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Carolina Power & Light Company

September 6, 1979

FILE: NG-3513(R)

SERIAL: GD-79-2186

Mr. James P. O'Reilly, Director
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
LICENSE NO. DPR-23
DOCKET NO. 50-261
RESPONSE TO IE BULLETIN 79-17
PIPE CRACKS IN STAGNANT BORATED WATER SYSTEMS

Dear Mr. O'Reilly:

We have reviewed the subject bulletin and have completed the necessary reviews. Attached are the responses to Item 1 of the bulletin. The items listed in Item 1 are addressed separately in the attachment. All examinations required by Item 2 of the bulletin will be performed on the 2 1/2-inch diameter and larger piping listed in this response.

Item 2 of the bulletin requires an extensive NDE program to be implemented for those portions of the systems identified as containing stagnant borated water. Included in this program is a complete visual examination of all normally accessible pipe welds in accordance with Subsection IWA, paragraph IWA-2210 of Section XI of the ASME B&PV Code.

As apparent from the bulletin and conversations with the NRC Staff, the inspection is to determine the presence of intergranular stress corrosion cracking, originating from the pipe ID. Therefore, the intent of the visual examinations is to detect any through-wall cracks associated with this type of phenomenon. Realizing the intent of this requirement, the examinations will be performed using a procedure developed specifically to identify this type of indication. The appropriate portions of Article IWA-2000 and Article 9 of Section V will be used in the development of this procedure. Evidence of such cracking found during the visual examination will be verified by additional inspections (i.e., surface and/or volumetric) prior to reporting the condition.

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In addition to the visual inspections required, the bulletin also requires a liquid penetrant surface examination and a volumetric examination using ultrasonic techniques on 10% (by schedule and diameter) of all pipe welds of normally accessible portions of the listed systems. The bulletin requires, in part, procedures for ultrasonic examinations yield a demonstrated effectiveness in detecting stress corrosion cracking in austenetic stainless steel piping. From discussions with members of the Region II staff and personnel at the utility which experienced the most recent problems, additional clarification is forthcoming from your staff relating to the requirements associated with the procedures necessary for making the required examinations.

The third portion of Item 2 requires that if cracking is identified by any of the NDE methods, all welds of safety-related piping systems and associated subsystems containing stagnant borated water shall be subject to volumetric examination and repair. Due to the number of welds involved, it is proposed that in the event that stress corrosion cracking is identified, the number of welds on normally accessible pipe to be examined shall be increased to 25 percent for the affected system and shall apply to the individually affected pipe diameter and wall thickness for the system, all of which shall be randomly selected. If stress corrosion cracking is identified in any of the additional welds, all remaining welds on piping for that system of the same diameter and wall thickness shall be volumetrically examined. This sampling is similar to the examination frequencies established in Section XI of the ASME B&PV code.

It is the intent of CP&L to complete the requirements of this bulletin in an expeditious manner. Due to the magnitude of the examination program, if the examination were to commence immediately, it would probably take the remainder of the 90 days allotted in Item 6 of the bulletin. In conjunction with this, as discussed above, there remain unsettled concerns about the requirements associated with verification of the ultrasonic procedures to be used. Discussions with Region II staff members have indicated that further guidance with respect to these procedures is forthcoming. Based on the concerns listed above, an extension of 60 days to the time allotted in Item 6 is necessary. Therefore, all examinations required by Item 2 will be completed by December 23, 1979, and a report will be submitted no later than January 22, 1980.

If this extension is unacceptable, or if there are other questions relating to the bulletin response, please contact me.

Yours very truly,

B. J. Furr
Manager
Generation Department

CSB:jmb*

Attachments

cc: Mr. V. Stello

RESPONSE TO IE BULLETIN NO. 79-17

PIPE CRACKS IN STAGNANT BORATED WATER SYSTEMS AT PWR PLANTS

Item No. 1

Conduct a review of safety-related stainless steel piping systems within 30 days of the date of this bulletin to identify systems and portions of systems which contain stagnant, oxygenated borated water. These systems typically include ECCS, decay/residual heat removal, spent fuel pool cooling, containment spray, and borated water storage tank (BWST-RWST) piping.

Response

Based on the information presented in the bulletin and discussions with the NRC Staff, a stagnant system or portion of a system is defined as one which does not contain flowing water during normal operation. A review of the systems containing borated water has been completed. A list of the systems containing stagnant portions is presented below.

1. Safety Injection System

   High Head Injection (Hot and Cold Leg Injection)
   Containment Spray
   RWST Outlet Piping
   RHR to High Head Suction Connect
   RWST to SI, RHR, CVCS, and CS Pump Suction
   Accumulator Piping
   CV Sump to Low Head Suction

2. Residual Heat Removal System

3. Chemical and Volume Control System

4. Waste Disposal System

5. Reactor Coolant System

6. Spent Fuel Pit Cooling System

In order to complete our response, the following list of the individual pipe lines which contain stagnant borated water in each system is provided. Pipe sizes and schedules are provided in this list. From the bulletin descriptions and discussions with the staff, it was determined that the problem areas are in the heat-affected zone of welds on piping 2 1/2 inches in diameter and larger. For this reason, only lines 2 1/2 inches and larger are specifically identified in the list. Lines with stagnant borated water, less than 2 1/2 inches in diameter, are described in the list but are not individually identified, as with the larger lines.

The following code is provided to facilitate identification of the accessibility of the piping described:

| | |
|---|---|
| A | Fully accessible for visual, volumetric, and surface examinations. |
| HR-V | High radiation area available for visual examination only - outside C.V. |
| HR-IN | High radiation area totally accessible - outside C.V. |
| CV-IN | Inside C.V. - Inaccessible |
| HT-IN | Heat traced - Inaccessible |
| NOTE: | The total accessibility of each weld due to physical barriers have not been identified at this time. Such limitations, if applicable, will be recorded on the field data sheets, evaluated, and reported with the results. |

## SAFETY INJECTION SYSTEM PIPING (2 1/2 INCHES AND LARGER)

| Line No. | Description | Accessibility | Line Size | Pipe Sch. (Wall Thick) |
|---|---|---|---|---|
| SI-4 | RWST Outlet | A | 16" | (1/4") |
| SI-14 | RWST Drain | A | 6" | 10S |
| SI-2 | RWST to SI Pump | A | 12" | 40 |
| SI-9 | "C" SI Pump Suction | A | 6" | 10S |
| SI-10 | "B" SI Pump Suction | A | 6" | 10S |
| SI-11 | "A" SI Pump Suction | A | 6" | 10S |
| SI-28 | "B" CS Pump Suction | A | 8" | 10S |
| SI-29 | "A" CS Pump Suction | A | 8" | 10S |
| SI-1 | RWST to RHR Pumps | A/HR-V | 14" | (1/4") |
| SI-82 | RWST to Charging Pumps | A | 4" | 10S |
| SI-88 | From RHR HX to "C" SI | A/HR-V | 6" | 10S |
| SI-89 | From RHR HX to "B" SI (to SI88) | A/HR-V | 6" | 10S |
| SI-16 | RHR to RWST (887 to RWST) | A | 10" | 10S |
| SI-30 | CS Pump B Discharge | A | 6" | 40S |
| SI-31 | CS Pump A Discharge | A | 6" | 40S |
| SI-34 | CS A to CV | A | 6" | 40/10 |
| SI-41 | CS B to CV | A | 6" | 40/10 |
| SI-44 | Cont. Sump to RHR | CV-IN | 14" | 40 |
| SI-45 | Cont. Sump to RHR | CV-IN | 14" | 40 |
| SI-93 | From SI88 to SI10 VIA 886D | A | 6" | 10S |
| SI-94 | RHR HX A to 863A | A/HR-V | 8" | 40S |
| SI-95 | RHR HX B to 863B | A/HR-V | 8" | 40S |
| SI-84 | A RHR HX to SI Pumps | A/HR-V | 6" | 40S |
| SI-85 | B RHR HX to SI Pumps | A/HR-V | 6" | 40S |
| SI-12 | "C" SI Pump Discharge | A | 3" | 80S |
| SI-13 | "B" SI Pump Discharge | A | 3" | 80S |

| | | | | |
|---|---|---|---|---|
| SI-126 | "A" SI Pump Discharge | A | 3" | 80S |
| SI-109 | SI-14 to SI-110 X CONN | A | 4" | 80S |
| SI-110 | SI CONN to BIT | A/HT-IN | 4" | 80S |
| | | | | |
| SI-16 | SI from BIT to Cold Legs | HT-IN/CV-IN | 4" | 80S |
| SI-14 | SI to Hot Legs | A/CV-IN | 3" | 80S |
| - | Pipe to 870 A&B* | HT/IN | 3" | 80S |
| - | Pipe to 867 A&B* | HT/IN | 3" | 80S |
| | | | | |
| SI-50 | A Accumul. to 865A | CV-IN | 10" | 40S |
| SI-51 | B Accumul. to 865B | CV-IN | 10" | 40S |
| SI-55 | C Accumul. to 865C | CV-IN | 10" | 40S |
| SI-47 | 865A to Loop 1 Cold Leg | CV-IN | 10" | 140 |
| SI-48 | 865B to Loop 3 Cold Leg | CV-IN | 10" | 140 |
| SI-54 | 865C to Loop 2 Cold Leg | CV-IN | 10" | 140 |

* Field-Installed Piping - No Number.

## RESIDUAL HEAT REMOVAL SYSTEM

| Line No. | Description | Accessibility | Line Size | Schedule (Wall Thick) |
|---|---|---|---|---|
| AC-146 | FE 608 Element | A | 3" | 40S |
| AC-1 | B RHR Pump Discharge | A/HR-V | 10" | 40S |
| AC-2 | A RHR Pump Discharge | A/HR-V | 10" | 40S |
| AC-9 | RCS Return to RHR Suction | A/CV-IN | 14" | 40S |
| AC-10 | A RHR Pump Suction | A/HR-V | 14" | 40S |
| AC-11 | B RHR Pump Suction | A/HR-V | 14" | 40S |
| AC-3 | RHR HX Bypass | A | 12" | 40S |
| AC-8 | RHR HX to RCS | A/CV-IN | 12" | 40S |
| - | RHR HCV-758 Bypass | A | 6" | 40S |
| AC-6 | B HX Outlet | A/HR-V | 10" | 40S |
| AC-7 | A HX Outlet | A/HR-V | 10" | 40S |
| SI-37 | Penetration to Accumulator A | CV-IN | 8" | 120 |
| SI-38 | Penetration to Accumulator B | CV-IN | 8" | 120 |
| SI-39 | Penetration to Accumulator C | CV-IN | 8" | 120 |
| SI-40 | Penetration to Accumulators | CV-IN | 10" | 140 |
| AC-9A | RHR Through Penetration | CV-IN | 12" | 40S |

CHEMICAL AND VOLUME CONTROL SYSTEM (2 1/2 INCHES AND LARGER)

| Line No. | Description | Accessibility | Line Size | Pipe Sch. (Wall Thick) |
|---|---|---|---|---|
| CH-55 | CVC Holdup Tank C Discharge | A | 4" | 10S |
| CH-56 | CVC Holdup Tank B Discharge | A | 4" | 10S |
| CH-57 | CVC Holdup Tank A Discharge | A | 4" | 10S |
| CH-74 | Recirc Pump to Holdup Tank C | A | 4" | 10S |
| CH-74A | Recirc Pump Discharge to Holdup Tank A | A | 4" | 10S |
| CH-74B | Recirc Pump Discharge to Holdup Tank B | A | 4" | 10S |
| CH-76 | RC Letdown to Line CH-74 | A | 3" | 10S |
| CH-73 | RCDT Pump Discharge to Holdup Tanks | A | 3" | 10S |
| CH-47 | RWST to Charging Pump Suction | A | 4" | 10S |
| CH-48 | RWST to Charging Pump Flow Control Valve Bypass | A | 4" | 10S |
| CH-13 | Seal Water Return System Filter Bypass | HR/V | 3" | 10S |
| CH-16 | Seal Water HX Bypass | HR/V | 3" | 10S |
| CV-IN | CVCS Charging Line to Loop 1 Hot Leg | CV-IN | 3" | 160 |

WASTE DISPOSAL SYSTEM PIPING (2 1/2 INCHES AND LARGER)

| Line No. | Description | Line Size | Schedule (Wall Thick) | Accessibility |
|---|---|---|---|---|
| WD-49 | RCDT Pumps Discharge Line | 3" | 10S | A |
| WD-52 | RCDT Pumps Discharge to Holdup Tanks | 3" | 10S | A |

# REACTOR COOLANT SYSTEM

| Line No. | Description | Accessibility | Line Size | Schedule (Wall Thick) |
|---|---|---|---|---|
| RC-23 | SI to RCS Loop 1 Cold Leg | CV-IN | 10" | 140 |
| RC-37 | SI to RCS Loop 3 Cold Leg | CV-IN | 10" | 140 |
| RC-15 | RCS to RHR Suction | CV-IN | 14" | 140 |
| RC-25 | CVC to Loop 1 Hot Leg | CV-IN | 3" | 160 |

## SPENT FUEL PIT COOLING SYSTEM

| Line No. | Description | Accessibility | Line Size | Schedule (Wall Thick) |
|---|---|---|---|---|
| AC-59 | Spent Fuel Pit Cooling Pump Suction | A | 4" | 10S |
| - | Emergency Cooling Connection | A | 4" | 10S |

The following is a brief description of lines 2 1/2 inches in diameter and under which contain stagnant borated water. No inspections pursuant to the bulletin requirements are planned for this piping.

RESIDUAL HEAT REMOVAL SYSTEM

- Pump discharge recirculation line
- RHR Relief Valve Tap
- Instrumentation Taps
- Vent Taps
- Drain Taps
- Flush Connection Taps
- Sample Taps

SAFETY INJECTION SYSTEM

- Accumulator Drains to WDS Taps
- Sample Taps
- SI System Mini-Flow Recirculation Test Lines
- Instrumentation Taps
- Drain Taps
- Vent Taps
- High Head SI to Hot and Cold Legs Inside C.V.
- SI and CS Pump Discharge Recirculation Lines
- Recirculation Lines Back to RWST
- CS Pump Eductor Lines
- Relief Valve Taps
- SFPC Refueling Water Purification Pump Suction

REACTOR COOLANT SYSTEM

- Safety Injection (high head) to Hot Legs
- Sample Taps

- Instrumentation Taps
- Excess Letdown Line
- Vent Taps
- Drain Taps
- Drain Lines to RCDT (WDS)
- Auxiliary Spray from CVCS

WASTE DISPOSAL

- Vent Taps
- Drain Taps
- CV Sump Pump Discharge CV Isolation Line
- RCDT to Refueling Water Purification Pump Suction

SPENT FUEL PIT COOLING SYSTEM

- Instrumentation Taps
- Vent Taps
- Drain Taps
- SFPC Loop to Purification System

CHEMICAL AND VOLUME CONTROL SYSTEM

- Letdown line to deborating cation and mixed bed demineralizers

- Boric Acid Tank Discharge and Recirculation Lines
- BAT Transfer Pumps to BIT
- Instrumentation Taps
- Sample Taps
- Vent Taps
- Drain Taps
- Holdup Tank to Gas Stripper Feed Pumps
- BAT to CVCS Charging Pumps
- Charging Pump to VCT Recirculation

- VCT Bypass
- Relief Valve Taps
- Filter Bypasses
- RCP Seal Bypass Lines
- Excess Letdown Lines

Item 1 (a)

Provide the extent and dates of the hydrotests, visual and volumetric examinations performed per 10 CFR 50.55a(g) (Re: IE Circular 76-06 enclosed) of identified systems. Include a description of the non-destructive examination procedures, procedure qualifications and acceptance criteria, the sampling plan, results of the examinations and any related corrective actions taken.

Response

The amount of testing performed per 10 CFR 50.55a(g) is limited to those inspections performed during the 1979 refueling outage. The total number of welds inspected on each line along with the method of examination is presented below.

| Line No. | Total Welds Inspected | Technique |
|---|---|---|
| RC-15 | 1 | UT, Visual |
| SI-47 | 2 | UT, Visual |
| SI-48 | 2 | UT, Visual |
| SI-54 | 2 | UT, Visual |
| 2" Cold Leg Injection | 3 | PT, Visual |
| AC-9 | 2 | UT, Visual |
| AC-10 | 1 | UT, Visual |
| AC-11 | 1 | UT, Visual |
| AC-9A | 1 | UT, Visual |
| AC-8 | 1 | UT, Visual |
| SI-37 | 1 | UT, Visual |
| SI-40 | 1 | UT, Visual |
| AC-2 | 2 | UT, Visual |
| AC-8 | 6 | UT, Visual |
| SI-94 | 1 | UT, Visual |
| SI-85 | 1 | UT, Visual |

The above listed inspections were performed under the guidelines of Section XI, ASME Code, 1974 Edition thru Summer 1975 Addenda.

In addition, welds on the piping in the following list were examined using Section XI, ASME Code, 1971 and the requirements of Technical Specification 4.2.

## 1973 OUTAGE

## MARCH 19 - 28, 1973

## 1971 SECTION XI, TECHNICAL SPECIFICATION 4.2-1

| | Lines Examined | Technique |
|---|---|---|
| Loop A | 10" SIS Nozzle Room (Weld #1) | Visual, UT |
| Loop A | 8" RHR Return (Weld #1 1NACC) | Visual, UT |
| Loop B | 8" RHR Return (Weld #1,2,3, IN. ACC, Fitting to Fitting-All) | Visual, UT |
| Loop C | 8" RHR Return Weld #2) | Visual, UT |
| Loop A | 10" SIS (Weld #3A & 4) | Visual, UT |
| Loop B | 10" SIS (Weld #3A & 4) | Visual, UT |
| Loop C | 10" SIS (Weld #4 & 5) | Visual, UT |
| Loop B | 14" RHR Take Off (Weld #5) | Visual, UT |
| Loop C | 2" SIS BIT (Weld #3) | Visual, PT |
| Loop B | 2" SIS BIT (Weld #1) | Visual, PT |
| | Auxiliary Spray 2" (Weld 1,2,3, & 4) | Visual, PT |
| Loop A | 2" SIS BIT (Weld #1) | Visual, PT |

## 1976 OUTAGE

## NOVEMBER 14 - 22, 1976

## SECTION XI UP TO & INCLUDING SUMMER 1972 ADDENDA TECH. SPEC. 4.2

| Lines Examined | | Technique |
|---|---|---|
| Loop B | RHR 14" Buttweld (Weld #6) | Visual, UT |
| Loop A | SIS 10" Buttweld (Weld #5) | Visual, UT |
| Loop B | SIS 10" Buttweld (Weld #5) | Visual, UT |
| Loop C | SIS 10" Buttweld (Weld 6 & 7) | Visual, UT |
| Loop B | RHR 8" Buttweld (Weld #1) | Visual, UT |
| Auxiliary Spray | 2" (Weld 5,6,7 & 8) | Visual, PT |

Operators performing examinations to the procedures are qualified to level II in accordance with SNT-TC-1A, its supplements and appendices as applicable for ultrasonic testing. Level I operators were employed as assistants.

Procedures used for ultrasonic testing of circumferential and longitudinal /Butt welds were Westinghouse Procedure ISI-2, 12 (Branch Connections) 5 & 205 and were approved by the "Authorized Inspector" prior to the start of examinations. Acceptance Standards are per IWB-3000 (74 Edition, Section XI) and the Construction Code (71 Edition, Section XI) and IWA3000 for Class II. No reportable type indications were found on any of the welds examined.

The sampling plans used for selection of examination are in accordance with Table IWB-2500 Category B-J for Class I and Table IWC-2520 Category C-F and C-G for Class II, Section XI, ASME Code (1974).

Table IS-251 Category J-1 was used for those examinations performed to the 1971 Edition of Section XI ASME Code.

For UT procedures during the 1979 outage, the following was required with respect to investigation and recording of indications.

All indications exceeding 20% of the primary reference DAC (40% of scanning DAC) shall be investigated to determine maximum response location and type of indication. Indications are generally categorized as flaw, geometric, or metallurgical.

All flaw indications which produce a response greater than 75 percent of the primary response reference level DAC curve will be investigated to the extent the examiner can characterize and report data relevant to the shape, orientation, location, and possible source of the indication producing area. Reflector length shall be determined by positioning the search unit such that the sound beam is directed perpendicular to the long axis of the discontinuity and by moving the transducer parallel with this axis in each direction from the position of maximum signal amplitude. The extremities of the discontinuity shall be defined as the points where the signal amplitudes drop to 50% of the calibrated DAC line. The size and location of reportable indications shall be recorded and reported.

Indications which are positively determined to result from the geometric configuration of the component and that exceed the recording level for flaws shall be acknowledged by recording the length and location, i.e. geo., from 175° to 270°.

Indications resulting from the metallurgical structure within the material shall be investigated and considered when assessing the effectiveness of the examinations. Restrictions or variations to the examination due to the metallurgical structure shall be reported.

Investigation and reporting of indications shall be performed at the reference frequency and sensitivity. Other frequencies, sizes or beam angles may be used as an aid in investigating or interpreting examination results.

All data relative to the inspection and flaw identifications are recorded. Earlier inspection procedures required the following:

Data sheets shall be completed for each weld examined with each weld positively identified by the designations provided in the instructions.

All recordable indications noted during the performance of these examinations shall be noted on the data sheet with precise details of the location. If no recordable defects whatsoever are noted during the examination of a weld, this fact shall be recorded on the data sheet. A permanent record shall be made of the DAC on the data sheet.

All indications which produce a response greater than 100 percent of primary reference level DAC curve shall be investigated to the extent that the operator can determine the shape, orientation, location and identity of the indication producing area. They shall also be fully evaluated as to length and amplitude of indication.

The following data shall be obtained and recorded:

1. Initial detection point - metal path.
2. The metal path at the maximum amplitude.
3. Maximum amplitude.
4. Terminal detection point - metal path.
5. Lateral transducer movement between initial and terminal detection points.

An indication is defined as any ultrasonic response where the amplitude visibly exceeds the ultrasonic noise level.

Evaluation of indications shall be performed at the scanning frequency and sensitivity. Other frequencies or variable angle transducers may be used as as aid in interpreting examination results.

Visual examination procedures comply with the applicable ASME Code, Section XI, as referenced above.

Hydrostatic testing performed on the lines listed above are limited to leak tests performed in accordance with the technical specifications. For the reactor coolant system, a hydrostatic test is performed at full temperature (535F) and 2335 psig. These tests are performed at start-up following refueling or opening of the RCS. For the RHR system, a leak check is performed annually to determine component leakages.

Examinations of piping in accordance with IE Circular 76-06 was presented in letters to Mr. Norman C. Moseley, Director of Region II, on December 22, 1976 and June 8, 1977. No further examinations in accordance with the requirements of the circular have been performed.

Item 1.(b)

Provide a description of water chemistry controls, summary of chemistry data, any design changes and/or actions taken, such as periodic flushing or recirculation procedures to maintain required water chemistry with respect to pH, B, Cl, F, $0_2$.

Response

Water chemistry is controlled by periodic sampling and analysis of the contents of various systems. A description of the samples taken, items analyzed, frequency of testing and limits for individual systems and/or components.

Reactor Coolant System

| | | |
|---|---|---|
| pH, | 5 days/week, | 4.2 - 10.5 |
| Boron, | 5 days/week, | no limit |
| Cl, | 5 days/week, | $\leq$0.15 ppm |
| Oxygen, | 5 days/week, | $\leq$0.1 ppm |
| Fl, | 5 days/week, | $\leq$0.15 ppm |

Pressurizer

| | | |
|---|---|---|
| pH, | 5 days/week | Limits not specified |
| Boron, | 5 days/week | Limits not specified |

| | | |
|---|---|---|
| Cl, | weekly | Limits not specified |
| Oxygen, | weekly | Limits not specified |

Residual Heat Removal System (When in service)

| | | |
|---|---|---|
| Boron, | 5 days/week, | Limits not specified |
| pH, | 5 days/week, | Limits not specified |

.....NOTE.....Same as RCS during refueling.

Boric Acid Storage Tanks A & B

| | | |
|---|---|---|
| Boron, | Mon.-Wed.-Fri., | 20,500 - 22,000 ppm |
| Cl, | Weekly, | Limits not specified |

Boron Injection Tank

| | | |
|---|---|---|
| Boron, | Mon.-Wed.-Fri., | 20,500 - 22,000 ppm |
| Cl, | Weekly, | Limits not specified |

Accumulators A, B, & C

| | | |
|---|---|---|
| Boron, | Monthly, | 2000 - 3000 ppm |

Primary Water Storage Tank

| | | |
|---|---|---|
| pH, | Weekly, | 5.8 - 8.0 |
| Oxygen, | Weekly, | Limits not specified |
| Cl, | Weekly, | $\leq$0.15 ppm |

Refueling Water Storage Tank

| | | |
|---|---|---|
| Boron, | Weekly, | 2050 - 2400 ppm |
| Cl, | Weekly | $\leq$0.15 ppm |
| F, | Weekly, | $\leq$0.15 ppm |

Spent Fuel Pit

| | | |
|---|---|---|
| Boron, | Prior to refueling, | 2050 - 3000 |
| Cl, | Weekly, | Limit not specified |

.....NOTE..... Boron sampled 5 days/week during refueling

The technical specification limits, frequency, and items to be checked for all the systems are provided in Table B-1.

In addition to the analyses required above, special samples are taken and recorded in the chemistry log periodically as operation requires. During the analyses, the same limits specified apply.

Routine chemistry results are reported on a "daily chemistry report", along with the date, technician performing the analyses, and any appropriate notations concerning the analyses. Items required by technical specifications which fall outside specified

limits are immediately reported to the Shift Foreman and a verification sample is taken and analyzed.

Corrective action as specified by the technical specifications is taken immediately.

Non-technical specification items which do not fall within limits are reported to the applicable foremen and supervisors and corrective action to return the item to within specified limits is initiated as soon as reasonably possible.

Portions of the piping systems listed are flushed on a minimum monthly basis during the periodic tests. These are lines associated with the RHR, SI and Containment Spray pump recirculation flow paths.

The boric acid storage tanks are recirculated a minimum of one hour every Monday, Wednesday & Friday. The BIT is recirculated with one of the boric acid storage tanks on the same schedule.

Makeup water to all boric acid systems is from the primary water supply which has chemistry controls as specified. Recycled boron and new boron added to the systems have limits for Cloride, as follows:

Recycled boron Cl $\leq .5$ ppm

New boric acid has a maximum of .00004% Cl. by weight.

<u>TABLE B-1</u>

<u>FREQUENCIES FOR SAMPLING TESTS</u>

| | | Check | Frequency | Maximum Time Between Tests |
|---|---|---|---|---|
| 1. | Reactor Coolant Samples | -Gross Activity (1) | Minimum 1 Per 72 hrs. | 3 days |
| | | -Radiochemical (2) | Monthly | 45 days |
| | | -Radiochemical for $\bar{E}$ Determination | 1 per 6 mos.(6)(7) | 6 months |
| | | -Isotopic Analysis for Dose Equivalent I-131 Concentration | 1 per 14 days (7) | 14 days |
| | | -Isotopic Analysis for Iodine Including I-131, I-133 and I-135 | a) Once per 4 hours (8)<br>b) One sample (9) | |
| | | -Tritium Activity | Weekly | 10 days |
| | | -Cl & $O_2$ | 5 day/week | 3 days |
| 2. | Reactor Coolant Boron | Boron concentration | Twice/week | 5 days |
| 3. | Refueling Water Storage Tank Water Sample | Boron concentration | Weekly | 10 days |
| 4. | Boric Acid Tank | Boron concentration | Twice/week | 5 days |
| 5. | Boron Injection Tank | Boron concentration | Weekly (5) | 10 days |
| 6. | Spray Additive Tank | NaOH concentration | Monthly | 45 days |
| 7. | Accumulator | Boron concentration | Monthly | 45 days |
| 8. | Spent Fuel Pit | Boron concentration | Prior to Refueling | NA* |
| 9. | Secondary Coolant | Gross activity<br>Isotopic Analysis for Dose Equivalent I-131 Concentration | Minimum 1 Per 72 hrs.<br>a) 1 per 31 days (10)<br>b) 1 per 6 months (11) | 3 days |
| 10. | Stack Gas Iodine & Particulate Samples | I-131 and particulate radioactivity releases | Weekly (3) | 10 days |
| 11. | Steam Generator Samples | Primary to secondary tube leakage | 5 days/week | 3 days |

(1) A gross activity analysis shall consist of the quantitative measurement of the total radioactivity of the primary coolant in units of uCi/gram

REV. 2

(2) A radiochemical analysis shall consist of the quantitative measurement of each radionuclide with half life greater than 30 minutes making up at least 95% of the total activity of the primary coolant.

(3) When iodine or particulate radioactivity levels exceed 10% of the limit in Specification 3.9.2.1 the sampling frequency shall be increased to a minimum of once each day.

(5) The boron concentration in the boron injection tank shall be checked immediately after any actuation of the safety injection system that might result in dilution of the boron concentration in the boron injection tank.

(6) Sample to be taken after a minimum of 2 EFPD and 20 days of power operation have elapsed since the reactor was last subcritical for 48 hours or longer.

(7) Samples are to be taken in the power operating condition.

(8) Samples taken at all operating conditions whenever the specific activity exceeds 1.0 uCi/gram DOSE EQUIVALENT I-131 or 100/$\bar{E}$ uCi/gram. These samples are to be taken with the specific activity of the reactor coolant system is restored within its limit.

(9) One sample between 2 and 6 hours following a thermal power change exceeding 15 percent of the rated thermal power within a one hour period. Samples are required when in the hot shutdown or power operating modes.

(10) Sample whenever the gross activity determination indicates iodine concentrations are greater than 10% of the allowable limit.

(11) Sample whenever the gross activity determination indicates iodine concentrations are below 10% of the allowable limit.

NA* - Not applicable

ITEM 1 (c)

Describe the preservice NDE performed on the weld joints of identified systems. The description is to include the applicable ASME Code sections and supplements (addenda) that were followed, and the acceptance criterion.

Response

Selected components of the H. B. Robinson Unit No. 2 nuclear reactor primary coolant system were subjected to a preoperational nondestructive examination during 1970. Southwest Research Institute performed this inspection. The selection of components to be examined was based on requirements specified by the Technical Specifications of the Carolina Power & Light Company, Robinson 2 Nuclear Power Plant. In essence, the inspection provides baseline data for future inservice examinations.

The techniques, standards, and test results of the examination, mechanized and manual ultrasonic techniques, as well as visual and liquid penetrant methods, were employed. The inspection techniques used were conducted in accorance with Appendix IX, Section III, of the ASME Code, with the exception of the ultrasonic inspection of the safe-end material on several nozzles, since Section III does not specifically cover this particular area. Thus, the safe-end base material examination sensitivity requirements established by ASME, USAS Nuclear Power Piping Code B31.7, Par. 1-7241, were used. Detailed calibration and test data are maintained on file at the Robinson 2 Plant.

All test personnel involved with the preoperational examination were qualified in accordance with "SNT-TC-1A," American Society for Nondestructive Testing. For clarification and ASME Code compliance purposes, test personnel performed "examinations" and were not acting as "inspectors." By ASME Code definition, an "inspector" has the duty to verify the owner's or his agent's certification of an operator in accordance with SNT-TC-1A and has the duty of auditing the program and requiring requalification of any operator when the inspector has reason to question the performance of that operator.

Visually observed, Branson Type 301 or 600 pulse-echo ultrasonic flaw detectors were used throughout the manual examinations. The Branson 600's were used for the mechanized examinations. Recording of the mechanized test data was accomplished on a 6-channel Brush 260 recorder with the Cathode Ray Tube (CRT) presentation being photographed. Probe selection was dependent on work piece wall thickness and diameter; they were either 2.25- or 5-MHz frequency. Couplant was glycerine (USP) or demineralized water for all of the tests. Reference standards were in accordance with the 1968 ASME Boiler and Pressure Vessel Code, Section III, and USA Standard Code for Power Piping, USAS B31.7-1969.

1. Methods

a. Ultrasonic (UT). A majority of the ultrasonic examinations were performed according to SwRI Procedures NDT-102 and NDT-104 with certain exceptions as noted in the attached "Testing Summary." The surfaces of the components tested were found in generally good condition for UT inspection. Prior to the actual inspection of each weld, checks were made to determine if the weld could be inspected by ultrasonic techniques.

1. Attentuation Test. The heat-affected zone (HAZ) and the base metal area outside this zone were examined for the purpose of determining the relative sound-transmission characteristics of the welds and nearby material. A 1/4-inch diameter, PZT, 5-MHz transducer, or 1/2 X 1/2-inch, PZT, 2.25-MHz transducer was used. The results of this test were classified as either "normal, poor, or unacceptable." Welds with the latter classification were not ultrasonically inspected.

2. Lamination/Inclusion Test. The base metal areas adjacent to the welds were examined to determine the existence of any laminations or inclusions which, if present, would cast "shadows" preventing sound beam access, to all or part of the welds. A 1/4-inch diameter, PZT, 5-MHz, 1/2-inch diameter, or 1/2 X 1-inch PZT, 2.25-MHz transducer was used.

b. Liquid Penetrant. Liquid penetrant examinations were performed on selected areas of cladding according to SwRI Procedure NDT-100.

2. Procedures

a. Weld Examinations. Each weld was examined by 45- and 60-deg shear waves directed from both sides of the weld into the entire volume of weld area, except where restricted by physical access or where surface conditions (e.g., concavity, etc.) prevented adequate transducer-to-surface contact. As determined by wall thickness of test material, 1/2 X 1-inch, 1/2 X 1/2-inch, or 1/2 X 1/4-inch, PZT, 2.25-MHz transducers were used.

b. Calibration Techniques. Welds were examined ultrasonically in accordance with USAS B31.7-1969 and ASME Section III, Appendix IX. The SwRI procedure and these two Codes specify that the equipment used be calibrated both for distance and echo height. This was done for each size material, using the appropriate reference standards. In general, one set of equipment was calibrated and used for each of the inspection techniques as described herein. In

this way, adjustments could be quickly checked to assure that no drift or change had occurred. These calibration checks were made at frequent intervals during the course of the work.

Table 1 is a listing of the results of all the preservice examinations conducted on the auxiliary piping listed in the above response. The number of welds inspected represent 100 percent of those required by the existing Technical Specifications for the particular lines listed. The preoperational, nondestructive mapping of selected areas of the RCS boundaries established baseline information to be used as a reference for later examinations.

In addition to the preservice examinations performed on the listed piping, 100 percent of all the welds on the piping listed in the above response was examined as per the construction and fabrication requirements. As a minimum, the following inspections were required. The final welds of all pipes listed received a liquid penetrant examination. One hundred percent of all piping listed with wall thickness greater than 0.250 inches received a root pass and finished weld liquid penetrant examination. One hundred percent of all piping greater than 0.250 inches wall thickness received a 100 percent radiograph.

The procedure followed for radiography is EBASCO Services, Inc.'s, Specification, EBASCO 73-68, Section I-B, Radiography Requirements for Gamma-Ray and X-Ray Examination of Vessels, Piping, and Piping Components. The liquid penetrant procedure followed is Specification EBASCO 73-68, Section III-B, Liquid Penetrant Inspection by Visible Dye and Fluorescent Methods. Visual examinations were performed on all field weld joints as required by specifications and procedure Specification EBASCO 73-68, Section V-B, Visual Inspection, was used. In addition, hydrostatic tests were performed in the field after piping systems were completed. The hydrostatic tests performed were 1.5 times the system design pressure, except as required by the applicable Codes.

All these procedures were written to reflect the requirements of the existing applicable codes and standards. All the referenced procedures are on file and available for examination at the plant site.

TABLE 1

PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component | Acoustic Characteristics | Examination Results | Remarks |
|---|---|---|---|
| WELD NUMBER | | | |
| Residual Heat Removal | | | |
| 14-RC-15 FW1 | Normal | No indications. | |
| 14-RC-15 FW2 | Normal | No indications. | |
| 14-RC-15 FW3 | Normal | No indications. | |
| 14-RC-15-1 SW2 | Normal | No indications. | |
| 14-RC-15-1 SW7 | Normal | No indications. | |
| 14-RC-15-1 SW4 | Normal | No indications. | |
| 14-RC-15-2 SW1 | Normal | No indications. | |
| 14-RC-15 FW5 | Normal | No indications. | |
| 14-RC-15-3 SW1 | Normal | No indications. | |
| 14-RC-15 FW6 | Normal | No indications. | Inspected from elbow side only due to geometry of valve. |
| Safety Injection to Loop C | | | |
| 10-SI-54 FW10 | Normal | No indications. | |
| 10-SI-54-7 SW2 | Poor | No indications. | |
| 10-SI-54-7 SW3 | Poor | No indications. | |
| 10-SI-54 FW8 | Poor | No indications. | Inspected from pipe side only. |
| 10-SI-54-6 SW3 | Poor | No indications. | Inspected from |

PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component | Acoustic Characteristics | Examination Results | Remarks |
|---|---|---|---|
| WELD NUMBER | | | |
| | | | pipe side only. |
| 10-SI-54-6 SW2 | Poor | No indications. | |
| 10-SI-54 FW9 | Normal | No indications. | Inspected from pipe side only. |
| 10-SI-54-5 SW3 | Poor | No indications. | Inspected from pipe side only. |
| 10-SI-54-6 SW2 | Poor | No indications. | |
| 10-SI-54 FW7 | Poor | No indications. | Inspected from pipe side only. |
| 10-SI-54-4 SW2 | Poor | No indications. | |
| 10-SI-54-4 SW3 | Poor | No indications. | |
| 10-SI-54 FW6 | Normal | No indications. | Inspected from one side of elbow due to unacceptable attenuation characteristic of opposite side of weld. |
| 10-SI-54-3 SW5 | Unacceptable | Not inspected. | Elbow-to-tee configuration. Not suitable geo-metrically or acoustically for ultrasonic examina tion. |
| 10-SI-54-3 SW7 | Unacceptable | Not inspected. | Elbow-to-tee configuration. Not suitable geo-metrically or acoustically for ultrasonic examina tion. |
| 10-SI-54 FW5 | Normal | No indications. | |
| 10-SI-54 FW4 | Normal | No indications. | |

PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component | Acoustic Characteristics | Examination Results | Remarks |
|---|---|---|---|
| WELD NUMBER | | | |
| 10-SI-54-2 SW2 | Unacceptable | Not inspected. | |
| 10-SI-54 FW3 | Unacceptable | Not inspected. | |
| 10-SI-54 FW6A | Normal | No indications. | |
| 10-SI-54-3 SW3 | Normal | No indications. | |
| 10-SI-54-3 SW2 | Normal | No indications. | |
| 10-SI-54 FW5A | Normal | No indications. | |
| 10-SI-54 FW4A | Normal | No indications. | |
| Safety Injection to Loop B | | | |
| 10-SI-48 FW3 | Unacceptable | Not inspected. | |
| 10-SI-48-2 SW1 | Normal | No indications. | Inspected from pipe side only. |
| 10-SI-48 FW4 | Unacceptable | No indications. | |
| 10-SI-48 FW5 | Poor | No indications. | |
| 10-SI-48-3 SW3 | Poor | No indications. | Inspected from pipe side of elbow only. |
| 10-SI-48-3 SW2 | Normal | No indications. | Inspected from pipe side only. |
| 10-SI-48-3 SW1 | Poor | No indications. | |
| 10-SI-48 FW6 | Poor | No indications. | Poor attenuation characteristics on elbow side only. |
| 10-SI-48-4 SW1 | Poor | No indications. | |
| 10-SI-48-4 SW2 | Poor | No indications. | Inspected from pipe side only. |
| 10-SI-48-4 SW3 | Normal | No indications. | |

PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component | Acoustic Characteristics | Examination Results | Remarks |
|---|---|---|---|
| WELD NUMBER | | | |
| 10-SI-48-4 SW4 | Normal | No indications. | |
| 10-SI-48-4 SW5 | Normal | No indications. | |
| 10-SI-48 FW7 | Normal | No indications. | |
| 10-SI-48 FW8 | Normal | No indications. | |
| 10-SI-48-5 SW8 | Poor | No indications. | |
| 10-SI-48-5 SW1 | Poor | No indications. | Inspected from elbow side only. |
| 10-SI-48-5 SW2 | Poor | No indications. | Inspected from pipe side only. |
| 10-SI-48 FW9 | Unacceptable | Not inspected. | |
| Safety Injection to Loop A | | | |
| 10-SI-47 FW11 | Unacceptable | Not inspected. | |
| 10-SI-47-7 SW3 | Poor | No indications. | Inspected from pipe side only. |
| 10-SI-47-7 SW2 | Poor | No indications. | |
| 10-SI-47-7 SW7 | Poor | No indications. | |
| 10-SI-47 FW10 | Poor | No indications. | Inspected from pipe side only. |
| 10-SI-47-6 SW2 | Normal | No indications. | Inspected from pipe side only. |
| 10-SI-47 FW9 | Normal | No indications. | |
| 10-SI-47-5 SW8 | Poor | No indications. | |
| 10-SI-47-5 SW2 | Poor | No indications. | |
| 10-SI-47 FW8 | Normal | No indications. | |
| 10-SI-47-5 SW4 | - | Not inspected. | Geometry of joint does not lend itself to ultrasonic |

## PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component | Acoustic Characteristics | Examination Results | Remarks |
|---|---|---|---|
| WELD NUMBER | | | |
| | | | examination. |
| 10-SI-47 FW7 | Normal | No indications. | Inspected from pipe side only. |
| **Penetration to Accumulator C** | | | |
| 10-SI-40-2 SW3 | Normal | No indications. | |
| 10-SI-40-2 SW2 | Poor | No indications. | |
| 10-SI-40 FW2 | Poor | No indications. | |
| 10-SI-40-1 SW6 | Unacceptable | Not inspected. | |
| 10-SI-40-1 SW5 | Unacceptable | Not inspected. | |
| 10-SI-40-1 SW4 | Unacceptable | Not inspected. | |
| 10-SI-40-1 SW2 | Poor | No indications. | |
| 10-SI-40-1 FW1A | Poor | No indications. | |
| 10-SI-40 FW1 | - | Not inspected. | Valve-to-tee geometrical configuration prevented meaningful ultrasonic examination. |
| 10-SI-40 FW3A | Normal | No indications. | |
| 10-SI-40 FW3 | | Not inspected. | Omitted from test due to temporary construction interference. |
| **Safety Injection to Loop C** | | | |
| 10-RC-37 FW2 | Normal | No indications. | |
| 10-RC-37-1 SW2 | Poor | No indications. | |
| 10-RC-37 FW1 | Normal | No indications. | |

PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component | Acoustic Characteristics | Examination Results | Remarks |
|---|---|---|---|
| WELD NUMBER | | | |
| **Safety Injection to Loop A** | | | |
| 10-RC-23 FW2 | Unacceptable | Not inspected. | |
| 10-RC-23-1 SW2 | Unacceptable | Not inspected. | |
| 10-RC-23 FW1 | Unacceptable | Not inspected. | |
| **Safety Injection to Loop B** | | | |
| 10-RC-21 FW1 | Unacceptable | Not inspected. | |
| 10-RC-21-1 SW1 | Normal | No indications. | Inspected from one side only due to poor attentuation characteristics on opposite side. |
| 10-RC-21 FW2 | Unacceptable | Not inspected. | |
| **Penetration to Accumulator B** | | | |
| 8-SI-38 FW1 | Unacceptable | Not inspected. | |
| 8-SI-38-1 SW7 | Unacceptable | Not inspected. | |
| 8-SI-38-1 SW5 | Normal | No indications. | |
| 8-SI-38 FW2 | Normal | No indications. | |
| 8-SI-38 FW1A | - | Not inspected. | Omitted from test due to temporary construction interference. |
| 8-SI-38-1 SW3 | Normal | No indications. | |
| 8-SI-38-1 SW2 | Poor | No indications. | |
| 8-SI-38 FW3 | - | Not inspected. | Omitted from test due to temporary construction interference. |

PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component | Acoustic Characteristics | Examination Results | Remarks |
|---|---|---|---|
| WELD NUMBER | | | |
| 8-SI-38-2 SW3 | Normal | No indications. | |
| 8-SI-38-2 SW2 | Normal | No indications. | Inspected from elbow side only. |
| 8-SI-38 FW4 | Normal | No indications. | |
| Penetration to Accumulator A | | | |
| 8-SI-37 FW6 | Poor | No indications. | |
| 8-SI-37-5 SW3 | Poor | No indications. | |
| 8-SI-37 FW5 | Normal | No indications. | |
| 8-SI-37-4 SW2 | Normal | No indications. | |
| 8-SI-37 FW4 | Poor | No indications. | |
| 8-SI-37-3 SW | Poor | No indications. | |
| 8-SI-37 SW5 | Normal | No indications. | |
| 8-SI-37 FW3 | Normal | No indications. | |
| 8-SI-37-2 SW2 | Normal | No indications. | |
| 8-SI-37 FW2 | - | Not inspected. | Omitted from test due to temporary construction interference. |
| 8-SI-37-1 SW2 | Normal | No indications. | |
| 8-SI-37 FW1 | - | Not inspected. | Omitted from test due to temporary construction interference. |
| Charging Line to Loop A | | | |
| 3-RC-25 FW1 | Normal | No indications. | |

PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component | Acoustic Characteristics | Examination Results | Remarks |
|---|---|---|---|
| WELD NUMBER | | | |
| 3-RC-25 FW1 | Normal | No indications. | |
| 3-CH-15 FW5 | Normal | No indications. | |
| 3-CH-15-3 SW2 | Normal | No indications. | |
| 3-CH-15-3 SW1 | Normal | No indications. | |
| 3-CH-15 FW6 | Normal | No indications. | |
| 3-CH-15-4 SW3 | Normal | No indications. | |
| 3-CH-15 SW6A | Normal | No indications. | |
| 3-CH-15 FW6B | Normal | No indications. | |
| 3-CH-15 FW7A | Normal | No indications. | |
| 3-CH-15 FW7 | Normal | No indications. | |
| 3-CH-15-5 SW1 | Normal | No indications. | |
| 3-CH-15 FW8 | Normal | No indications. | |
| 3-CH-15-6 SW1 | Normal | No indications. | |
| 3-CH-15 FW9 | Normal | No indications. | |
| 3-CH-15-7 SW1 | Normal | No indications. | |
| 3-CH-15 FW10 | Normal | No indications. | |
| 3-CH-15-8 SW1 | Normal | No indications. | |
| 3-CH-15-8 SW2 | Normal | No indications. | |
| 3-CH-15-8 SW3 | Normal | No indications. | |
| 3-CH-15 FW11 | Normal | No indications. | |
| 3-CH-15 FW12 | Normal | No indications. | |
| 3-CH-15 FW13 | Normal | No indications. | |
| 3-CH-15-11 SW1 | Normal | No indications. | |

PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component | Acoustic Characteristics | Examination Results | Remarks |
|---|---|---|---|
| WELD NUMBER | | | |
| 3-CH-15 FW14 | Normal | No indications. | |
| 3-CH-15-12 SW1 | Normal | No indications. | |
| 3-CH-15-12 SW2 | Normal | No indications. | |
| 3-CH-15-12 SW3 | Normal | No indications. | |
| 3-CH-15-12 SW4 | Normal | No indications. | |
| 3-CH-15-12 SW5 | Normal | No indications. | |
| 3-CH-15 FW15 | Normal | Reflectors. | Using 45-deg shear wave, several indications up to 100-percent DAC were noted between 2 o'clock to 6 o'clock position at root of weld, due to geometry. |
| 3-CH-15 FW16 | Normal | No indications. | |
| 3-CH-15-13 SW21 | Normal | Reflector. | Using 45-deg shear wave, several indications up to 150-percent DAC were noted at 11 o'clock position at root of weld, due to geometry. |
| 3-CH-15-FW17 | Normal | Reflector. | Using 45-deg shear wave, several indications up to 150-percent DAC were noted at 11 o'clock position at root of weld, due to geometry. |
| 3-CH-15 FW18 | Normal | Reflector. | Using 45-deg shear wave, several indications up to 150-percent DAC were noted at |

PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component WELD NUMBER | Acoustic Characteristics | Examination Results | Remarks |
|---|---|---|---|
| | | | 11 o'clock positi[illegible] at root of weld, due to geometry. |
| 3-CH-15 FW19 | Normal | Reflector. | Using 45-deg shea[illegible] wave, several indications up to 150-percent DAC were noted at 11 o'clock positi[illegible] at root of weld, due to geometry. |
| 3-CH-15-14 SW2 | Normal | No indications. | |
| 3-CH-15-14 SW1 | Normal | Reflector. | Using 45-deg shea[illegible] wave, several indications up to 100-percent DAC were noted betwee[illegible] 5 o'clock to 10 o'clock positions at root of weld, due to geometry. |
| 3-CH-15 FW22 | Normal | No indications. | |
| 3-CH-15 FW23 | Normal | Reflector. | Using 45-deg shear wave, several indications up to 100-percent DAC were noted between 7 o'clock to 9 o'clock positions at root of weld, due to geometry. |
| 3-CH-15 FW24 | Normal | No indications. | Using 45-deg shear wave, several indications up to 75-percent DAC were noted at 10 o'clock position at root of weld, due to |

PRESERVICE EXAMINATION RESULTS

| Explanation Area/Component | Acoustic Characteristics | Examination Results | Remarks |
| --- | --- | --- | --- |
| WELD NUMBER | | | |
| | | | geometry. |
| 3-CH-15 FW25 | Normal | No indications. | |
| 3-CH-15 FW26 | Normal | No indications. | |
| 3-CH-15 FW27 | Normal | No indications. | |

Item 1.(d)

Facilities having previously experienced cracking in identified systems, Item 1, are requested to identify (list) the new materials utilized in repair or replacement on a system-by-system basis. If a report of this information and that requested above has been previously submitted to the NRC, please reference the specific report(s) in response to this Bulletin.

Response

Two individual cases of stress corrosion cracking have been identified in the past at HBR Unit No. 2.

The first case was in October, 1977 when the plant experienced a ruptured thermo well coupling on the Boron Injection Tank. A complete description of this occurrence is contained in Licensee Event Report 77-25 and its Supplemental Information submitted November 8, 1977. As requested, a list of material used in the replacement in provided in Table D-1. All welds resulting from the repair were radiographed following replacement, by Pittsburgh Testing Laboratories and/or Law Engineering. The Law Engineering Procedure used (CHS RT-101 issued on October 27, 1977) meets the requirements of ASME Section V, Article 1, 1974 Edition with Addenda through Winter 1974. The welds were liquid penetrant tested using Carolina Power & Light Company procedures.

The other case where stress corrosion cracking was experienced was in portions of the inlet and outlet piping to the BIT. This cracking was identified by NDE (UT) methods during inspection of the piping as a precautionary followup to the BIT failure. The cracks were discovered on March 5, 1978 and were reported to the NRC in Licensee Event Report 78-06 submitted March 20, 1978. As requested, a list of material used in the piping replacement is provided in Table D-2. All new welds were liquid penetrant examined and radiographed using CP&L procedures and/or Peabody Testing Procedure 3.23.A.1, Penetrant Examination-Visible Dye and Peabody Testing Procedure 3.20.A.1, Radiographic Examination of Welds.

The Peabody Liquid Penetrant Procedure meets the minimum requirements of ASME Section V, Article 6 and any other code or specification referencing the methods for liquid penetrant examination as defined by ASME Section V, Article 6.

The RT procedure meets the requirements of the ASME Code, Section V, Article 2 (1974 Edition, Including all Addenda through Summer 1976) and any other code or specification referencing the methods for radiographic examination as defined by ASME Section V, Article 2.

In addition, after both replacements, a hydrostatic test was performed on the section of piping, including the BIT, from the BIT inlet valves (SI-867 A&B) to the BIT outlet valves (SI-870 A&B). The test was performed to a pressure 1.1 times the system design pressure.

To provide a clear response to this item, Figures D-1 and D-2 are included for the purpose of showing which lines were replaced during the two experiences described. The numbers indicate welds added or replaced during the piping replacements, letters indicate welds added during the BIT replacement.

TABLE D-1

MATERIAL LIST - BIT REPLACEMENT

| | | |
|---|---|---|
| Boron Injection Tank: | SS Type 304<br>ASME Section III, 1971 Ed. Thru Summer<br>1975 Addenda, Class 2 | |
| 6" Sch. 160 SR ELL | SA403 WP 304 | |
| 6" X 3/4" 3000# S/W Elbolet | SA 182 | F304 |
| 6" Sch. 160 SS SML's Pipe | A 312 | TP304 |
| 3/4" SW Coupling | A 182 | 304 |
| 4" Sch. 80 SS Pipe | A 376 | 316/316H |
| 4" Sch. 80 SS Pipe | A 312 | 316 |

TABLE D-2

MATERIAL LIST - BIT PIPING REPLACEMENT

| | | |
|---|---|---|
| 4" X 3/4" 3000# S/S Sockolet | A-182 | F316L |
| 4" X 1" 3000# S/S Sockolet | A-182 | F316L |
| 4" Schedule 80 S/S smls. pipe | A-312 | 316L |
| 3/4" Schedule 30 S/S smls. pipe | A-312 | 316L |
| 1" Schedule 80 S/S smls. pipe | A-312 | 316L |
| 3/4" 3000# coupling | A-182 | F316L |
| 1" 3000# coupling | A-182 | F316L |
| 4" Schedule 80 S/S L.R. 90 ell | A-403 | WR316L |
| 4" Schedule 80 S/S 45 ell | A-403 | WR316L |
| 1" 3000# socket weld 90 ell | A-182 | F316L |

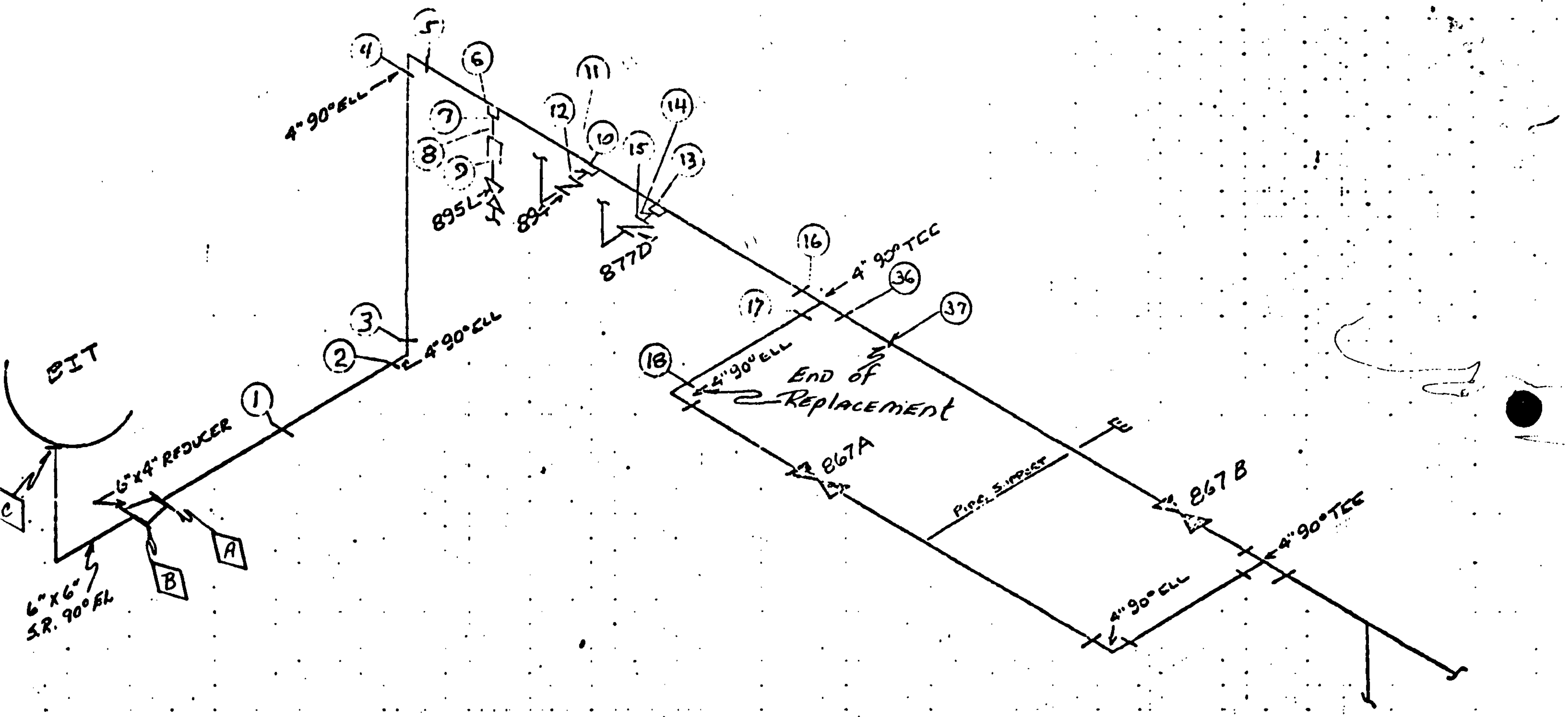


FIGURE D-1

BORON INJECTION TANK INLET PIPING

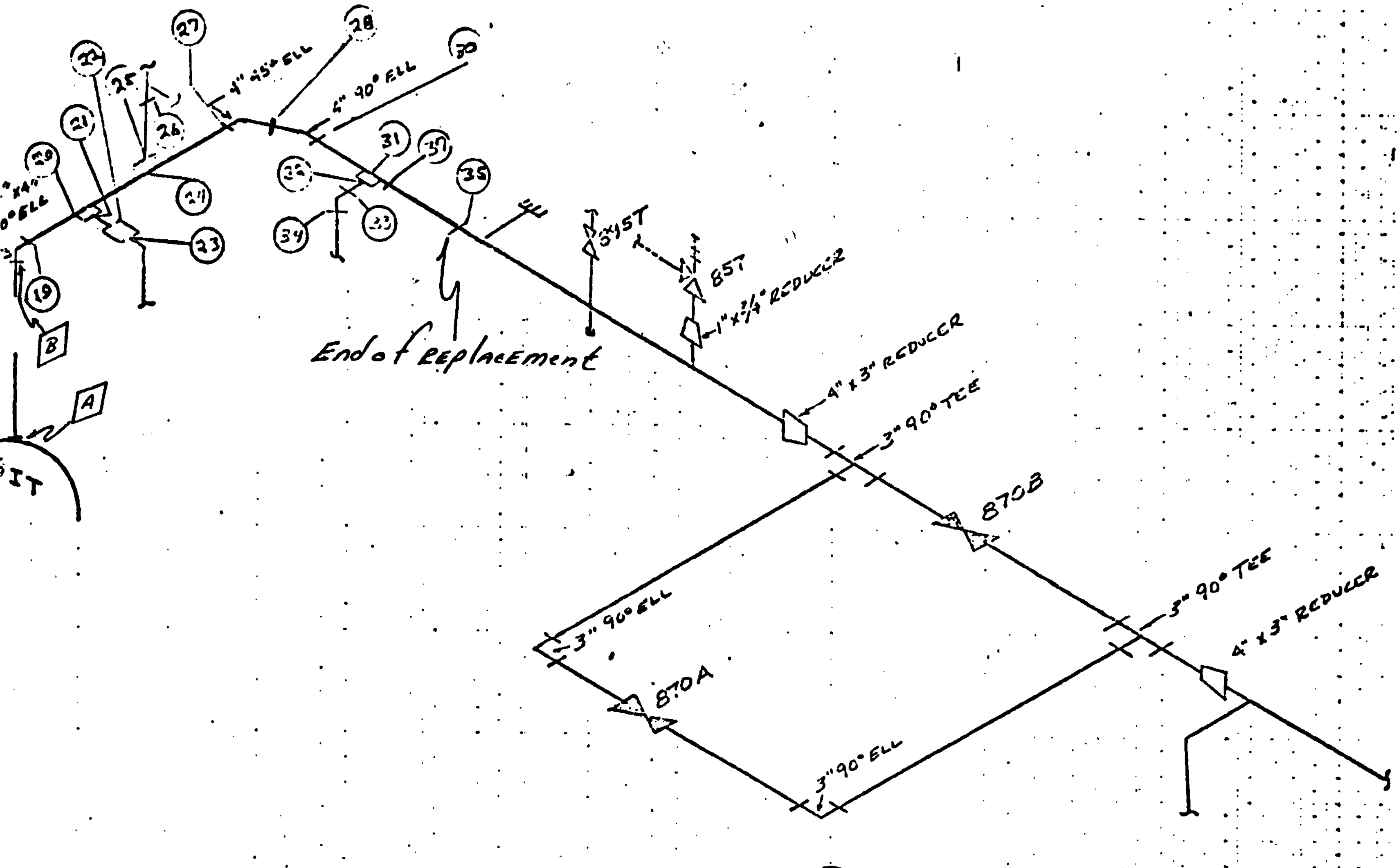


*Figure D-2*

BORON INJECTION TANK OUTLET PIPING