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SL-461
2572N

March 10, 1986

Director of Nuclear Reactor Regulation
Attention: Mr. D. Muller, Project Director
BWR Project Directorate No. 2
Division of Boiling Water Reactor Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

NRC DOCKET 50-321
OPERATING LICENSE DPR-57
EDWIN I. HATCH NUCLEAR PLANT UNIT 1
INSERVICE INSPECTION OF CLASS 1 STAINLESS STEEL
PIPING AND COMPONENTS - 1985 MAINTENANCE/REFUELING OUTAGE

Gentlemen:

Georgia Power Company (GPC) submits herein for your review the results of inservice inspection of stainless steel components, corrective actions taken for those welds found to have reportable indications, and IGSCC-mitigation actions taken during the Fall 1985 maintenance/refueling outage. Enclosed is a report which details, but is not limited to, 1) procedure and personnel qualification related to IGSCC detection, sizing, and examination of weld overlays, 2) inspection results, 3) flaw evaluations and repairs, 4) IGSCC-mitigation activities, and 5) future plans.

Pursuant to the requirements of the NRC letter dated January 13, 1985 and the subsequent safety evaluation report issued for the inspections and repairs of stainless steel piping conducted during the Hatch Unit 1 Fall 1984 maintenance/refueling outage, GPC submitted by letter NED-85-477 dated July 1, 1985 for your review and comment our proposed inspection/mitigation program for the subject piping during the Fall 1985 maintenance/refueling outage. Included as part of the July 1, 1985 submittal was a justification for continued service with the weld overlays which were applied during the previous maintenance/refueling outages. By letter dated August 1, 1985, you indicated that the proposed inspection/mitigation program was acceptable with the exception of several NRC comments noted therein. The NRC comments involved inspector training and qualification, flaw evaluations, and post-IGSCC mitigation inspection. The NRC comments reflected the current staff position at the time as well as the pertinent guidelines proposed in the draft revision 2 of NUREG-0313 as verbally discussed with GPC personnel. These comments were incorporated into GPC's program as reflected in the attached reports unless noted otherwise.

A047
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3 CYS ADVANCED TO PM G. RIVENBARK

NOTE: ENCLS TO REG FILE 2x PDR LPDR NSIC

Rec'd w/check $150.00

Georgia Power

Based on our July 1, 1985 submittal, GPC performed a number of IGSCC-mitigation activities, which included IHSI and weld overlays, during the current outage. In addition, the existing weld overlays underwent surface finish improvement to provide for a better ultrasonic inspection in order to verify the integrity of the weld overlays and the outer 1/4 T of the underlying piping base material. The surface finish of newly applied weld overlays similarly were improved to provide for better inspection. The resultant surface finish of the existing and new weld overlays meets or exceeds the EPRI criteria for weld overlay surface finish. Subsequent to restart of the unit, a hydrogen water chemistry "mini-test" will be conducted. Future hydrogen addition is contingent upon several factors, including the results of the "mini-test" and the on-going industry experience with hydrogen water chemisty and IHSI.

GPC intends to return the unit to power operation upon completion of the necessary repairs, analyses, baseline examinations, and successful completion of the hydrostatic test. Return to power operation is currently scheduled for on or about April 1, 1986. We believe the results of the inspections, repairs, and IGSCC-mitigation activities conducted during the outage provides an adequate basis for the safe operation of the unit.

Seven copies of this letter and enclosed reports are provided for your convenience. Since the final version of the design report will not be available until all activities are complete, the enclosed Structural Integrity Associates (SIA) design report is a Revision 0 and constitutes a draft version. The final design report will be provided for your review when it becomes available to GPC, consistent with the previous procedure for design reports of this nature. The final version of the SIA design report is not expected to differ significantly from the draft version enclosed herein. GPC expects to submit the final design report to NRC tentatively by March 25, 1986.

A meeting to discuss the information enclosed herein has been scheduled through our NRC licensing project manager, Mr. G. Rivenbark, for 9:00 a.m, Tuesday, March 18, 1986 at the NRC offices in Bethesda, Maryland.

Georgia Power

Pursuant to the requirements of 10 CFR 170, enclosed herein as payment of the application fee for review of the subject information is our check for $150.00.

Sincerely yours,

L. T. Gucwa

JAE/mb

Attachments

xc: Mr. J. T. Beckham, Jr.
Mr. H. C. Nix, Jr.
Dr. J. N. Grace (NRC-Region II) (4 copies)
Senior Resident Inspector

ENCLOSURE 1

Inspection of Hatch Unit 1 Class 1 Recirculation,
RHR, and RWCU Stainless Steel
Piping and Components -
1985 Maintenance/Refueling Outage

TABLE OF CONTENTS

1.0 Introduction

2.0 1985 Maintenance/Refueling Outage Plans

- 2.1 Background and Summary of Plans
- 2.2 NRC Response

3.0 Inspection Procedures and Personnel Qualifications

- 3.1 Procedures
  - 3.1.1 IGSCC Detection
  - 3.1.2 IGSCC Sizing
  - 3.1.3 Weld Overlay Examination
- 3.2 Personnel Qualification
  - 3.2.1 IGSCC Detection
  - 3.2.2 IGSCC Sizing
  - 3.2.3 Weld Overlay Examination

4.0 Pre-IHSI Examination Sample

- 4.1 Examination Scope
- 4.2 Examination Results
- 4.3 Resolution of Reportable Indications

5.0 Examination of Existing Weld Overlays and Weld Overlay Upgrade

- 5.1 Examination of Existing Weld Overlays
  - 5.1.1 Pre-Surface Finish Improvement Examination
  - 5.1.2 Post-Surface Finish Improvement Examination
- 5.2 Upgrade of Selected Existing Weld Overlays

6.0 IHSI of Stainless Steel Piping and Components

7.0 Post-IHSI Examination Results

- 7.1 Welds with Reportable Indications
- 7.2 Nature of Reportable Indications and Resolution Thereof

8.0 Repairs and Flaw Evaluations

- 8.1 Repair by IHSI
- 8.2 Repair by Weld Overlay
- 8.3 Flaw Evaluations and Overlay Design

TABLE OF CONTENTS (Continued)

9.0 Future Plans

9.1 Modifications/Replacement
9.2 Leakage Limits and Detection
9.3 Inspection Program

10.0 Summary and Conclusions

1.0 INTRODUCTION

During the inservice inspection conducted during the Fall 1985 maintenance/refueling outage at Hatch Unit 1, several welds in the stainless steel piping and components in the Class 1 Reactor Recirculation (Recirc), Residual Heat Removal (RHR), and Reactor Water Cleanup (RWCU) systems were observed to have reportable indications. Georgia Power Company (GPC) hereby submits information concerning the inservice inspection of welds in stainless steel piping and components, inspection procedures and personnel qualifications, intergranular stress corrosion cracking (IGSCC)-mitigation activities, weld repairs and flaw evaluations, weld overlay surface finish improvement, and future plans.

2.0 1985 MAINTENANCE/REFUELING OUTAGE PLANS

2.1 Background and Summary of Plans

Pursuant to the NRC letter of January 3, 1985, GPC submitted by letter NED-85-477 dated July 1, 1985 its proposed program for the mitigation of IGSCC in and inspection of the recirculation and other reactor pressure boundary stainless steel piping during the 1985 maintenance/refueling outage at Hatch Unit 1. Included in the GPC submittal was a technical justification for continued service with weld overlays. The proposed program included our criteria for weld selection, ultrasonic examination, flaw evaluation, IGSCC mitigation, and weld overlay repairs. In addition, leak detection and leakage limits for the next fuel cycle were discussed. The criteria were consistent with the intent of corresponding applicable portions of NRC Generic Letter 84-11, "Inspection of BWR Stainless Steel Piping," dated April 19, 1984.

GPC indicated that in order to provide what it believed to be a viable long-term correction of the cracking in Class 1 stainless steel piping, it intended to mitigate the potential for IGSCC in those sizes of Class 1 Recirc, RHR, and RWCU stainless steel piping required to be nondestructively examined pursuant to the ASME Section XI Code by either Induction Heating Stress Improvement (IHSI) or weld overlay, depending on such variables as piping and flaw size. Further, it was indicated that a test of hydrogen water chemistry (HWC) and its effects on the plant was planned for a subsequent operating cycle. A permanent program of additional IGSCC mitigation by hydrogen addition was to be evaluated for implementation based upon the results of the "mini-test" and on-going industry experience with HWC and IHSI.

2.2 NRC Response

By letter dated August 1, 1985, NRC informed GPC that it had reviewed the GPC submittal of July 1, 1985 regarding the proposed inspection/IGSCC-mitigation program of reactor coolant stainless steel piping during the 1985 maintenance/refueling outage at Hatch Unit 1. Based on review of the aforementioned GPC submittal, NRC concluded that the inspection/IGSCC-mitigation program proposed by GPC was acceptable with the exception of several NRC comments. The following is a brief summary of the NRC comments:

1) Re-qualify ultrasonic examination personnel in the detection of IGSCC;

2) Ultrasonic examination personnel performing inspections of overlay repaired welds should be properly trained and qualified at the Electric Power Research Institute (EPRI) NDE Center, using the demonstrated procedures and techniques;

3. For defective welds with axial indications, the current NRC staff position recommends the application of weld overlay to provide a leakage barrier. Therefore, NRC recommended that GPC consider overlaying the two unrepaired welds with axial indications during the 1985 outage;

4. Since ASME Section XI IWB-3640 was being revised to take account of the low toughness associated with flux welds, it was indicated that the NRC staff's interim guidelines for allowable flaw sizes in flux welds should be used. It was further indicated that unrepaired welds previously justified for continued service without repair may require overlay repair when reevaluated in accordance with the staff interim guidelines; and

5. All IHSI-treated welds should be ultrasonically inspected after the treatment.

The aforementioned NRC comments reflected the current staff position at the time as well as the pertinent guidelines proposed in the draft revision 2 of NUREG-0313 and were discussed verbally with cognizant GPC personnel.

(Note: Conformance with and/or exceptions to the NRC comments will be addressed throughout this report and attached draft Structural Integrity Associates (SIA) report, as appropriate).

3.0 INSPECTION PROCEDURES AND PERSONNEL QUALIFICATIONS

3.1 Procedures

3.1.1 IGSCC Detection

Southern Company Services (SCS) NDE procedure UT-H-400, Revision 5 was used in the requalification process at the EPRI NDE Center as part of the NRC-mandated requalification program prior to the 1985 Hatch Unit 1 maintenance/refueling outage. SCS NDE procedure UT-H-401, Revision 4 was used for the examination of the four 4-inch Recirc welds. These two procedures are similar in many areas such as recording criteria; however, UT-H-400 used holes as the calibration reflectors while UT-H-401 used notches as the calibration reflectors.

3.1.2 IGSCC Sizing

SCS NDE planar flaw sizing procedure UT-H-470, Revision 0 was developed incorporating techniques and methods demonstrated and approved at the EPRI NDE Center for use at Plant Hatch.

3.1.3 Weld Overlay Examination

After SCS personnel successfully demonstrated their ability to examine weld overlays, SCS developed NDE procedure UT-H-408, Revision 0 which incorporates the techniques and methods from the EPRI NDE Center for the post-surface finish improvement examination.

This procedure incorporates several improvements which enhance the examination of weld overlays as demonstrated at the EPRI NDE Center:

1) New angle-beam transducers were used with focused elements, better signal-to-noise ratio, and increased resolution which improved the detection capabilities.

2) Instead of adding 6 dB when scanning, a 10 to 15% noise level was used. This ensured scanning was performed at the proper sensitivity to locate indications. This sensitivity was never lower than the reference or calibration sensitivity.

3) "O.D. creeping" longitudinal wave examination was added for locating flaw indications in the weld overlay material.

3.2 Personnel Qualifications

3.2.1 IGSCC Detection

As required by the NRC, Level II and III personnel performing ultrasonic examinations and/or evaluations were requalified at the EPRI NDE Center for the detection of IGSCC. An EPRI IGSCC pipe crack sample was also used at the Hatch site for Level I personnel training to ensure an understanding of procedure requirements (e.g., scanning, detection, and transducer location requirements).

3.2.2 IGSCC Sizing

Level II or III personnel performing ultrasonic sizing of indications were qualified at the EPRI NDE Center in planar flaw sizing.

3.2.3 Weld Overlay Examination

As required by the NRC, Level II and III personnel performing ultrasonic examinations and/or evaluations of weld overlays demonstrated their ability at the EPRI NDE Center. In addition, weld overlay examination personnel were IGSCC requalified. The final surface condition of the weld overlays was also verified by personnel who had demonstrated their ability to examine weld overlays at the EPRI NDE Center.

4.0 PRE-IHSI EXAMINATION SAMPLE

4.1 Examination Scope

Prior to performing the IHSI, a sample of forty-three (43) piping welds (i.e., circumferential and sweepolet/weldolet/branch connection piping welds) in the Class 1 Recirc and RWCU systems were ultrasonically examined by SCS and its contractors. The scope of pre-IHSI examinations included the following:

System	Diameter	Quality of Welds
Recirc	12"	18
Recirc	22"	2
Recirc	28"	2
RWCU	6"	21

(Note: Hereinafter, the term "piping welds" will pertain to circumferential, sweepolet, weldolet, or branch connection welds only unless otherwise noted).

The piping welds chosen in the Recirc and RWCU systems included those piping welds thought to be the most IGSCC-susceptible and included, but was not limited to, unrepaired piping welds from the 1982 and 1984 maintenance/refueling outages. It should be noted that the pre-IHSI sample did not include any piping welds in the stainless steel portions of the Class 1 RHR System due to the number of existing weld overlays in place and/or piping diameter. A one hundred percent inspection of those piping welds which were candidates for IHSI was not performed pre-IHSI due to ALARA considerations, but was performed post-IHSI. Approximately forty percent of the one hundred eight piping welds which were candidates for treatment by IHSI were examined in the pre-IHSI sample.

In addition to the aforementioned piping welds, twelve Recirc dissimilar metal safe end-to-nozzle welds were examined prior to treating the subject welds with IHSI. Originally, only six of the twelve 12" and 28" safe end-to-nozzle welds were to be examined pre-IHSI and are included in the number of welds examined pre-IHSI as addressed in GPC letter SL-179 dated January 15, 1986. The aforementioned letter was submitted to NRC Region II as an information report and a copy was provided to the Director of Nuclear Reactor Regulation. GPC, as a measure of conservatism, decided to examine the remaining six 12" and 28" safe end-to-nozzle welds before performing IHSI on the subject welds and was not reflected in GPC letter SL-179 since the remaining safe end-to-nozzle examinations had not been completed at the time of letter submittal. Ultimately, the scope of examinations for the safe end-to-nozzle welds included the following:

System	Diameter	Quality of Welds
Recirc	12"	10
Recirc	28"	2

The dissimilar metal safe end-to-nozzle welds were ultrasonically examined using techniques similar to those developed by EPRI.

Subsequent to the completion of the pre-IHSI examination sample and submittal of GPC letter SL-179 dated January 15, 1986, an additional piping weld was discovered in the Recirc System. Details on the discovery of Recirc piping weld 1B31-1RC-28A-5A was provided to the NRC in GPC letter SL-321 dated February 28, 1986. The subject piping weld was not examined by the examination agency which performed the preservice inspection, but was examined by the piping fabricator before the unit was placed in service. Piping weld 1B31-1RC-28A-5A was ultrasonically examined this outage prior to

performing IHSI on the subject weld joint. The ultrasonic examination of piping weld 1B31-1RC-28A-5A revealed that it was free of rejectable indications. Subsequent to the ultrasonic examiantion, the subject weld was treated by IHSI. Piping weld 1B31-1RC-28A-5A was again examined post-IHSI and was found to be free of rejectable indications.

4.2 Examination Results

Of the 56 piping and safe end-to-nozzle welds ultimately included in the pre-IHSI examination sample, sixteen piping welds and one safe end-to-nozzle weld were observed by ultrasonics to have reportable indications. These welds and their examination results are tabulated in Table 4.1.

4.3 Resolution of Reportable Indications

Table 4.1 denotes repairs which were tentative after completion of the pre-IHSI examination sample. Because of the through-wall depth of their indications, eight Recirc and RWCU piping welds required repair by weld overlay and, as a result, were no longer candidates for IHSI. The piping welds from the pre-IHSI examination sample which were repaired by weld overlay included the following:

System	Weld Number
Recirc	1B31-1RC-12AR-G-3
Recirc	1B31-1RC-12AR-H-4
Recirc	1B31-1RC-12BR-C-4
Recirc	1B31-1RC-12BR-D-2
RWCU	1G31-1RWCU-6-D-4
RWCU	1G31-1RWCU-6-D-5
RWCU	1G31-1RWCU-6-D-18
RWCU	1G31-1RWCU-6-D-18A

The new weld overlays were designed by SIA and were applied by Welding Services, Inc. (WSI). Details on the design and analyses of new and existing weld overlays is provided in the draft SIA Report SIR No. 86-02, "Evaluation of IGSCC Flaw Indications and Weld Overlay Designs for Plant E. I. Hatch Unit 1 - Fall 1985 Maintenance/Refueling Outage", and is included as an attachment to this report.

The remaining eight piping welds and the one safe end-to-nozzle weld found to have reportable indications during the pre-IHSI examination sample had indications of such a size to still consider them as candidates for treatment by IHSI. It should be noted that the indication observed in the safe end-to-nozzle weld, weld no. 1B31-1RC-12BR-C-5 was a Code-acceptable inclusion and/or lamination located, it is believed, outside the heat affected zone of the inconel butter of the safe end and was not connected to the I.D. of the component. The aforementioned IHSI-candidate welds were treated by IHSI. The results of their post-IHSI examination will be addressed in Section 7.0 of this report.

TABLE 4.1

WELDS WITH REPORTABLE INDICATIONS - PRE-IHSI
SAMPLE OF STAINLESS STEEL PIPING AND COMPONENTS
1985 HATCH UNIT 1 MAINTENANCE/REFUELING OUTAGE

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	INDICATION ORIENTATION AND LOCATION	INDICATION LENGTH	INDICATION DEPTH (% THROUGH-WALL)	REMARKS
Recirc	1B31-1RC-12AR-F-4	Pipe-to-Safe End	12"	Circumferential; pipe side	4"	13%	Tentative repair: IHSI.
Recirc	1B31-1RC-12AR-G-3	Elbow-to-Pipe	12"	Circumferential; elbow side	Indication #1: 1.25" Indication #2: 2.1"	Indication #1: 37% Indication #2: 50%	Tentative repair: Weld Overlay.
Recirc	1B31-1RC-12AR-H-4	Pipe-to-Safe End	12"	Circumferential; safe end side	Indication #1: 1" Indication #2: 1" Indication #3: 2" Indication #4: 1"	Indication #1: 28% Indication #2: 28% Indication #3: 35% Indication #4: 35%	Tentative repair: Weld Overlay.
Recirc	1B31-1RC-12BR-A-4	Pipe-to-Safe End	12"	Circumferential; pipe side	2"	22%	Tentative repair: IHSI.
Recirc	1B31-1RC-12BR-B-3	Elbow-to-Pipe	12"	Circumferential;elbow side	Indication #1: 1.35" Indication #2: 1.5"	Indication #1: 20% Indication #2: 13%	Tentative repair: IHSI.

TABLE 4.1 (Continued)

WELDS WITH REPORTABLE INDICATIONS - PRE-IHSI
SAMPLE OF STAINLESS STEEL PIPING AND COMPONENTS
1985 HATCH UNIT 1 MAINTENANCE/REFUELING OUTAGE

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	INDICATION ORIENTATION AND LOCATION	INDICATION LENGTH	INDICATION DEPTH (% THROUGH-WALL)	REMARKS
Recirc	1B31-1RC-12BR-C-4	Pipe-to-Safe End	12"	Circumferential; safe end side	Indication #1: 1.2" Indication #2: 0.9" Indication #3: 4.3"	Indication #1: 33% Indication #2: 39% Indication #3: 33%	Tentative repair: Weld Overlay.
Recirc	1B31-1RC-12BR-C-5	Safe End-to-Nozzle	12"	Axial; safe end side	0.4"	No appreciable depth	Code allowable indication (i.e., inclusion and/or lamination); currently evaluating IHSI for this and similar such welds in Recirc. It should be noted that the indication was not connected to the I.D. of the component and is believed to be outside the heat affected zone of the inconel butter of the safe end.

TABLE 4.1 (Continued)

WELDS WITH REPORTABLE INDICATIONS - PRE-IHSI
SAMPLE OF STAINLESS STEEL PIPING AND COMPONENTS
1985 HATCH UNIT 1 MAINTENANCE/REFUELING OUTAGE

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	INDICATION ORIENTATION AND LOCATION	INDICATION LENGTH	INDICATION DEPTH (% THROUGH-WALL)	REMARKS
Recirc	1B31-1RC-12BR-D-2	Pipe-to-Elbow	12"	Circumferential; elbow side	Indication #1: 1" Indication #2: 0.75" Indication #3: 0.6"	Indication #1: 40% Indication #2: 50% Indication #3: 50%	Tentative repair: Weld Overlay.
Recirc	1B31-1RC-12BR-E-4	Pipe-to-Safe End	12"	Circumferential; Indication #1: pipe side, Indication #2: safe end side	Indication #1: 3.5" Indication #2: 2"	Indication #1: 21% Indication #2: 25%	Tentative repair: IHSI.
Recirc	1B31-1RC 22AM-1BC-1	Sweepolet-to Manifold	22"	See Remarks	See Remarks	See Remarks	Reportable indications observed previously on this unrepaired weld. No significant change from 1984 outage. Tentative repair: IHSI.

TABLE 4.1 (Continued)

WELDS WITH REPORTABLE INDICATIONS - PRE-IHSI
SAMPLE OF STAINLESS STEEL PIPING AND COMPONENTS
1985 HATCH UNIT 1 MAINTENANCE/REFUELING OUTAGE

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	INDICATION ORIENTATION AND LOCATION	INDICATION LENGTH	INDICATION DEPTH (% THROUGH-WALL)	REMARKS
Recirc	1B31-1RC-22BM-1BC-1	Sweepolet-to Manifold	22"	See Remarks	See Remarks	See Remarks	Reportable indications observed previously on this unrepaired weld. No significant change from 1984 outage. Tentative repair: IHSI.
Recirc	1B31-1RC-28A-6	Pipe-to-Elbow	28"	Indication #1: Axial; elbow side Indication #2: Axial; elbow side Indication #3: Circumferential with axial components; elbow side	Indication #1: 0.375" Indication #2: 0.125" Indication #3: 2.5"	Indication #1: 7% Indication #2: 7% Indication #3: 30%	Some reportable indications observed previously on this unrepaired weld. Tentative repair: IHSI.

TABLE 4.1 (Continued)

WELDS WITH REPORTABLE INDICATIONS - PRE-IHSI
SAMPLE OF STAINLESS STEEL PIPING AND COMPONENTS
1985 HATCH UNIT 1 MAINTENANCE/REFUELING OUTAGE

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	INDICATION ORIENTATION AND LOCATION	INDICATION LENGTH	INDICATION DEPTH (% THROUGH-WALL)	REMARKS
Recirc	1B31-1RC-28B-16	Pipe-to-Tee	28"	Indication #1: Circumferential; pipe side	Indication #1: 18.75" (intermittent)	Indication #1: 10%	Some reportable indications observed previously on this unrepaired weld. Tentative repair: IHSI.
				Indication #2: Axial; pipe side	Indication #2: 0.37"	Indication #2: 15%	
				Indication #3: Axial; pipe side	Indication #3: 0.19"	Indication #3: 20%	
				Indication #4: Axial; pipe side	Indication #4: 0.32"	Indication #4: 7%	
				Other Indications (includes Indication #1): Circumferential; pipe side	Other indications (includes Indication #1): 47.35" (intermittent)	Other indications (includes Indication #1): 10%	
RWCU	1G31-1RWCU-6-D-4	Pipe-to-Valve	6"	Circumferential; pipe side	1.6"	50%	Tentative repair: Weld Overlay.
RWCU	1G31-1RWCU-6-D-5	Valve-to Elbow	6"	Circumferential; elbow side	1.5"	70%	Tentative repair: Weld Overlay.
RWCU	1G31-1RWCU-6-D-18	Elbow-to Pipe	6"	Circumferential; elbow side	1.25"	39%	Tentative repair: Weld Overlay.
RWCU	1G31-1RWCU-6-D-18A	Pipe-to Pipe	6"	Circumferential; pipe side	1"	43%	Tentative repair: Weld Overlay.

5.0 EXAMINATION OF WELD OVERLAYS AND WELD OVERLAY UPGRADE

5.1 Examination of Existing Weld Overlays

5.1.1 Pre-Surface Finish Improvement Examination

Prior to improving the surface finish of the existing weld overlays in order to provide for a better ultrasonic examination of the weld overlay and the underlying piping base material (outer 1/4 T), the weld overlays were ultrasonically examined. For the six weld overlays which were applied during the 1982 maintenance/refueling outage, a 45-degree shear-wave examination was performed since these weld overlays were originally examined in this fashion. In addition, a high angle refracted longitudinal-wave ultrasonic examination was conducted on the six weld overlays from the 1982 outage. For the seventeen weld overlays applied during the 1984 maintenance/refueling outage, only a high angle refracted longitudinal-wave ultrasonic examination was performed. The results of the pre-surface finish examination of the existing weld overlays were acceptable. Subsequent to the completion of the examinations, additional weld metal was added to each of the existing weld overlays in a manner similar to applying a weld overlay. The additional weld metal was applied by automatic welding using Type 308L stainless steel. The piping was filled with water during application of the additional weld metal just as all overlays have been applied at Hatch Unit 1. The added overlay material was liquid penetrant examined and ferrite measurements were taken to assure proper ferrite level. Subsequent to the application of the additional weld metal, the overlay finish of each overlay was mechanically ground to achieve a weld overlay surface finish which meets or exceeds the EPRI criteria for weld overlay surface finish. Pre- and post-surface finish improvement overlay thickness measurements are tabulated in Table 5.1. (Note: Weld overlays newly applied during the 1985 maintenance/refueling outage had their surface finishes similarly prepared to better facilitate ultrasonic examination).

5.1.2 Post-Surface Finish Improvement Examination

Subsequent to the reconditioning of the surface finish of the existing weld overlays, ultrasonic examinations were conducted using the techniques demonstrated at the EPRI weld overlay workshops. All of the existing weld overlays, with the exception of Recirc piping weld 1B31-1RC-28B-4, was observed to be free of reportable indications. Weld 1B31-1RC-28B-4 was observed to have small lack of fusion indications in the weld overlay. Disposition of the lack of fusion indications will be addressed in detail in the attached draft SIA report. In addition to the ultrasonic examinations, a liquid penetrant examination was performed on each overlay and 1" of base material on either side of the weld overlay. (Note: Recirc weld overlay 1B31-1RC-28A-12, which was applied during the current outage, was also observed to have indications similar to weld overlay 1B31-1RC-28B-4 and was dispositioned by analysis).

5.2 Upgrade of Selected Weld Overlays

The existing weld overlays for Recirc piping welds 1B31-1RC-22AM-1, 1B31-1RC-22AM-4, 1B31-1RC-22BM-1, and 1B31-1RC-22BM-4 were upgraded in order to make them full structural (i.e., Type 1) overlays. An increase in overlay

thickness ranging from 0.19" - 0.28" (post-surface finish improvement) was experienced for these Recirc manifold end cap weld overlays. Please refer to Table 5.1 for the weld overlay thickness for each specific weld upgraded. Details on the re-evaluation and upgrade of these existing weld overlays is addressed in the attached draft SIA report. As a result of this upgrade, all weld overlays (includes existing and new weld overlays) are the full structural type (i.e., Type 1) with the exception of three overlays. The exceptions include RHR piping weld 1E11-1RHR-24B-R-13 which was observed during the 1982 outage to have axial indications and was overlaid, RHR piping weld 1E11-1RHR-24A-R-13 which was overlaid during the 1984 outage to provide a leakage barrier for axial indications, and RHR piping weld 1E11-1RHR-24B-R-12, which was overlaid with inconel solely to facilitate inspection of that weld. The close proximity of an adjacent weld overlay (weld 1E11-1RHR-24B-R-13) encroached upon weld 1E11-1RHR-24B-R-12 and made inspection difficult using ultrasonics.

TABLE 5.1

EXISTING WELD OVERLAY THICKNESS MEASUREMENTS -
PRE- AND POST-SURFACE FINISH IMPROVEMENT

HATCH UNIT 1 WELD NO.	1982/1984 WELD OVERLAY THK. (IN.) (3)	1986 WELD OVERLAY THK. (IN.) (1, 3)	DIFF. (IN.)
1B31-1RC-12AR-F-2	0.59	0.61	+0.02
1B31-1RC-12AR-H-2	0.52	0.53	+0.01
1B31-1RC-12AR-K-2	0.41	0.39	-0.02
1B31-1RC-12BR-C-2	0.56	0.56	0.00
1B31-1RC-12BR-E-2	0.41	0.42	+0.01
1B31-1RC-12AR-F-3	0.33	0.35	+0.02
1B31-1RC-12AR-H-3	0.46	0.43	-0.03
1B31-1RC-12AR-K-3	0.45	0.46	+0.01
1B31-1RC-12BR-C-3	0.30	0.37	+0.07
1B31-1RC-12BR-E-3	0.38	0.38	0.00
1B31-1RC-12AR-J-3	0.35	0.38	+0.03
1B31-1RC-12BR-D-3	0.44	0.48	+0.04
1B31-1RC-22BM-1	0.33	0.52	+0.19(2)
1E11-1RHR-20B-D-3	0.47	0.51	+0.04
1B31-1RC-28B-3	0.60	0.61	+0.01
1B31-1RC-28B-4	0.64	0.73	+0.09
1B31-1RC-22AM-4	0.31	0.58	+0.27(2)
1B31-1RC-22BM-4	0.37	0.57	+0.20(2)
1E11-1RHR-24B-R-13	0.39	0.39	0.00
1E11-1RHR-24A-R-13	0.22	0.29	+0.07
1B31-1RC-22AM-1	0.27	0.55	+0.28(2)
1B31-1RC-28B-11	0.68	0.71	+0.03
1B31-1RC-28A-10	0.61	0.74	+0.13

Notes: (1) Existing (1982/1984) Overlay Post-Surface Finish Improvement Thickness
(2) Recirc End Cap Overlays Thickened to Make Type 1 Weld Overlay
(3) Thickness Given is Inclusive of First Layer

6.0 IHSI OF STAINLESS STEEL PIPING AND COMPONENTS

Subsequent to the completion of the pre-IHSI sample examination, nirty-nine piping welds and twelve safe end-to-nozzle welds were treated using IHSI. The IHSI was performed by NUTECH Engineers, Inc. under contract to GPC. The following is a breakdown of the welds which were treated using IHSI:

PIPING WELDS

System	Diameter	Quantity of Welds
Recirc	4"	4
Recirc	12"	24
Recirc	22"	12
Recirc	28"	34
RHR	20"	5
RHR	24"	3
RWCU	6" (accessible)	17
		Total 99

SAFE END-TO-NOZZLE WELDS

System	Diameter	Quantity of Welds
Recirc	12"	10
Recirc	28"	2
		Total 12

Following the completion of the IHSI, several piping welds were observed to have reportable indications which necessitated repair by weld overlay. These welds will be discussed in Section 7.0 of this report.

7.0 POST-IHSI EXAMINATION RESULTS

7.1 Welds with Reportable Indications

As noted in Section 6.0, ninty-nine piping welds and twelve safe end-to-nozzle welds were treated using IHSI. The post-IHSI ultrasonic examinations conducted on all piping welds so treated revealed that four piping welds had reportable indications which required repair by weld overlay. The additional piping welds that required repair by overlay post-IHSI included the following:

PIPING WELDS

System	Weld Number
Recirc	1B31-1RC-12AR-F-4
Recirc	1B31-1RC-12BR-B-3
Recirc	1B31-1RC-28A-12
Recirc	1B31-1RC-28B-16

Twelve additional welds which were observed to have reportable indications pre- and/or post-IHSI were left "as is" with the IHSI constituting repair of the welds. The twelve welds included eleven piping welds and one safe end-to-nozzle weld. The welds left "as is" following IHSI include the following:

PIPING WELDS

System	Weld Number
Recirc	1B31-1RC-12AR-G-4
Recirc	1B31-1RC-12BR-A-4
Recirc	1B31-1RC-12BR-E-4
Recirc	1B31-1RC-22AM-1BC-1
Recirc	1B31-1RC-22BM-1BC-1
Recirc	1B31-1RC-28A-2
Recirc	1B31-1RC-28A-4
Recirc	1B31-1RC-28A-6
Recirc	1B31-1RC-28B-8
Recirc	1B31-1RC-28B-10
RHR	1E11-1RHR-20B-D-4

SAFE END-TO-NOZZLE WELDS

System	Weld Number
Recirc	1B31-1RC-12BR-C-5

The aforementioned welds which were repaired by weld overlay or left "as is" following IHSI of the piping and safe end-to-nozzle welds are addressed in GPC letter SL-406 dated March 6, 1986 which was submitted to NRC Region II as an information report. A copy of GPC letter SL-406 was provided to the Director of Nuclear Reactor Regulation.

7.2 Nature of Reportable Indications and Resolution Thereof

As noted in Section 7.0, a number of piping welds required weld overlay following the IHSI treatment. The nature of the reportable indications are shown in Table 7.1 for those piping welds requiring overlay post-IHSI. Pre- and post-IHSI examination results are noted in the subject table. In addition, Table 7.1 addresses those piping welds which were required to be repaired by weld overlay following the pre-IHSI examination. (Note: Included in Table 7.1 is RHR piping weld 1E11-1RHR-24B-R-12 which was not treated with IHSI but was weld overlaid with inconel to facilitate inspection of the weld joint. As noted in Section 5.0 of this report, the close proximity of an adjacent weld overlay (piping weld 1E11-1RHR-24B-4-13) encroached upon piping weld 1E11-1RHR-24B-R-12 and made inspection difficult using ultrasonics. Piping weld 1E11-1RHR-24B-R-12 and the overlay thereof will be discussed in greater detail in the attached draft SIA report.

The nature of the indications in the eleven piping welds and the one safe end-to-nozzle weld which are being left "as is" following the IHSI are shown in Table 7.2. Pre- and post-IHSI examination results are noted in the subject table. In at least one case, safe end-to-nozzle weld 1B31-1RC-12BR-C-5, indications were not observed during the post-IHSI ultrasonic examination. Recirc sweepolet piping welds 1B31-1RC-22AM-1BC-1 and 1B31-1RC-22BM-1BC-1 which were observed to have reportable indications during the 1982 and 1984 outages, respectively, were deemed during the post-IHSI ultrasonic examinations to be geometrical-type reflectors caused by the weld configuration. A detailed discussion of those welds being left "as is" following IHSI and the reason(s) therefor is presented in the attached draft SIA report.

TABLE 7.1

HATCH UNIT 1 ADDITIONAL WELD OVERLAYS -
1985 MAINTENANCE/REFUELING OUTAGE

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	PRE-IHSI FLAW DESCRIPTION	POST-IHSI FLAW DESCRIPTION	REMARKS
Recirc	1B31-1RC-12AR-F-4	Pipe-to-Safe End	12"	Pipe side: Circumferential indication 4" long, 13% max. through-wall.	Pipe side: Circumferential indication 3.2" long, 32% max. through-wall.	Repaired by weld overlay post-IHSI.
Recirc	1B31-1RC-12AR-G-3	Elbow-to-Pipe	12"	Elbow side: Indication #1: Circumferential 1.25" long, 37% through-wall; Indication #2: Circumferential 2.1" long, 50% through-wall.	See Remarks	Repaired by weld overlay following pre-IHSI examination of the subject weld.
Recirc	1B31-1RC-12AR-H-4	Pipe-to-Safe End	12"	Safe End side: Indication #1: Circumferential 1" long, 28% through-wall; Indication #2 Circumferential 2" long, 28% through-wall; Indication #3: Circumferential 2" long, 35% through-wall; Indication #4: Circumferential 1" long, 35% through-wall.	See Remarks	Repaired by weld overlay following pre-IHSI examination of the subject weld.

TABLE 7.1 (Continued)

HATCH UNIT 1 ADDITIONAL WELD OVERLAYS -
1985 MAINTENANCE/REFUELING OUTAGE

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	PRE-IHSI FLAW DESCRIPTION	POST-IHSI FLAW DESCRIPTION	REMARKS
Recirc	1B31-1RC-12BR-B-3	Elbow-to-Pipe	12"	Elbow side: Indication #1: Circumferential 1.35" long, 20% through-wall; Indication #2: Circumferential 1.5" long 13% through-wall.	Through-wall axial indications observed post-IHSI by visual, dye penetrant, and ultrasonic examinations.	Repaired by weld overlay post-IHSI.
Recirc	1B31-1RC-12BR-C	Pipe-to-Safe End	12"	Safe End side: Indication #1: Circumferential 1.2" long, 33% through-wall; Indication #2: Circumferential 0.90" long, 39% through-wall; Indication #3: Circumferential 4.3" long, 33% through-wall.	See Remarks	Repaired by weld overlay following pre-IHSI examination of the subject weld.
Recirc	1B31-1RC-12BR-D-2	Pipe-to-Elbow	12"	Elbow side: Indication #1: Circumferential 1" long, 40% through-wall; Indication #2: Circumferential 0.75" long, 50% through-wall; Indication #3: Circumferential 0.6" long, 50% through-wall.	See Remarks	Repaired by weld overlay following pre-IHSI examination of the subject weld.

TABLE 7.1 (Continued)

HATCH UNIT 1 ADDITIONAL WELD OVERLAYS -
1985 MAINTENANCE/REFUELING OUTAGE

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	PRE-IHSI FLAW DESCRIPTION	POST-IHSI FLAW DESCRIPTION	REMARKS
Recirc	1B31-1RC-28A-12	Pipe-to-Valve	28"	See Remarks	Pipe side: Indication #1: Circumferential 14" long, 29% through-wall; Indications 2-4: Axials, 41% through-wall; See Remarks.	Weld not examined in pre-IHSI examination sample. Repaired by weld overlay post-IHSI. Indications 2-4 (axials) were a component of Indication #1.
Recirc	1B31-1RC-28B-16	Pipe-to-Tee	28"	Pipe side: Both axially and circumferentially-oriented indications observed, 10% max. through-wall (circ. indications).	Pipe side: Indication #1: Circumferential 2.65" long, 24% through-wall; Indication #2: Circumferential 4.0" long, 18% through-wall; Indication #3: Circumferential 1.5" long, 40% through-wall; No sizing signals observed from pre-IHSI circ. indications.	Repaired by weld overlay post-IHSI.
RWCU	1G31-1RWCU-6-D-4	Pipe-to-Valve	6"	Pipe side: Circumferential indication 1.6" long, 50% through-wall.	See Remarks	Repaired by weld overlay following pre-IHSI examination of the subject weld.

TABLE 7.1 (Continued)

HATCH UNIT 1 ADDITIONAL WELD OVERLAYS -
1985 MAINTENANCE/REFUELING OUTAGE

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	PRE-IHSI FLAW DESCRIPTION	POST-IHSI FLAW DESCRIPTION	REMARKS
RWCU	1G31-1RWCU-6-D-5	Valve-to-Elbow	6"	Elbow side: Circumferential indication 1.5" long, 70% through-wall.	See Remarks	Repaired by weld overlay following pre-IHSI examination of the subject weld.
RWCU	1G31-1RWCU-6-D-18	Elbow-to-Pipe	6"	Elbow side: Circumferential indication 1.25" long, 39% through-wall.	See Remarks	Repaired by weld overlay following pre-IHSI examination of the subject weld.
RWCU	1G31-1RWCU-6-D-18A	Pipe-to-Pipe	6"	Pipe side (upstream): Circumferential indication 1.0" long, 43% through-wall.	See Remarks	Repaired by weld overlay following pre-IHSI examination of the subject weld.
RHR	1E11-1RHR-24B-R-12	Valve-to-Pipe	24"	See Remarks	See Remarks	The length of the overlay on adjacent weld 24B-R-13 encroaches upon weld 24B-R-12 and makes inspection of 24B-R-12 difficult. The overlay on weld 24BR-13 is to be extended onto weld 24B-R-12 using inconel solely to facilitate the inspection of dissimilar metal weld 24B-R-12.

TABLE 7.2

HATCH UNIT 1 IHSI-TREATED STAINLESS STEEL PIPING
AND COMPONENT WELDS WITH INDICATIONS

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	PRE-IHSI FLAW DESCRIPTION	POST-IHSI FLAW DESCRIPTION	REMARKS
Recirc	1B31-1RC-12AR-G-4	Pipe-to-Safe End	12"	Pipe side: No recordable indications; Safe End side: Geometric indications.	Pipe side: Circumferential indication 5 3/8" long, 20% through-wall; Safe End side: Geometric indications.	Left "as is" - no repair other than by IHSI.
Recirc	1B31-1RC-12BR-A-4	Pipe-to-Safe End	12"	Pipe side: Circumferential indication 2" long, 22% max. through-wall.	Pipe side: Circumferential indication 2.6" long, 26% max. through-wall.	Left "as is" - no repair other than by IHSI.
Recirc	1B31-1RC-12BR-C-5	Safe End-to-Nozzle	12"	Safe End side: Code-acceptable inclusion and/or lamination, 0.4" long, no appreciable depth.	Pre-IHSI indication was not detected in the post-IHSI examination.	Left "as is".
Recirc	1B31-1RC-12BR-E-4	Pipe-to-Safe End	12"	Pipe side: Circumferential indication 3.5" long, 21% through-wall; Safe End side: Circumferential indication 2.0" long, 25% through-wall.	Pipe side: Circumferential indication 2.75" long, 19% through-wall; Safe End side: Circumferential indication 2" long, 14% through-wall.	Left "as is" - no repair other than by IHSI.

TABLE 7.2 (Continued)

HATCH UNIT 1 IHSI-TREATED STAINLESS STEEL PIPING
AND COMPONENT WELDS WITH INDICATIONS

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	PRE-IHSI FLAW DESCRIPTION	POST-IHSI FLAW DESCRIPTION	REMARKS
Recirc	1B31-1RC-22AM-1BC-1	Sweepolet-to-Manifold	22"	Reportable indications observed previously on this unrepaired weld - no significant change from 1984 ISI results.	These indications are currently being deemed geometrical-type reflectors caused by the weld configuration.	Left "as is."
Recirc	1B31-1RC-22BM-1BC-1	Sweepolet-to-Manifold	22"	Reportable indications observed previously on this unrepaired weld - no significant change from 1984 ISI results.	These indications are currently being deemed geometrical-type reflectors caused by the weld configuration.	Left "as is".
Recirc	1B31-1RC-28A-2	Safe End-to-Pipe	28"	See Remarks	Safe End side: Indication #1: circumferential 1" long, 13% through-wall; Indication #2: circumferential 5.25" long, 15% through-wall.	Weld not examined in pre-IHSI examination sample. Left "as is" - no repair other than by IHSI.
Recirc	1B31-1RC-28A-4	Elbow-to-Pipe	28"	See Remarks	Elbow side: One axial indication, 14% max. through-wall; Pipe side: Six axial indications, 14% max. through-wall.	Weld not examined in pre-IHSI examination sample. Left "as is" - no repair other than by IHSI.

TABLE 7.2 (Continued)

HATCH UNIT 1 IHSI-TREATED STAINLESS STEEL PIPING
AND COMPONENT WELDS WITH INDICATIONS

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	PRE-IHSI FLAW DESCRIPTION	POST-IHSI FLAW DESCRIPTION	REMARKS
Recirc	1B31-1RC-28A-6	Pipe-to-Elbow	28"	Elbow Side: Indication #1: Axial 0.375" long, 7% through-wall; Indication #2: Axial 0.125" long, 7% through-wall; Indication #3: Circumferential with axial components 2.5" long, 30% through-wall; See Remarks	Elbow side: Axial indication 0.3" long, 29% through-wall.	Some indications observed previously on this unrepaired weld from 1984 outage. Left "as is" - no repair other than by IHSI.
Recirc	1B31-1RC-28B-8	Elbow-to-Valve	28"	See Remarks	Elbow side: Indication #1: Axial 0.25" long, 24% through-wall; Indication #2: Axial 0.25" long, 24% through-wall.	Weld not examined in pre-IHSI examination sample. Left "as is" - no repair other than by IHSI.
Recirc	1B31-1RC-28B-10	Pipe-to-Elbow	28"	See Remarks	Elbow side: Indication #1: Circumferential 1.875" long, 23% through-wall (@ 83 1/2")	Weld not examined in pre-IHSI examination sample. Post-IHSI indications #1 and #3 had axial com-

TABLE 7.2 (Continued)

HATCH UNIT 1 IHSI-TREATED STAINLESS STEEL PIPING
AND COMPONENT WELDS WITH INDICATIONS

SYSTEM	WELD NO.	WELD DESCRIPTION	DIAMETER	PRE-IHSI FLAW DESCRIPTION	POST-IHSI FLAW DESCRIPTION	REMARKS
					Indication #2: Circumferential 1.375" long (@ 87 3/8"), 20% through-wall; Indication #3: Circumferential 2.875" long (@ 1 3/8"), 17% through-wall; Indication #4: Circumferential 0.5" long (@ 6 3/4"), 15% Indication #5: Axial (@ 83 1/2"), 31% through-wall; Indication #6: Axial (@ 1 3/8"), 26% through-wall; See Remarks	ponents (Indications 5 and 6, respectively). Left "as is" - no repair other than by IHSI. Number in parentheses is location of indication around pipe circumference measured from the pipe zero reference location (L_o). For example, the 1.375" long indication (Indication #2) extends from 87 3/8" to 88 3/4" measured from L_o.
RHR	1E11-1RHR-20B-D-4	Pipe-to-Pipe	20"	See Remarks	Pipe side (downstream): Indication #1: Axial 0.25" long, 18% through-wall; Indication #2: Axial 0.15" long, 16% through-wall.	Weld not examined in pre-IHSI examination sample. Left "as is" - no repair other than by IHSI.

FIGURE 7.1

"A" Loop - Recirculation & Attached Systems

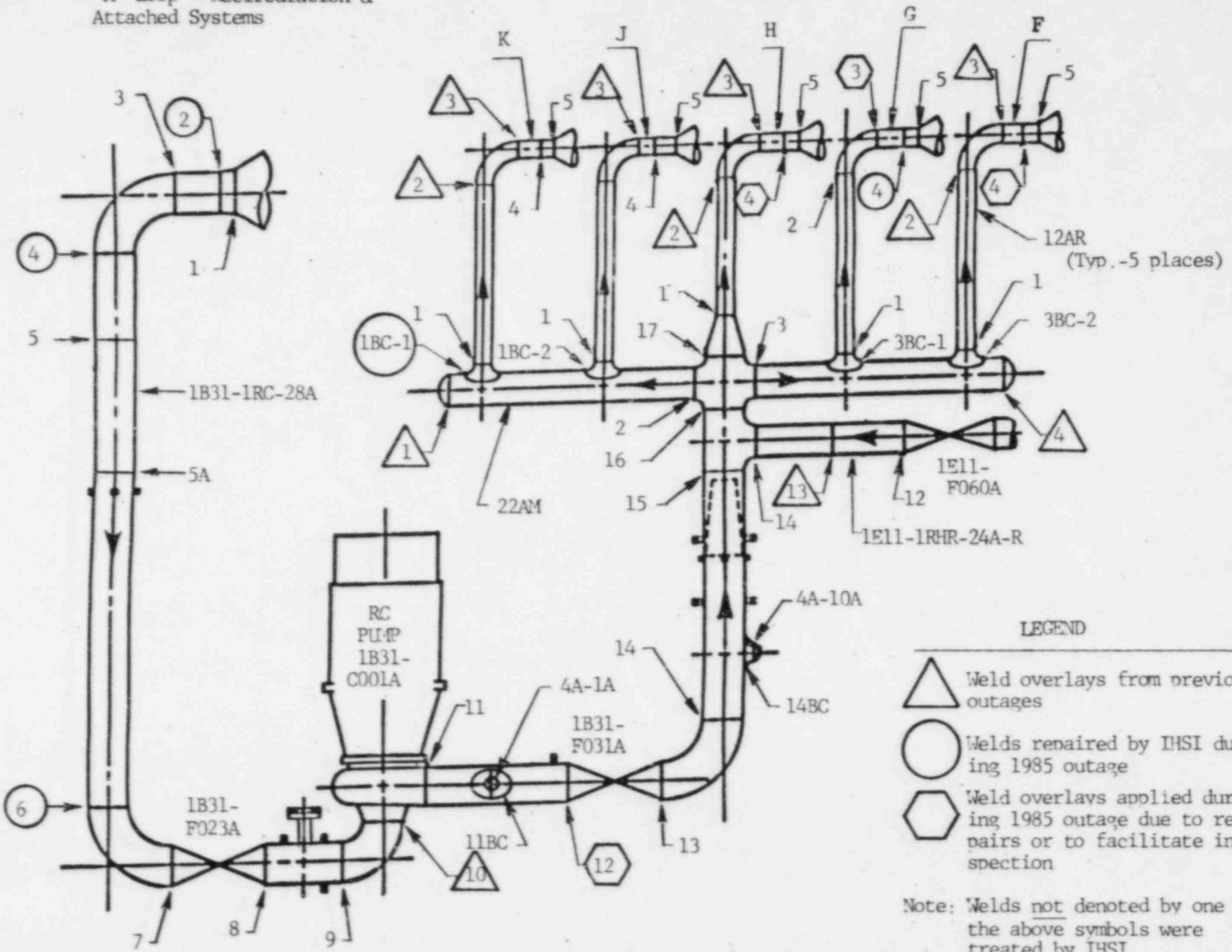
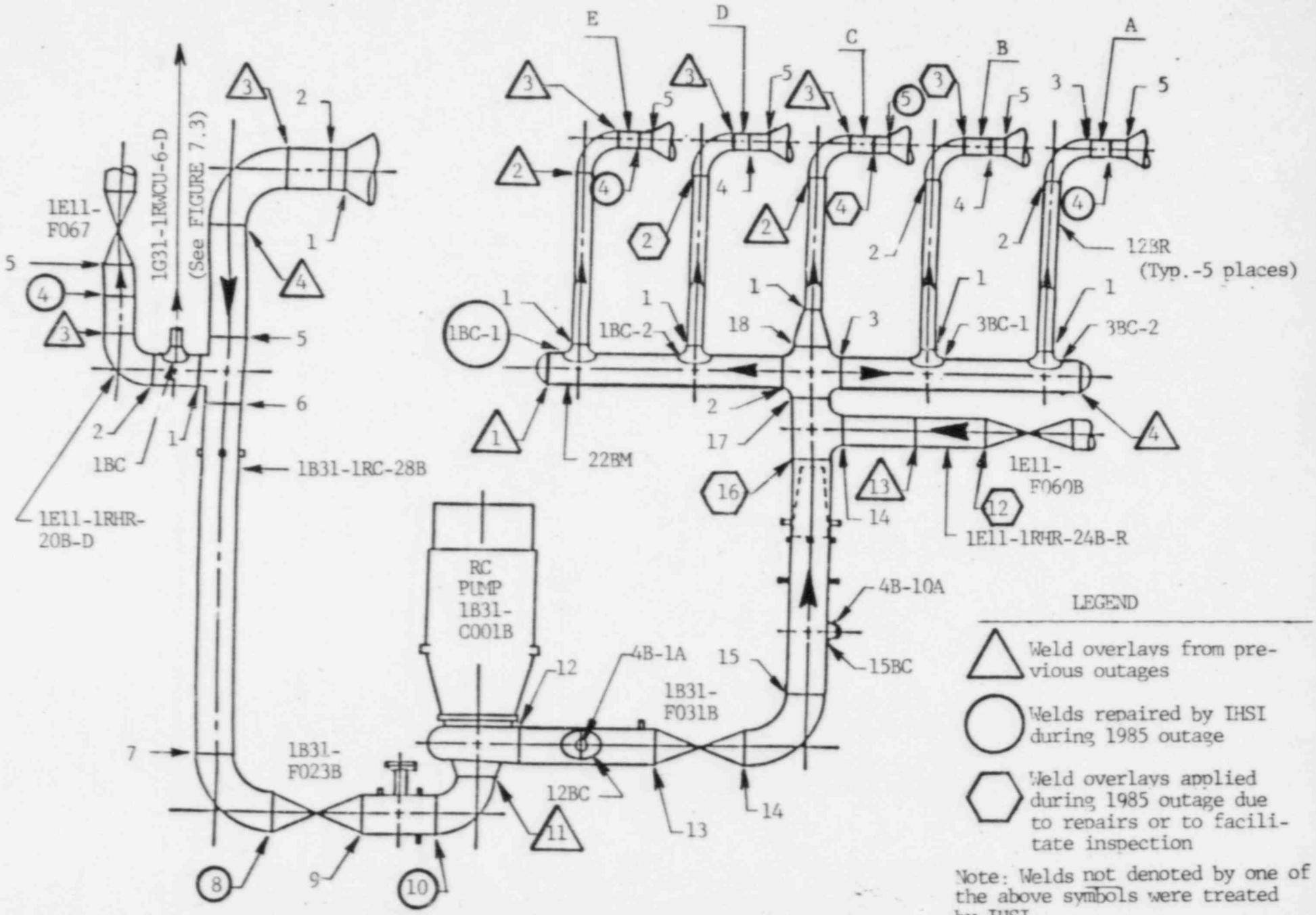


FIGURE 7.2
"B" Loop - Recirculation &
Attached Systems



LEGEND

Weld overlays from previous outages

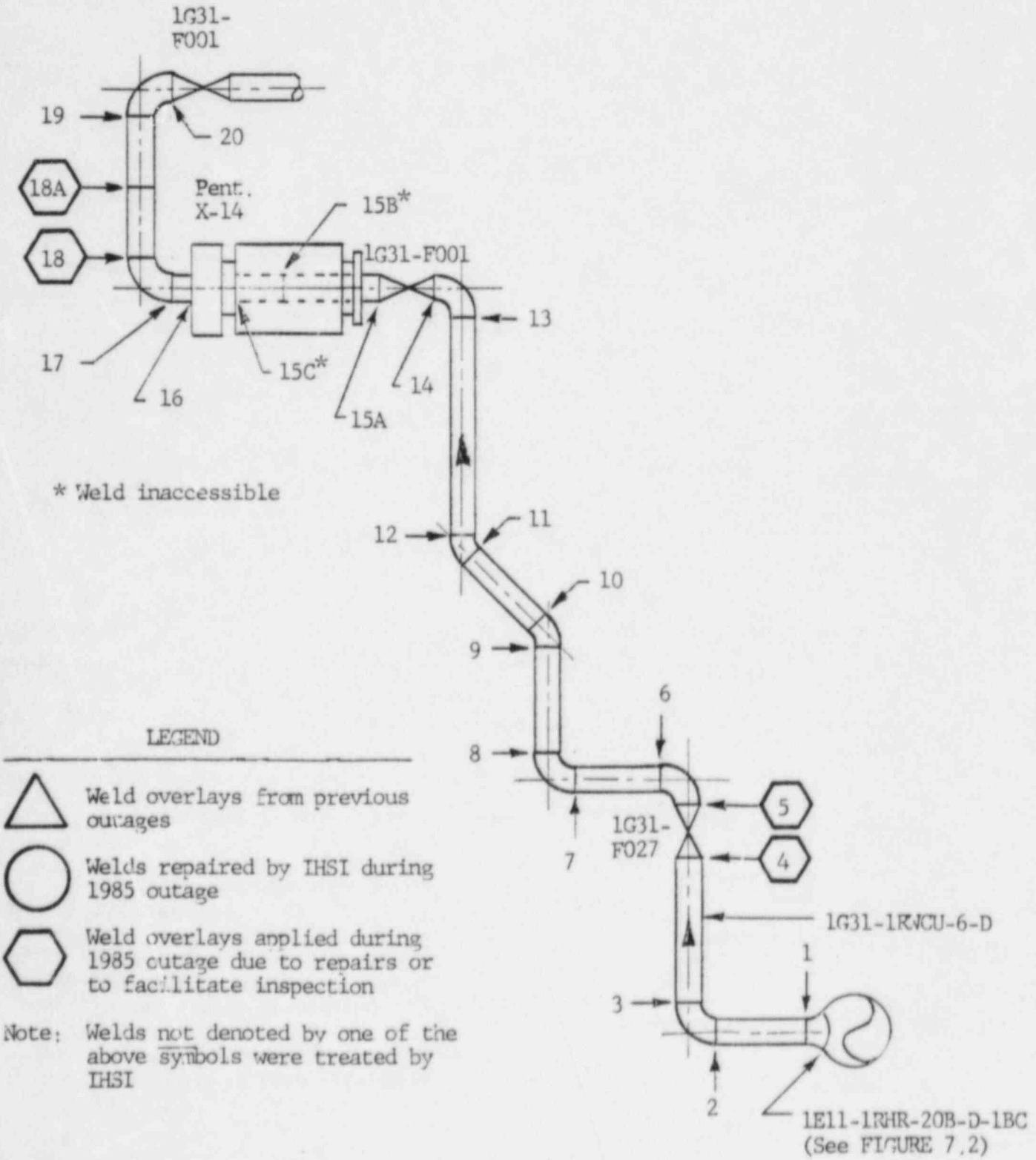
Welds repaired by IHSI during 1985 outage

Weld overlays applied during 1985 outage due to repairs or to facilitate inspection

Note: Welds not denoted by one of the above symbols were treated by IHSI

FIGURE 7.3

Reactor Water Cleanup System
(Class 1)



8.0 REPAIRS AND FLAW EVALUATIONS

8.1 Repair by IHSI

As noted in Section 7.0 of this report, eleven piping welds and one safe end-to-nozzle weld had reportable indications pre- and/or post-IHSI, but were of such a size to warrant leaving them "as is". The IHSI on the affected weld joints constitutes the repair. The examination results of those piping and safe end-to-nozzle welds which were treated with IHSI and were left "as is" typically were weighed against the "NRC staff position" on repairs using IHSI. The "NRC staff position" is described in the January 7, 1986 safety evaluation report issued to Commonwealth Edison Company for Quad Cities Unit 2 and does not mandate repairs for welds not exactly meeting the criteria specified in the "NRC staff position". The welds that are being left "as is" following IHSI and the reasons therefor are addressed in the attached draft SIA report. The welds being left "as is" were identified in Section 7.0 of this report. Their locations are depicted in Figures 7.1 and 7.2.

8.2 Repair by Weld Overlay

As noted in Sections 4.0 and 7.0 of this report, twelve piping welds in the Recirc and RWCU systems required repair by weld overlay. Four of the twelve piping welds were repaired by overlay following treatment by IHSI. The affected piping welds were overlaid by WSI in accordance with design provided by SIA. The piping welds which were required to be repaired by overlay were identified in the aforementioned sections of this report. Figures 7.1, 7.2, and 7.3 depict the location of piping welds repaired by overlay during the 1985 maintenance/refueling outage at Hatch Unit 1. Those overlays which were applied during the 1982 and 1984 maintenance/refueling outages are also noted on the aforementioned figures.

As noted herein, one additional piping weld, RHR weld 1E11-1RHR-24B-R-12 was overlaid during the 1985 maintenance/refueling outage solely for the purpose of facilitating inspection of the weld joint. The piping weld adjacent to the aforementioned piping weld has an overlay whose length encroaches upon weld 1E11-1RHR-24B-R-12 and makes its inspection difficult using ultrasonics. The weld overlay on the adjacent piping weld, 1E11-1RHR-24B-R-13, was extended onto 1E11-1RHR-24B-R-12 using inconel solely to facilitate the ultrasonic inspection of dissimilar metal piping weld 1E11-1RHR-24B-R-12. The location of RHR piping weld 1E11-1RHR-24B-R-12 is depicted on Figure 7.2.

The design and analysis of weld overlay repairs (and for piping weld 1E11-1RHR-24B-R-12) is discussed in detail in the attached draft SIA report.

8.3 Flaw Evaluations and Overlay Design

Flaw evaluation (and weld overlay design) were performed to criteria consistent with those specified in Attachment 2 of NRC Generic Letter 84-11 dated April 19, 1984. In addition, the NRC staff recommendations concerning

flaw evaluation specified in the NRC letter of August 1, 1985 to GPC were taken into consideration. With regard to repairs post-IHSI, the "NRC staff position" specified in the safety evaluation report dated January 7, 1986 issued to Commonwealth Edison Company for Quad Cities Unit 2 typically were employed. It should be noted that repairs were not mandated should the "NRC staff position" criteria specified in the aforementioned safety evaluation report not be exactly met. Flaw evaluation and repair criteria will be discussed in detail in the attached draft SIA report. Deviations from the "NRC staff position" which was cited in the aforementioned safety evaluation report were verbally discussed with NRC staff personnel during a telephone conference call on February 6, 1986.

9.0 FUTURE PLANS

9.1 Modifications/Replacement

With a number of IGSCC-mitigation activities, which included IHSI and weld overlays, having been performed during the 1985 maintenance/refueling outage, GPC has no firm plans at this time with regard to replacement of the existing subject Class 1 stainless steel piping. As noted in previous correspondence with NRC, GPC has procurred piping for the Recirc, RHR, and RWCU systems should it be decided to replace the existing piping at some point in the future. Should replacement be undertaken, the replacement piping would be of a similar configuration to that installed at Hatch Unit 2 during the 1984 maintenance/refueling outage for that particular unit.

With regard to modifications, GPC committed to NRC by letter dated July 1, 1985 to perform a test of hydrogen water chemistry and the affects on the plant during "a subsequent operating cycle." This "mini-test" is tentatively planned for May 1986. GPC is currently pursuing a temporary Technical Specification change to change the setpoint of the steamline radiation monitors to support the "mini-test". As noted in the aforementioned GPC letter, a permanent program of additional IGSCC mitigation by hydrogen addition will be evaluated for future implementation based upon several factors, including the results of the "mini-test" and the on-going industry experience with hydrogen water chemistry and IHSI.

9.2 Leakage Limits and Detection

The GPC submittal of July 1, 1985 addressed leak detection and leakage limits for the next operating cycle. It was indicated that by letters dated February 10 and 11, 1983, GPC proposed Technical Specification changes to augment then existing reactor coolant leakage detection requirements. NRC reviewed and approved the Technical Specification changes as discussed in the Hatch Unit 1 Safety Evaluation Report dated February 11, 1983. The changes meet the intent of the leak detection and leakage limits discussed in Attachment 1 to NRC Generic Letter 84-11.

In addition to the above, it was indicated in our submittal of July 1, 1985 that a visual examination for leakage of the reactor coolant piping would be performed during each plant outage in which the primary containment is deinerted. The examination would be performed consistent with the requirements of IWA-5241 and IWB-5242 of the 1980 Edition of the ASME Section XI Code. The system boundary subject to this examination would be in accordance with IWA-5221. The examination committed to is consistent with that identified in Attachment 1 of NRC Generic Letter 84-11.

GPC wishes to advise NRC that it may wish to relax the visual examination commitment after several operating cycles of experience with IHSI of the existing stainless steel piping. Because of actions taken by GPC during the 1985 maintenance/refueling, each accessible weld in the stainless steel piping in the Recirc, RHR, and RWCU system for those sizes of Class 1 piping required by the ASME Section XI Code to be examined will have had the potential for IGSCC mitigated by either IHSI or weld overlay. Should a relaxation of the visual examination commitment be desired, GPC will pursue accordingly with NRC at the appropriate time.

9.3 Inspection Program

Future inspection plans have not been formulated at this time. GPC will provide for NRC review and comment an inspection program for the subject Class 1 stainless steel piping and components at least thirty days prior to the next regularly scheduled maintenance/refueling outage.

10.0 SUMMARY AND CONCLUSIONS

- A proposed inspection/mitigation program was submitted to NRC by GPC letter dated July 1, 1985 and was subsequently approved by NRC with comments as identified in the NRC letter dated August 1, 1985.

- Ultrasonic examination personnel (i.e., Level II and III inspectors) were requalified in the detection of IGSCC. In addition, inspection personnel were trained through workshops at the EPRI NDE Center in weld overlay inspection. The requalification in IGSCC detection and training in weld overlay examination were conducted in response to NRC comments in the August 1, 1985 letter.

- Prior to performing IHSI, a pre-IHSI examination sample of forty-four piping welds and twelve safe end-to-nozzle welds was ultimately conducted. Eight piping welds in the Recirc and RWCU systems were observed during the pre-IHSI examination to have reportable indications requiring weld overlay. Eight other piping welds were observed to have reportable indications, but were of sufficient size to consider them for repair by IHSI. (Note: Three of the eight piping welds considered for repair by IHSI were later repaired by weld overlay because of the nature of reportable indications observed post-IHSI). One Recirc safe end-to-nozzle weld, 1B31-1RC-12BR-C-5, was observed to have a Code-acceptable inclusion and/or lamination and was later treated with IHSI.

- In order to provide for a better ultrasonic examination of the existing weld overlays, the surface finish on each existing overlay was improved. The resultant surface finish of the existing weld overlays meets or exceeds the EPRI criteria for weld overlay surface finish. New weld overlays applied during the current outage were similarly prepared.

- Four existing Recirc end cap weld overlays were upgraded during the outage to make them full structural weld overlays (i.e., Type 1 overlays).

- Subsequent to the completion of the pre-IHSI examination sample, ninty-nine piping welds and twelve safe end-to-nozzle welds in the Recirc, RHR, and RWCU systems were treated by IHSI.

- Post-IHSI examinations revealed that four Recirc piping welds of the ninty-nine piping welds which were treated by IHSI in the Recirc, RHR, and RWCU systems were required to be repaired by weld overlay. In addition, twelve welds in the Recirc and RHR systems were observed to have reportable indications pre- and/or post-IHSI and were left "as is" with the IHSI constituting the repair. The subject twelve welds included eleven piping welds and one safe end-to-nozzle weld.

- One piping weld, RHR weld 1E11-1RHR-24B-R-12, was overlaid solely to facilitate ultrasonic inspection of the weld joint and not as a result of any necessary repairs. The subject piping weld was overlaid due to the close proximity of an adjacent weld overlay which encroached on piping weld 1E11-1RHR-24B-R-12 and made its inspection by ultrasonics difficult.

- Ultimately, one hundred seven welds consisting of ninty-five piping welds and twelve safe end-to-nozzle welds in the Recirc, RHR, and RWCU systems were successfully treated by IHSI. Thirteen new weld overlays were applied during the outage either as a result of repairs or to facilitate inspection.

- The existing twenty-three weld overlays in the Recirc and RHR systems, with the exception of Recirc overlay 1B31-1RC-28B-4, were observed to be free of reportable indications. Weld 1B31-1RC-28B-4 was observed to have small lack of fusion indications in the weld overlay and was found to be acceptable through analysis.

- Flaw evaluations were performed to criteria consistent with those specified in NRC Generic Letter 84-11 and the NRC staff comments identified in the NRC letter of August 1, 1985 except where otherwise noted in this submittal. With regard to repairs post-IHSI, the "NRC staff position" specified in the safety evaluation report dated January 7, 1986 for Commonwealth Edison's Quad Cities Unit 2 typically were employed. It should be noted that repairs were not mandated should the "NRC staff position" criteria not be exactly met.

- Continued operation with the existing twenty-three weld overlays in the Recirc and RHR systems is justified based on the acceptable examination results and/or analysis during the current outage and GPC's justification provided in our July 1, 1985 submittal to the NRC.

- As a result of actions taken during the current outage, the potential for IGSCC was mitigated by either IHSI or weld overlay for each of the accessible welds in the following sizes of Class 1 stainless steel piping and components:

PIPING

System	Diameter	Number of Welds
Recirc	4"	4
Recirc	12"	40
Recirc	22"	16
Recirc	28"	38
RHR	20"	6
RHR	24"	6
RWCU	6"(accessible)	21
		Total 131

SAFE END-TO-NOZZLE WELDS

System	Diameter	Number of Welds
Recirc	12"	10
Recirc	28"	2
		Total 12

Refer to Figures 7.1, 7.2, and 7.3 enclosed herein for the location of the mitigated weld joints.

- Regarding future modification/replacement plans, there are no firm plans at this time to replace the existing Class 1 stainless steel piping since a number of IGSCC-mitigation activities, which included IHSI and weld overlays, were performed during the current outage. With regard to modifications, GPC committed by letter dated July 1, 1985 to perform a hydrogen water chemistry "mini-test". Future installation of hydrogen addition on a permanent basis is contingent upon several factors, including the results of the "mini-test" and on-going industry experience with hydrogen water chemistry and IHSI.

- Leakage detection and leakage limits are not changed from previous commitments. Relaxation of the visual examination commitment for leakage each plant outage when the unit is deinerted may be pursued with NRC after several cycles of service with IHSI of the existing stainless steel piping and components. Should a relaxation of the previous commitment be desired by GPC, it will be discussed with NRC at the appropriate time.

- No future inspection plans have been formulated at this time. GPC will provide for NRC review and comment an inspection plan at least thirty days prior to the next regularly scheduled maintenance/refueling outage.

- Upon completion of the necessary repairs, analyses, baseline examinations, and successful completion of the hydrostatic test, it is the intention of GPC to return the unit to power operation on or about April 1, 1986.

- GPC concludes that the inspections, repairs, and IGSCC-mitigation activities conducted during the Hatch Unit 1 1985 maintenance/refueling outage provides an adequate basis for the safe operation of the unit.