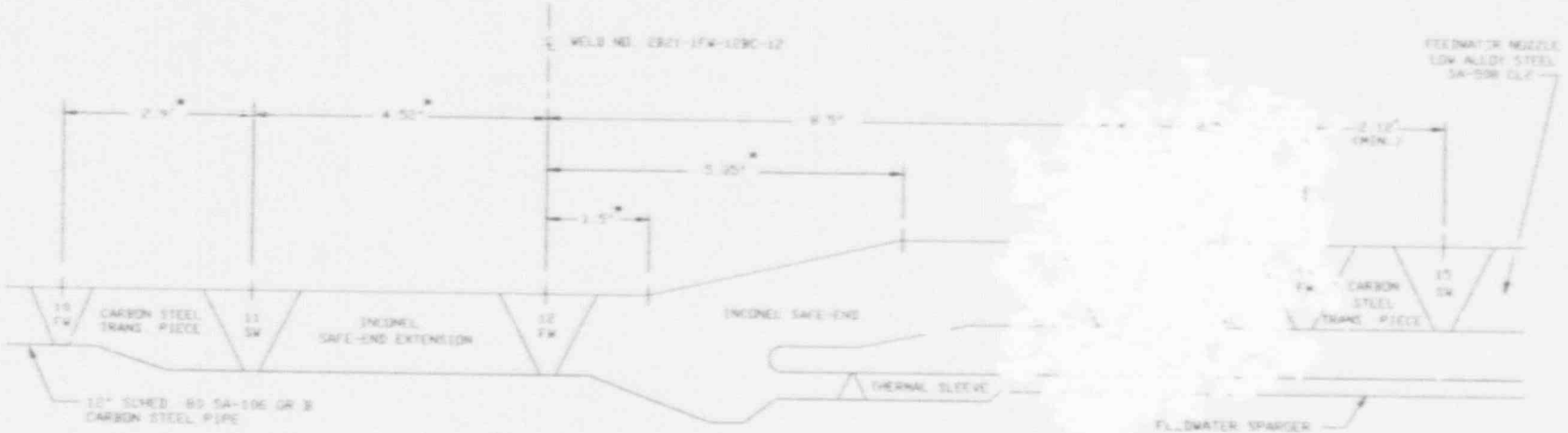
NOTES:

(1) FIELD MEASURED DIMENSIONS (*) APPLY TO 2N4A ONLY. CONFIGURATIONS FOR NOZZLES 2N4B, 4C AND 4D SHOULD BE SIMILAR.

(2) DESIGN DIMENSIONS SHOWN MAY VARY SLIGHTLY FROM ACTUAL AS-BUILT CONDITIONS.

FIGURE 3

HATCH UNIT 2 SAFE-END ASSEMBLY
FEEDWATER NOZZLE 2N4C



LEGEND

FW = FIELD WELD
SW = SHOP WELD
* FIELD MEASUREMENT

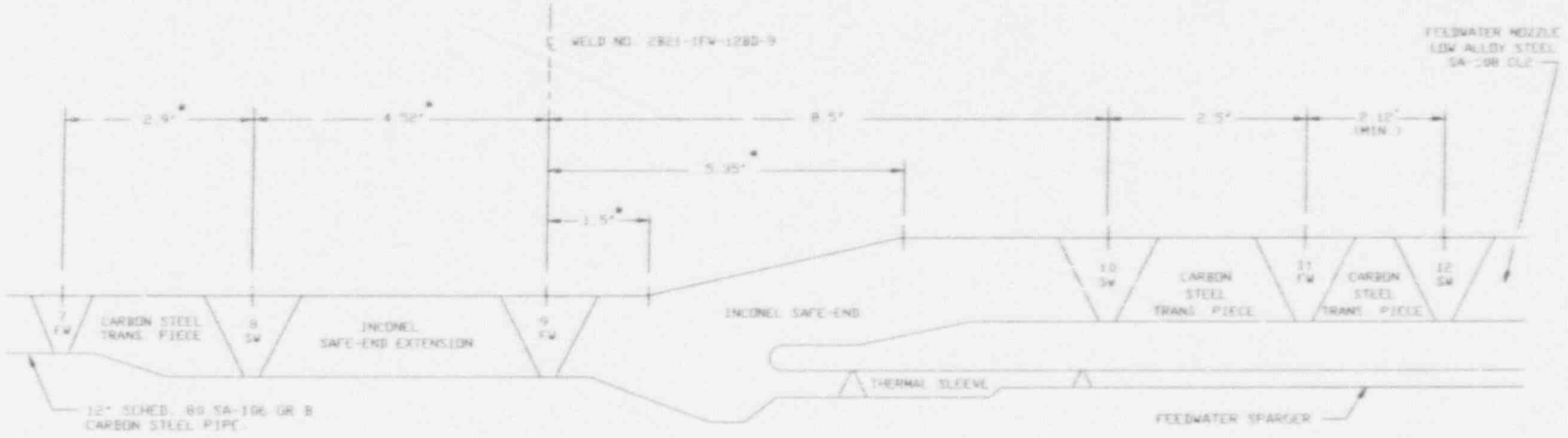
NOTES:

(1) FIELD MEASURED DIMENSIONS (*) APPLY TO 2N4A ONLY. CONFIGURATIONS FOR NOZZLES 2N4B, 4C AND 4D SHOULD BE SIMILIAR.

(2) DESIGN DIMENSIONS SHOWN MAY VARY SLIGHTLY FROM ACTUAL AS-BUILT CONDITIONS.

FIGURE 4

HATCH UNIT 2 SAFE-END ASSEMBLY
FEEDWATER NOZZLE 2N4D



LEGEND

FW = "FIELD" WELD
SW = SHOP WELD
* FIELD MEASUREMENT

NOTES:

(1) FIELD MEASURED DIMENSIONS (*) APPLY TO 2N4A ONLY. CONFIGURATIONS FOR NOZZLES 2N4B,4C AND 4D SHOULD BE SIMILIAR.

(2) DESIGN DIMENSIONS SHOWN MAY VARY SLIGHTLY FROM ACTUAL AS-BUILT CONDITIONS.