PHILADELPHIA ELECTRIC COMPANY

2301 MARKET STREET

P.O. BOX 8699

PHILADELPHIA, PA. 19101

(215) 841-5003

JOSEPH W. GALLAGHER
MANAGER
ELECTRIC PRODUCTION DEPARTMENT

November 18, 1983

Docket No. 50-277

Dr. Thomas E. Murley, Administrator
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

SUBJECT: Supplement III to Peach Bottom Unit 2 Response to I.E. Bulletin No. 83-02

REFERENCE: Letter to Dr. T. E. Murley from S. L. Daltroff, dated October 19, 1983, (Supplement to Peach Bottom Unit 2 Response to I.E. Bulletin No. 83-02

Dear Dr. Murley:

This supplement to our above referenced submittal letter of October 19, 1983, S. L. Daltroff (PECo) to Dr. T. E. Murley (NRC), provides the results of the post Induction Heating Stress Improvement (IHSI) ultrasonic examinations and thus completes the Philadelphia Electric Company response to I.E. Bulletin No. 83-02.

The enclosed attachments include information extracted from General Electric Company report RSFA 83-71, Rev. 0, entitled, 'Fracture Mechanics Evaluation and Weld Overlay Design for the Indications in the Peach Bottom 2 Recirculation and RHR Piping Subject to IHSI,' which is included as Attachment C.

Philadelphia Electric Company decided to embark on a partial IHSI program to reduce the susceptibility of sixteen (16) selected welds to Intergranular Stress Corrosion Cracking (IGSCC). Attachment A of our above referenced submittal has been updated to address:

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(1) the welds on which IHSI was performed,

(2) the corrective actions taken, if necessary, on welds receiving IHSI treatment, and

(3) the inclusion of items omitted from the previous submittal.

Attachment A of this submittal, 'Recirculation, Residual Heat Removal Shutdown Cooling, Head Spray Line, Reactor Water Clean-Up Line, and Core Spray Line Piping Weld Information, Revision 1,' provides the information requested in Action Item 3 susceptibility matrix.

The results of the volumetric inspection are shown in Attachment A, Table II, pages 21 of 60 through 40 of 60, under the heading "IGSCC Detection." The heading "Remarks" on the same pages provides justification why some welds were not examined.

The post IHSI ultrasonic examinations were performed utilizing inspection teams from General Electric Company (GE), Lambert-MacGill-Thomas, Inc. (LMT), and Southwest Research Institute (SWRI). The personnel and procedures utilized by each company were qualified as described in our response to Action Item 1 in our October 19, 1983, submittal.

All non-destructive examinations (NDE) were performed to the 1974 Edition of Section XI with Addenda thru Summer 1975. GE and LMT were the prime contractors for these examinations. If the ultrasonic examination discovered evidence of a defect, the other contractor examined the weld to confirm the others' findings. A third contractor, SWRI, was utilized whenever the GE and LMT findings did not concur. Attachment B, "Summary of Ultrasonic Weld Indications," dated October 12, 1983, contains the results of the post IHSI ultrasonic examinations which identified five (5) welds with IGSCC. The length and depth of each indication is shown, as well as the circumferential location from the weld reference point.

In addition, a review of previous ultrasonic examination data discovered one (1) additional weld with IGSCC. Table 1, 'Peach Bottom 2 Ultrasonic Testing,' on page 11 of Attachment C, "Fracture Mechanics Evaluation and Weld Overlay Design for the Indications in the Peach Bottom 2 Recirculation and RHR Piping Subject to IHSI," contains the results of the examination which identified weld 10-0-2 as having IGSCC. The length and depth of the indication is shown, as well as the circumferential location.

These six (6) additional cracked welds increases the total number of welds with IGSCC indications to twenty-six (26).

Attachment C, "Fracture Mechanics Evaluation and Weld Overlay Design for the Indications in the Peach Bottom 2 Recirculation and RHR Piping Subject to IHSI," contains the GE document #83-71 (Rev. 0) which describes the analysis and overlay designs where required, for disposition of the six (6) additional welds with indications. The fracture mechanics evaluations included in Attachment C were performed in accordance with Appendix X of Section XI of the ASME code and Paragraph IWB-3640, "Acceptance Criteria for Flaws in Austenitic Stainless Steel Piping." The beneficial effects of IHSI stresses were not included in the crack growth calculations. Full structural overlays, where required, were designed and applied to re-establish the Code required safety factor of 3 for a minimum period of 24 months of continued full-power operation. This design assumes the indications will grow fully circumferential through the original pipe wall. The most limiting ultrasonic data was utilized in the disposition of indications in order to provide an additional degree of conservatism.

Two welds, the 2-AS-3 recirculation suction weld and the 10-0-2 RHR weld were discovered to contain circumferential indications requiring weld overlays in accordance with the fracture mechanics analysis in Attachment C. The four other welds (three located in the recirculation suction lines and the other in a recirculation discharge line), containing circumferential indications, were evaluated using the same fracture mechanics technique and were found to be acceptable for 24 months continued full-power operation. In order to provide an additional margin of safety, full structural overlays were applied to each of the three recirculation suction welds, Nos. 2-AS-4, 2-BS-6, and 2-BD-14. Fracture mechanics evaluation of the recirculation discharge weld No. 2-AS-7 found the final flaw size to be acceptable beyond 24 months of continued full power operation per ASME Code Section XI, Paragraph IWB-3640.

Philadelphia Electric Company plans to operate with the 2-AS-7 weld "as is" for the six to seven months remaining to the next scheduled refueling outage. In addition, this weld will be instrumented with moisture sensing equipment prior to operation. This weld will be reinspected during the next refueling outage, and will either be replaced with conforming material or overlaid with a full structural overlay.

The overlay welding was performed using remote GTAW equipment and 0.035" SFA 5.9 Type 308L weld filler metal. The welding procedures, welding qualification procedures, and repair procedures SP 602 P.B. Clad 1.0, Rev. 8, were contained in Appendices D, E, F, G, and I of our October 19, 1983, submittal. A summary of the weld overlay size details is contained in GE Report #83-71 (Rev. 0), Figures 8 and 9 in Attachment C. A liquid penetrant examination was performed in accordance with P.B. 83-3.0 (Appendix H of our October, 19, 1983, submittal)

before and after overlay. A final ultrasonic examination was performed in accordance with UT-38 (Appendix J, October 19, 1983, submittal) to verify the structural integrity of the completed overlay. An operational hydro will be performed prior to Unit startup.

Attachment D, "Safety Evaluation for the Operation of Peach Bottom Atomic Power Station Unit 2," contains the safety evaluation for only these six (6) additional welds. Attachment D of the October 19, 1983, supplement contains the safety evaluation for the previous twenty welds. Together, these two safety evaluations support the six to seven months operation to the next scheduled refueling outage of Unit 2.

A written report will be submitted to the NRC staff outlining the plans and ALARA programs necessary for the replacement of portions of the recirculation and other reactor coolant pressure boundary piping systems to be performed during Unit 2 upcoming refueling outage. This report will be submitted at least 60 days prior to start of refueling outage.

Should you have any questions or require additional information, please do not hesitate to contact us.

Very truly yours,

J. W. Gallagher

Attachments

cc: A. R. Blough, Site Inspector
J. F. Stolz, Chief, Division of Licensing (NRC)
NRC Document Control Desk

COMMONWEALTH OF PENNSYLVANIA :

: ss.

COUNTY OF PHILADELPHIA :

J. W. Gallagher, being first duly sworn, deposes and says:

That he is Manager, Electric Production Department, Philadelphia Electric Company; that he has read the foregoing Supplement III to Peach Bottom Unit 2 Reponse to I. E. Bulletin 83-02 and knows the contents thereof; and that the statements and matters set forth therein are true and correct to the best of his knowledge, information and belief.

J W Gallagher

Subscribed and sworn to
before me this 18TH day
of NOVEMBER, 1983.

Judith Y. Franklin

Notary Public

JUDITH Y. FRANKLIN
Notary Public, Phila., Phila. Co.
My Commission Expires July 28, 1987

PHILADELPHIA ELECTRIC COMPANY

PEACH BOTTOM ATOMIC POWER
STATION UNIT #2

SUPPLEMENT III RESPONSE
TO I.E. BULLETIN NO. 83-02

NOVEMBER 1983

DOCKET NO. 50-277

IE11

PHILADELPHIA ELECTRIC COMPANY

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cc: A. R. Blough, Site Inspector
J. F. Stolz, Chief, Division of Licensing (NRC)
NRC Document Control Desk

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM UNIT #2
SUPPLEMENT III TO RESPONSE TO
I.E. BULLETIN NO. 83-02

NOVEMBER 1983

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ATTACHMENT A

PEACH BOTTOM - UNIT #2

Recirculation, Residual Heat Removal Shutdown Cooling, Head Spray Line, Reactor Water Clean-Up Line, and Core Spray Line Piping Weld Information (Revision 1)

TABLE 1 - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "A"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated
28"	2-AS-1	Reactor Nozzle	Carbon Steel	—	Not Calculated		NO
		S.S. Safe End	304	<0.025			
28"	2-AS-2	S.S. Safe End	304	<0.025	1.279	1.343	YES
		S.S. Pipe	304	.059			
28"	2-AS-3	S.S. Pipe	304	.059	1.659	1.742	YES
		S.S. Elbow	304	.059			
28"	2-AS-4	S.S. Elbow	304	.059	1.619	1.699	YES
		S.S. Pipe	304	.062			
28"	2-AS-5	S.S. Pipe	304	.062	1.034	1.086	YES
		S.S. Tee	304	.048			
28"	2-AS-6	S.S. Tee	304	.048	1.011	1.061	YES
		S.S. Pipe	304	.070			
28"	2-AS-7	S.S. Pipe	304	.070	1.427	1.498	YES
		S.S. Elbow	304	.070			
28"	2-AS-8	S.S. Elbow	304	.070	1.118	1.174	YES
		Cast S.S. Valve	CF8	.040			
28"	2-AS-9	Cast S.S. Valve	CF8	.040	1.093	1.147	NO
		S.S. Pipe	304	.059			
28"	2-AS-10	S.S. Pipe	304	.059	1.379	1.448	YES
		S.S. Elbow	304	.059			
28"	2-AS-11	S.S. Elbow	304	.059	1.40	1.47	NO
		Cast S.S. Pump Casing	CF8M	.04			
28"	2-AD-12	Cast S.S. Pump Casing	CF8M	.04	1.030	1.081	NO
		S.S. Pipe	304	.059			
28"	2-AD-13	S.S. Pipe	304	.059	1.035	1.086	NO
		Cast S.S Valve	CF8	.060			
28"	2-AD-14	Cast S.S. Valve	CF8	.059	1.284.	1.348	NO
		S.S. Elbow	304	.059			
28"	2-AD-15	S.S. Elbow	304	.059	1.301	1.366	YES
		S.S. Pipe	304	.059			
28"	2-AD-16	S.S. Pipe	304	.059	1.007	1.057	NO
		S.S. Tee	304	.048			

REV. 1

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "A"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated	
28"	2-AD-17	S.S. Tee S.S. Cross	304 304	.048 .070	0.983	1.032	NO	
28"	2-AD-18	S.S. Cross S.S. Reducer	304 304	.070 .058	1.250	1.312	NO	
28"	2-AD-12/ BPA	S.S. Pipe S.S. Weldolet	304 304	.059 .060	Not Calculated		NO	REV. 1
4"	2-BPA-1-A	S.S. Weldolet S.S. END CAP	304 304	.060 <.08	Not Calculated		No	
4"	2-AD-15/ BPA	S.S. Pipe S.S. Weldolet	304 304	.059 .060	Not Calculated		No	
4"	2-BPA-10-A	S.S. Weldolet S.S. End Cap	304 304	.060 <.08	Not Calculated		No	
22"	2-AH-3	S.S. Manifold Cast S.S. Valve	304 CF8	.062 .042	1.126	1.182	No	
22"	2-AH-2	Cast S.S. Valve S.S. Manifold	CF8 304	.042 .062	1.085	1.139	No	
22"	2-AH-1	S.S. Manifold S.S. Cross	304 304	.062 .070	1.181	1.240	No	
22"	2-AH-4	S.S. Cross S.S. Manifold	304 304	.070 .062	1.124	1.180	No	
22"	2-AH-5	S.S. Manifold S.S. End Cap	304 304	.062 .070	Not Calculated		No	
22"	2-AH-1/ AHK	S.S. Manifold S.S. Sweepolet	304 304	.062 .059	1.172	1.230	No	
22"	2-AH-1/ AHJ	S.S. Manifold S.S. Sweepolet	304 304	.062 .059	1.174	1.232	No	
22"	2-AH-4/ AHG	S.S. Manifold S.S. Sweepolet	304 304	.062 .059	1.120	1.176	No	
22"	2-AH-4/ AHP	S.S. Manifold S.S. Sweepolet	304 304	.062 .059	1.086	1.140	No	
12"	2-AHK-1	S.S. Sweepolet S.S. Pipe	304 304	.059 .052	0.949	0.996	No	

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "A"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated
12"	A-AHJ-1	S.S. Sweepolet S.S. Pipe	304 304	.059 .052	0.988	1.037	No
12"	2-AHH-1	S.S. Reducer S.S. Pipe	304 304	.058 .054	Not Calculated		No
12"	2-AHG-1	S.S. Sweepolet S.S. Pipe	304 304	.059 .042	0.937	0.983	No
12"	2-AHP-1	S.S. Sweepolet S.S. Pipe	304 304	.059 .042	0.925	0.971	No
12"	2-AHK-2	S.S. Pipe S.S. Elbow	304 304	.052 .065	1.453	1.525	No
12"	2-AHJ-2	S.S. Pipe S.S. Elbow	304 304	.052 .063	1.530	1.606	No
12"	2-AHH-2	S.S. Pipe S.S. Elbow	304 304	.054 .063	1.526	1.602	No
12"	2-AHG-2	S.S. Pipe S.S. Elbow	304 304	.042 .063	1.485	1.559	No
12"	2-AHP-2	S.S. Pipe S.S. Elbow	304 304	.042 .065	1.348	1.415	No
12"	2-AHK-3	S.S. Elbow S.S. Pipe	304 304	.065 .047	1.668	1.751	No
12"	2-AHJ-3	S.S. Elbow S.S. Pipe	304 304	.063 .047	1.715	1.800	No
12"	2-AHH-3	S.S. Elbow S.S. Pipe	304 304	.063 .047	1.647	1.729	No
12"	2-AHG-3	S.S. Elbow S.S. Pipe	304 304	.063 .047	1.739	1.825	No
12"	2-AHP-3	S.S. Elbow S.S. Pipe	304 304	.065 .047	1.593	1.672	No
12"	2-AHK-4	S.S. Pipe S.S. Safe End	304 304	.047 <.025	1.623	1.704	No
12"	2-AHJ-4	S.S. Pipe S.S. Safe End	304 304	.047 <.025	1.778	1.866	No
12"	2-AHH-4	S.S. Pipe	304	.047	1.523	1.599	No

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		S.S. Safe End	304	<.025			
12"	2-AHG-4	S.S. Pipe S.S. Safe End	304 304	.047 <.025	1.901	1.996	No
12"	2-~~AHF-4~~	S.S. Pipe S.S. Safe End	304 304	.047 <.025	1.541	1.618	No
12"	2-AHK-5	S.S. Safe End Reactor Nozzle	304 Carbon Steel	<0.025 —	Not Calculated		No
12"	2-AHJ-5	S.S. Safe End Reactor Nozzle	304 Carbon Steel	<0.025 —	Not Calculated		No
12"	2-AHH-5	S.S. Safe End Reactor Nozzle	304 Carbon Steel	<0.025 —	Not Calculated		No
12"	2-AHG-5	S.S. Safe End Reactor Nozzle	304 Carbon Steel	<0.025 —	Not Calculated		NO
12"	2-AHP-5	S.S. Safe End Reactor Nozzle	304 Carbon Steel	<0.025 —	Not Calculated		No

REV. 1

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SYSTEM: RECIRCULATION LOOP "B"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated
28"	2-BS-1	Reactor Nozzle	Carbon Steel	—	Not Calculated		NO
		S.S. Safe End	304	<.025			
28"	2-BS-2	S.S. Safe End	304	<.025	1.117	1.172	NO
		S.S. Pipe	304	.041			
28"	2-BS-3	S.S. Pipe	304	.041	1.326	1.392	NO
		S.S. Elbow	304	.059			
28"	2-BS-4	S.S. Elbow	304	.059	1.307	1.372	NO
		S.S. Pipe	304	.059			
28"	2-BS-5	S.S. Pipe	304	.059	Not Calculated		YES
		S.S. Pipe	304	.070			
28"	2-BS-6	S.S. Pipe	304	.070	1.260	1.323	YES
		S.S. Elbow	304	.070			
28"	2-BS-7	S.S. Elbow	304	.070	1.076	1.129	NO
		Cast S.S. Valve	CF8	.050			
28"	2-BS-8	Cast S.S. Valve	CF8	.050	1.062	1.115	NO
		S.S. Pipe	304	.041			
28"	2-BS-9	S.S. Pipe	304	.041	1.258	1.320	NO
		S.S. Elbow	304	.059			
28"	2-BS-10	S.S. Elbow	304	.059	1.262	1.325	YES
		Cast S.S. Pump	CF8M	.03			
28"	2-BD-11	Cast S.S. Pump	CF8M	.03	0.965	1.013	NO
		S.S. Pipe	304	.059			
28"	2-BD-12	S.S. Pipe	304	.059	0.968	1.016	NO
		Cast Valve	CF8	.060			
28"	2-BD-13	Cast S.S. Valve	CF8	.060	0.985	1.034	YES
		S.S. Elbow	304	.059			
28"	2-BD-14	S.S. Elbow	304	.059	1.178	1.236	YES
		S.S. Pipe	304	.059			
28"	2-BD-15	S.S. Pipe	304	.059	0.901	0.946	NO
		S.S. Tee	304	.058			
28"	2-BD-16	S.S. Tee	304	.058	0.921	0.967	NO
		S.S. Cross	304	.070			
28"	2-BD-17	S.S. Cross	304	.070	1.155	1.212	NO

REV. 1

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Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated	
		S.S. Reducer	304	.058				
4"	2-BD-11/ BPB	S.S. Pipe S.S. Weldolet	304 304	.062 .060	Not Calculated		No	
4"	2-BPB-1-A	S.S. Weldolet S.S. END CAP	304 304	.060 <.08	Not Calculated		No	REV. 1
4"	2-BD-14/ BPB	S.S. Pipe S.S. Weldolet	304 304	.059 .060	Not Calculated		No	
4"	2-BPB-10-A	S.S. Weldolet S.S. Cap	304 304	.060 <.08	Not Calculated		No	
22"	2-BM-3	S.S. Manifold Cast S.S. Valve	304 CF8	.062 .042	1.147	1.204	No	
22"	2-BM-2	Cast S.S. Valve S.S. Manifold	CF8 304	.042 .062	1.128	1.184	No	
22"	2-BM-1	S.S. Manifold S.S. Cross	304 304	.062 .058	0.954	1.001	No	
22"	2-BM-4	S.S. Cross S.S. Manifold	304 304	.058 .062	1.061	1.114	No	
22"	2-BM-5	S.S. Manifold S.S. Cap	304 304	.062 .070	Not Calculated		No	
22"	2-BM-1/ BHA	S.S. Manifold S.S. Sweepolet	304 304	.062 .059	1.148	1.205	No	
22"	2-BM-1/ BHB	S.S. Manifold S.S. Sweepolet	304 304	.062 .059	1.113	1.168	No	
22"	2-BM-4/ BHD	S.S. Manifold S.S. Sweepolet	304 304	.062 .059	1.027	1.078	No	
22"	2-BM-4/ BHE	S.S. Manifold S.S. Sweepolet	304 304	.062 .059	1.050	1.102	No	
12"	2-BHA-1	S.S. Sweepolet S.S. Pipe	304 304	.059 .070	0.973	1.021	No	
12"	2-BHB-1	S.S. Sweepolet S.S. Pipe	304 304	.059 .070	0.948	0.995	No	
12"	2-BHC-1	S.S. Reducer S.S. Pipe	304 304	.058 .054	Not Calculated		No	

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "B"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated
12"	2-BHD-1	S.S. Pipe S.S. Elbow	304 304	.059 .042	.934	.980	No
12"	2-BHE-1	S.S. Sweepolet S.S. Pipe	304 304	.059 .042	0.983	1.032	No
12"	2-BHA-2	S.S. Pipe S.S. Elbow	304 304	.070 .065	1.460	1.533	No
12"	2-BHB-2	S.S. Pipe S.S. Elbow	304 304	.070 .065	1.425	1.496	No
12"	2-BHC-2	S.S. Pipe S.S. Elbow	304 304	.054 .065	1.389	1.458	No
12"	2-BHD-2	S.S. Pipe S.S. Elbow	304 304	.042 .065	1.321	1.387	No
12"	2-BHE-2	S.S. Pipe S.S. Elbow	304 304	.042 .065	1.395	1.464	No
12"	2-BHA-3	S.S. Elbow S.S. Pipe	304 304	.065 .047	1.595	1.674	No
12"	2-BHB-3	S.S. Elbow S.S. Pipe	304 304	.065 .047	1.511	1.586	No
12"	2-BHC-3	S.S. Elbow S.S. Pipe	304 304	.065 .047	1.445	1.517	No
12"	2-BHD-3	S.S. Elbow S.S. Pipe	304 304	.065 .047	1.451	1.523	No
12"	2-BHE-3	S.S. Elbow S.S. Pipe	304 304	.065 .047	1.427	1.498	No
12"	2-BHA-4	S.S. Pipe S.S. Safe End	304 304	.047 <.025	1.678	1.761	No
12"	2-BHB-4	S.S. Pipe S.S. Safe End	304 304	.047 <.025	1.511	1.586	No
12"	2-BHC-4	S.S. Pipe S.S. Safe End	304 304	.047 <.025	1.293	1.357	No
12"	2-BHD-4	S.S. Pipe S.S. Safe End	304 304	.047 <.025	1.409	1.479	No

TABLE I - P3APS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "B"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated
12"	2-BHE-4	S.S. Pipe S.S. Safe End	304 304	.047 <.025	1.247	1.309	No
12"	2-BHA-5	S.S. Safe End Reactor Nozzle	304 Carbon Steel	<.025 —	Not Calculated		No
12"	2-BHB-5	S.S. Safe End Reactor Nozzle	304 Carbon Steel	<.025 —	Not Calculated		No
12"	2-BHC-5	S.S. Safe End Reactor Nozzle	304 Carbon Steel	<.025 —	Not Calculated		No
12"	2-BHD-5	S.S. Safe End Reactor Nozzle	304 Carbon Steel	<.025 —	Not Calculated		No
12"	2-BHE-5	S.S. Safe End Reactor Nozzle	304 Carbon Steel	<.025 —	Not Calculated		No

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TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR SHUTDOWN COOLING SUCTION LINE

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated	
20"	10-0-1	S.S. Tee	304	.048	1.320	1.386	No	REV. 1
		S.S. Pipe	304	.055				
20"	10-0-1/ 12-0	S.S. Pipe	304	.055	Not Calculated		No	
		S.S. Weldolet	304	.060				
20"	10-0-2	S.S. Pipe	304	.055	1.725	1.811	No	
		S.S. Elbow	304	.05				
20"	10-0-3	S.S. Elbow	304	.05	1.150	1.207	No	
		S.S. Pipe	304	.061				
20"	10-0-4	S.S. Pipe	304	.061	1.847	1.939	No	
		S.S. Elbow	304	.050				
20"	10-0-5	S.S. Elbow	304	.050	1.151	1.208	No	
		S.S. Pipe	304	.057				
20"	10-0-6	S.S. Pipe	304	.057	1.996	2.095	No	
		S.S. Elbow	304	.050				
20"	10-0-7	S.S. Elbow	304	.050	1.231	1.292	No	
		C.S. Pipe	CARBON STEEL	———				
20"	10-0-10	C.S. Pipe	CARBON STEEL	———	1.891	1.985	No	REV. 1
		S.S. Elbow	304	.050				
20"	10-0-11	S.S. Elbow	304	.050	1.125	1.181	No	
		S.S. Pipe	304	.061				
20"	10-0-12	S.S. Pipe	304	.061	Not Calculated	2.424	No	
		C.S. Pipe	CARBON STEEL	———				
20"	10-0-15	C.S. Pipe	CARBON STEEL	———	1.706	1.791	NO	REV. 1
		S.S. Elbow	304	.050				
20"	10-0-16	S.S. Elbow	304	.050	1.113	1.168	No	
		S.S. Penetration	304	.061				
20"	10-0-17	S.S. Penetration	304	.061	Not Calculated	2.091	No	REV. 1
		C.S. Pipe	CARBON STEEL	———				

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR SHUTDOWN COOLING RETURN LINE

Pipe Size	Weld No.	Piping Weld Joint Component	Piping Weld Joint Meterial	Piping Weld Joint Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated	
24"	10-1A-14	S.S. Tee	304	.048	Not Calculated	2.763	NO	
		C.S. Pipe	Carbon Steel	———				
24"	10-1A-11	S.S. Pipe	Carbon Steel	———	1.740	1.827	NO	
		S.S. Elbow	304	.056				
24"	10-1A-10	S.S. Elbow	304	.056	1.072	1.125	NO	
		S.S. Elbow	304	.056				
24"	10-1A-9	S.S. Elbow	304	.056	1.729	1.815	NO	
		S.S. Pipe	304	.072				
24"	10-1A-8	S.S. Pipe	304	.072	1.855	1.947	NO	REV. 1
		S.S. Elbow	304	.056				
24"	10-1A-7	S.S. Elbow	304	.056	1.118	1.173	NO	
		S.S. Pipe	304	.074				
24"	10-1A-6	S.S. Pipe	304	.074	1.227	1.288	NO	
		Cast S.S. Valve	CF8M	.07				
24"	10-1A-5	Cast S.S. Valve	CF8M	.07	1.225	1.286	NO	
		S.S. Pipe	304	.065				
24"	10-1A-4	S.S. Pipe	304	.065	1.790	1.879	NO	
		S.S. Elbow	304	.056				
24"	10-1A-3	S.S. Elbow	304	.056	1.055	1.107	NO	
		S.S. Penetration	304	.065				
24"	10-1A-2	S.S. Penetration	304	.065	Not Calculated		NO	
		Cast S.S. Valve	CF8M	.062				

TABLE I - PSAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR SHUTDOWN COOLING RETURN LINE "B"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated	
24"	10-1B-14	S.S. Tee	304	.058	Not Calculated	2.763	NO	
		C.S. Pipe	Carbon Steel	—				
24"	10-1B-11	C.S. Pipe	Carbon Steel	—	1.740	1.827	NO	
		S.S. Elbow	304	.056				
24"	10-1B-10	S.S. Elbow	304	.056	1.072	1.125	NO	
		S.S. Elbow	304	.056				
24"	10-1B-9	S.S. Elbow	304	.056	1.729	1.815	NO	
		S.S. Pipe	304	.074				
24"	10-1B-8	S.S. Pipe	304	.074	1.855	1.947	YES	REV.1
		S.S. Elbow	304	.056				
24"	10-1B-7	S.S. Elbow	304	.056	1.118	1.173	YES	
		S.S. Pipe.	304	.065				
24"	10-1B-6	S.S. Pipe	304	.065	1.227	1.288	NO	
		Cast S.S. Valve	CF8M	.07				
24"	10-1B-5	Cast S.S. Valve	CF8M	.07	1.225	1.286	NO	
		S.S. Pipe	304	.072				
24"	10-1B-4	S.S. Pipe	304	.072	1.790	1.879	NO	
		S.S. Elbow	304	.056				
24"	10-1B-3	S.S. Elbow	304	.056	1.055	1.107	NO	
		S.S. Penetration	304	.072				
24"	10-1B-2	S.S. Penetration	304	.072	Not Calculated		NO	
		Cast S.S. Valve	CF8M	.060				

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR HEAD SPRAY LINE

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated
6"	10-HS-27R	C.S. Flange	Carbon Steel	—			
		S.S. Elbow	304	<.08	Not Calculated		No
6"	10-HS-26R	S.S. Elbow	304	<.08			
		S.S. Pipe	304	<.08	Not Calculated		No
6"	10-HS-25A	S.S. Pipe	304	<.08			
		S.S. Pipe	304	.055	Not Calculated		No
6"	10-HS-25	S.S. Pipe	304	.055			
		S.S. 30° Elbow	304	.07	Not Calculated		No
6"	10-HS-24	S.S. 30° Elbow	304	.07			
		S.S. Pipe	304	.055	Not Calculated		No
6"	10-HS-23	S.S. Pipe	304	.055			
		S.S. Elbow	304	.07	Not Calculated		No
6"	10-HS-22	S.S. Elbow	304	.07			
		S.S. Pipe	304	.055	Not Calculated		No
6"	10-HS-21	S.S. Pipe	304	.055			
		S.S. Elbow	304	.07	Not Calculated		No
6"	10-HS-20	S.S. Elbow	304	.07			
		S.S. Pipe	304	.055	Not Calculated		No
6"	10-HS-19	S.S. Pipe	304	.055			
		S.S. Flange	316	.052	Not Calculated		No
6"	10-HS-18	S.S. Flange	316	.052			
		S.S. Pipe	304	.04	Not Calculated		No
6"	10-HS-17	S.S. Pipe	304	.04			
		S.S. Pipe	304	.04	Not Calculated		No

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TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR HEAD SPRAY LINE

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated	
6"	10-HS-16	S.S. Pipe S.S. Elbow	304 304	.04 .07	Not Calculated		No	
6"	10-HS-15	S.S. Elbow S.S. Pipe	304 304	.07 .05	Not Calculated		No	
6"	10-HS-14	S.S. Pipe S.S. Elbow	304 304	.05 .07	Not Calculated		No	
6"	10-HS-13	S.S. Elbow S.S. Pipe	304 304	.07 .05	Not Calculated		No	
6"	10-HS-12	S.S. Pipe S.S. Valve	304	.05	Not Calculated		No	
6"	10-HS-11	S.S. Valve S.S. Elbow	304	.07	Not Calculated		No	
6"	10-HS-10	S.S. Elbow S.S. Pipe	304 304	.07 .05	Not Calculated		No	
6"	10-HS-9	S.S. Pipe C.S. Pipe	304 Carbon Steel	.05 ——	--	2.091	No	REV. 1
6"	10-HS-6	C.S. Pipe S.S. Elbow	Carbon Steel 304	—— .07	--	1.039	No	REV. 1
6"	10-HS-5	S.S. Elbow S.S. Pipe	304 304	.07 .046	Not Calculated		No	
6"	10-HS-4	S.S. Pipe S.S. Penetration	304 304	.046 .05	Not Calculated		No	
6"	10-HS-3	S.S. Penetration C.S. Pipe	304 Carbon Steel	.05 ——	--	1.247	No	REV. 1

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: REACTOR WATER CLEAN UP LINE

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated
6"	12-0-20	S.S. Weldolet S.S. Pipe	304 316L	.06 <.025	Not Calculated		No
6"	12-0-21	S.S. Pipe CAST S.S. VALVE	316L CF8M	<.025 .078	Not Calculated		No
6"	12-0-22	CAST S.S. VALVE S.S. Pipe	CF8M 316L	.078 <.025	Not Calculated		No
6"	12-0-23	S.S. Pipe CAST S.S. VALVE	316L CF8M	<.025 .050	Not Calculated		No
6"	12-0-24	CAST S.S. VALVE S.S. Elbow	CF8M 316L	.050 <.025	Not Calculated		No
6"	12-0-25	S.S. Elbow S.S. Pipe	316L 316L	<.025 <.025	Not Calculated		No
6"	12-0-26	S.S. Pipe S.S. Elbow	316L 316L	<.025 <.025	Not Calculated		No
6"	12-0-27	S.S. Elbow S.S. Pipe	316L 316L	<.025 <.025	Not Calculated		No
6"	12-0-28	S.S. Pipe S.S. Elbow	316L 316L	<.025 <.025	Not Calculated		No
6"	12-0-29	S.S. Elbow S.S. Pipe	316L 316L	<.025 <.025	Not Calculated		No

REV. 1

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: REACTOR WATER CLEAN UP LINE

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated
		S.S. Pipe	316L	<.025			
6"	12-0-30	S.S. Elbow	316L	<.025	Not Calculated		No
		S.S. Elbow	316L	<.025			
6"	12-0-31	S.S. Pipe	316L	<.025	Not Calculated		No
		S.S. Pipe	316L	<.025			
6"	12-0-32	S.S. Elbow	316L	<.025	Not Calculated		No
		S.S. Elbow	316L	<.025			
6"	12-0-33	S.S. Pipe	316L	<.025	Not Calculated		No
		S.S. Pipe	316L	<.025			
6"	12-0-34	S.S. Penetration	304	.055	Not Calculated		No
		S.S. Penetration	304	.055			
6"	12-0-17	S.S. Pipe	304	<.08	Not Calculated		No
		S.S. Pipe	304	<.08			
6"	12-0-18	CAST S.S. VALVE	CF8M	.055	Not Calculated		No

REV. 1

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "A"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated	
10"	14-A-27	RPV Nozzle S.S. Safe End	Carbon Steel 304	— <.025	Not Calculated		No	
10"	14-A-43	S.S. Safe End S.S. Pipe	304 316L	<.025 <.02	Not Calculated		No	REV.1
10"	14-A-42	S.S. Pipe S.S. Elbow	316L 316L	<.02 <.02	Not Calculated		No	
10"	14-A-41	S.S. Elbow S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No	
10"	14-A-40	S.S. Pipe S.S. Reducer	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-39	S.S. Reducer S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-38	S.S. Pipe S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-37	S.S. Pipe S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-36	S.S. Pipe S.S. Elbow	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-35	S.S. Elbow S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-34	S.S. Pipe S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-33	S.S. Pipe S.S. Elbow	316L 316L	<.02 <.02	Not Calculated		No	

TABLE I - PBAPS UNIT 2 - PIPING/WELD DA

SYSTEM: CORE SPRAY LINE "A"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated	
12"	14-A-32	S.S. Elbow S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-31	S.S. Pipe S.S. Elbow	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-30	S.S. Elbow S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-29	S.S. Pipe S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-A-28	S.S. Pipe C.S. Pipe	316L Carbon Steel	<.02 ——	NOT CALCULATED		NO	REV. 1
12"	14-A-12	C.S. Pipe S.S. Pipe	Carbon Steel 304	—— <.08	——	0.849	No	REV. 1
12"	14-A-11	S.S. Pipe S.S. Pipe	304 304	<.08 <.08	Not Calculated		NO	
12"	14-A-10	S.S. Pipe S.S. Elbow	304 304	<.08 <.08	Not Calculated		No	
12"	14-A-9	S.S. Elbow S.S. Pipe	304 304	<.08 <.08	Not Calculated		No	
12"	14-A-8	S.S. Pipe S.S. Elbow	304 304	<.08 <.08	Not Calculated		No	
12"	14-A-7	S.S. Elbow S.S. Pipe	304 304	<.08 <.08	Not Calculated		No	
12"	14-A-6	S.S. Pipe S.S. Check Valve	304	<.08	Not Calculated		No	
12"	14-A-5	S.S. Check Valve S.S. Elbow	304	<.08	Not Calculated		No	

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "A"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated
12"	14-A-4	S.S. Elbow S.S. Penetration	304 304	<.08 .07	Not Calculated		No
12"	14-A-3	S.S. Penetration S.S. Pipe	304 304	.07 <.08	Not Calculated		No
12"	14-A-2	S.S. Pipe S.S. Valve	304	<.08	Not Calculated		No

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "B"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated
10"	14-B-27	RPV Nozzle S.S. Safe End	Carbon Steel 304	— <.025	Not Calculated		No
10"	14-B-41	S.S. Safe End S.S. Pipe	304 316L	<.025 <.02	Not Calculated		No
10"	14-B-40	S.S. Pipe S.S. Elbow	316L 316L	<.02 <.02	Not Calculated		No
10"	14-B-39	S.S. Elbow S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No
10"	14-B-38	S.S. Pipe S.S. Reducer	316L 316L	<.02 <.02	Not Calculated		No
12"	14-B-37	S.S. Reducer S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No
12"	14-B-36	S.S. Pipe S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No
12"	14-B-35	S.S. Pipe S.S. Elbow	316L 316L	<.02 <.02	Not Calculated		No
12"	14-B-34	S.S. Elbow S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No
12"	14-B-33	S.S. Pipe S.S. Elbow	316L 316L	<.02 <.02	Not Calculated		No
12"	14-B-32	S.S. Elbow S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No
12"	14-B-31	S.S. Pipe S.S. Elbow	316L 316L	<.02 <.02	Not Calculated		No
12"	14-B-30	S.S. Elbow S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No

REV. 1

TABLE I - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "B"

Pipe Size	Weld No.	Piping Weld Joint Component	Material	Carbon Content, %	SRI Valve Original	SRI Valve Revised	IHSI Treated	
12"	14-B-29	S.S. Pipe S.S. Pipe	316L 316L	<.02 <.02	Not Calculated		No	
12"	14-B-28	S.S. Pipe C.S. Pipe	316L Carbon Steel	<.02 —	Not Calculated		No	
12"	14-B-11	C.S. Pipe S.S. Pipe	Carbon Steel 304	— <.08	--	0.849	No	REV. 1
12"	14-B-10	S.S. Pipe S.S. Elbow	304 304	<.08 <.08	Not Calculated		No	
12"	14-B-9	S.S. Elbow S.S. Pipe	304 304	<.08 <.08	Not Calculated		No	
12"	14-B-8	S.S. Pipe S.S. Elbow	304 304	<.08 <.08	Not Calculated		No	
12"	14-B-7	S.S. Elbow S.S. Pipe	304 304	<.08 <.08	Not Calculated		No	
12"	14-B-6	S.S. Pipe S.S. Check Valve	304	<.08	Not Calculated		No	
12"	14-B-5	S.S. Check Valve S.S. Elbow	304	<.08	Not Calculated		No	
12"	14-B-4	S.S. Elbow S.S. Penetration	304 304	<.08 .07	Not Calculated		No	
12"	14-B-3	S.S. Penetration S.S. Pipe	304 304	.07 <.08	Not Calculated		No	
12"	14-B-2	S.S. Pipe S.S. Valve	304	<.08	Not Calculated		No	REV. 1

TABLE-11 - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "A"

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
2-AS-1	No	1) No 2) 562°F 3) 45,200 gpm	--	Conforming-Carbon Steel to Low Carbon 304 S.S.	
2-AS-2	Yes	--	No	Nonconforming-Low Carbon 304 S.S. to 304 S.S.	
2-AS-3	Yes	--	YES	Nonconforming-304 S.S. to 304 S.S.	IGSCC DETECTED DURING POST IHSI NDE.
2-AS-4	Yes	--	YES	Same as 2-AS-3	SAME AS 2-AS-3
2-AS-5	Yes	--	No	Same as 2-AS-3	
2-AS-6	Yes	--	No	Same as 2-AS-3	
2-AS-7	Yes	--	YES	Same as 2-AS-3	SAME AS 2-AS-3
2-AS-8	Yes	--	No	Same as 2-AS-3	
2-AS-9	Yes	--	No	Same as 2-AS-3	
2-AS-10	Yes	--	No	Same as 2-AS-3	
2-AS-11	Yes	--	No	Same as 2-AS-3	
2-AD-12	Yes	--	No	Same as 2-AS-3	
2-AD-13	Yes	--	No	Same as 2-AS-3	
2-AD-14	Yes	--	No	Same as 2-AS-3	
2-AD-15	Yes	--	No	Same as 2-AS-3	
2-AD-16	Yes	--	Yes	Same as 2-AS-3	
2-AD-17	Yes	--	No	Same as 2-AS-3	
2-AD-18	Yes	--	Yes	Same as 2-AS-3	
2-AD-12/ BPA	No	1) Yes 2) 562°F 3) 0 gpm	--	Same as 2-AS-3	Weldolet to Pipe Weld Unexaminable
2-BPA-1/ A	No	1) Yes 2) 562°F 3) 0 gpm	--	Conforming: 304 S.S. Buttered with Low Carbon S.S. Prior to Heat Sink Welding TO 304 S.S.	

REV. 1

TABLE-II - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "A"

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
2-AD-15/ BPA	No	1) No 2) 562°F 3) 0 gpm	--	Same as 2-AS-3	Same as 2-AD-12/BPA
2-BPA-10/ A	No	1) No 2) 562°F 3) 0 gpm	--	Same as 2-BPA-1-A	
2-AM-3	Yes	----	No	Same as 2-AS-3	
2-AM-2	Yes	----	No	Same as 2-AS-3	
2-AM-1	Yes	--	No	Same as 2-AS-3	
2-AM-4	Yes	----	No	Same as 2-AS-3	
2-AM-5	Yes	----	Yes	Same as 2-AS-3	
2-AM-1/ AHK	Yes	----	No	Conforming-Weld Solution Annealed	
2-AM-1/ AHJ	Yes	----	No	Conforming-Weld Solution Annealed	
2-AM-4/ AHG	Yes	----	Yes	Conforming-Weld Solution Annealed	
2-AM-4/ AHF	Yes	----	No	Conforming-Weld Solution Annealed	
2-AHK-1	Yes	----	No	Same as 2-AS-3	
2-AHJ-1	Yes	----	No	Same as 2-AS-3	
2-AHH-1	Yes	----	No	Same as 2-AS-3	
2-AHG-1	Yes	----	No	Same as 2-AS-3	
2-AHF-1	Yes	----	No	Same as 2-AS-3	
2-AHK-2	Yes	----	No	Same as 2-AS-3	
2-AHJ-2	Yes	----	No	Same as 2-AS-3	
2-AHH-2	Yes	----	Yes	Same as 2-AS-3	
2-AHG-2	Yes	----	No	Same as 2-AS-3	
2-AHF-2	Yes	----	No	Same as 2-AS-3	

TABLE-II - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "A"

Weld No.	ISI or Post-IHSI NDE 19837	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
2-AHK-3	Yes	----	No	Same as 2-AS-3	
2-AHJ-3	Yes	----	Yes	Same as 2-AS-3	
2-AHH-3	Yes	----	No	Same as 2-AS-3	
2-AHG-3	Yes	----	No	Same as 2-AS-3	
2-AHF-3	Yes	----	No	Same as 2-AS-3	
2-AHK-4	Yes	----	No	Same as 2-AS-2	
2-AHJ-4	Yes	----	No	Same as 2-AS-2	
2-AHH-4	Yes	----	No	Same as 2-AS-2	
2-AHG-4	Yes	----	No	Same as 2-AS-2	
2-AHF-4	Yes	----	No	Same as 2-AS-2	
2-AHK-5	No	1) No 2) 562°F 3) 4520 gpm	--	Same as 2-AS-1	
2-AHJ-5	No	Same as 2-AHK-5	--	Same as 2-AS-1	
2-AHH-5	No	Same as 2-AHK-5	--	Same as 2-AS-1	
2-AHG-5	No	Same as 2-AHK-5	--	Same as 2-AS-1	
2-AHF-5	No	Same as 2-AHK-5	--	Same as 2-AS-1	

TABLE-II - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "B"

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
2-BS-1	No	1) No 2) 562°F 3) 85,200 gpm	--	Conforming-Carbon Steel to Low Carbon 304 S.S.	
2-BS-2	Yes	----	No	Nonconforming-Low Carbon 304 S.S. to 304 S.S.	
2-BS-3	Yes	----	Yes	Nonconforming-304 S.S. to 304 S.S.	
2-BS-4	Yes	----	No	Same as 2-BS-3	
2-BS-5	Yes	----	No	Same as 2-BS-3	
2-BS-6	Yes	----	YES	Same as 2-BS-3	IGSCC DETECTED DURING POST IHSI NDE. REV. 1
2-BS-7	Yes	----	No	Same as 2-BS-3	
2-BS-8	Yes	----	No	Same as 2-BS-3	
2-BS-9	Yes	----	No	Same as 2-BS-3	
2-BS-10	Yes	----	No	Same as 2-BS-3	
2-BD-11	Yes	----	No	Same as 2-BS-3	
2-BD-12	Yes	----	No	Same as 2-BS-3	
2-BD-13	Yes	----	No	Same as 2-BS-3	
2-BD-14	Yes	----	YES	Same as 2-BS-3	SAME AS 2-BS-6. REV. 1
2-BD-15	Yes	----	No	Same as 2-BS-3	
2-BD-16	Yes	----	No	Same as 2-BS-3	
2-BD-17	Yes	----	No	Same as 2-BS-3	
2-BD-11/ BPB	No	1) Yes 2) 562°F 3) 0 gpm	--	Same as 2-BS-3	Weldolet to Pipe Weld Unexaminable
2-BPB-1/ A	No	1) Yes 2) 562°F 3) 0 gpm	--	Conforming: 304 S.S. Buttered with Low Carbon S.S. Prior to Heat Sink Welding TO 304 S.S.	REV. 1
2-BD-14/	No	1) No	--	Same as 2-BS-3	SAme as

TABLE-11 - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "B"

Weld No. BPB	ISI or Post-IMSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.? 2) 562°F 3) 0 gpm	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks 2-ED-11/BPB
2-BPB-10/A	No	1) No 2) 562°F 3) 0 gpm	--	Same as 2-BPB-1-A	
2-BM-3	Yes	----	No	Same as 2-BS-3	
2-BM-2	Yes	----	No	Same as 2-BS-3	
2-BM-1	Yes	----	No	Same as 2-BS-3	
2-BM-4	Yes	----	Yes	Same as 2-BS-3	
2-BM-5	Yes	----	No	Same as 2-BS-3	
2-BM-1/BHA	Yes	----	No	Conforming-Weld Solution Annealed	
2-BM-1/BHB	Yes	----	No	Conforming-Weld Solution Annealed	
2-BM-4/BHD	Yes	----	Yes	Conforming-Weld Solution Annealed	
2-BM-4/BHE	Yes	----	No	Conforming-Weld Solution Annealed	
2-BHA-1	Yes	----	No	Same as 2-BS-3	
2-BHB-1	Yes	----	No	Same as 2-BS-3	
2-BHC-1	Yes	----	No	Same as 2-BS-3	
2-BHD-1	Yes	----	No	Same as 2-BS-3	
2-BHE-1	Yes	----	No	Same as 2-BS-3	
2-BHA-2	Yes	----	No	Same as 2-BS-3	
2-BHB-2	Yes	----	Yes	Same as 2-BS-3	
2-BHC-2	Yes	----	No	Same as 2-BS-3	
2-BHD-2	Yes	----	No	Same as 2-BS-3	
2-BHE-2	Yes	----	Yes	Same as 2-BS-3	

TABLE-II - PRAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "B"

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
2-BHA-3	Yes	----	No	Same as 2-BS-3	
2-BHB-3	Yes	----	Yes	Same as 2-BS-3	
2-BHC-3	Yes	----	Yes	Same as 2-BS-3	
2-BHD-3	Yes	----	No	Same as 2-BS-3	
2-BHE-3	Yes	----	No	Same as 2-BS-3	
2-BHA-4	Yes	----	No	Same as 2-BS-2	
2-BHB-4	Yes	----	No	Same as 2-BS-2	
2-BHC-4	Yes	----	No	Same as 2-BS-2	
2-BHD-4	Yes	----	No	Same as 2-BS-2	
2-BHE-4	Yes	----	No	Same as 2-BS-2	
2-BHA-5	No	1) No 2) 562°F 3) 4520 gpm	--	Same as 2-BS-1	
2-BHB-5	No	Same as 2-BHA-5	--	Same as 2-BS-1	
2-BHC-5	No	Same as 2-BHA-5	--	Same as 2-BS-1	
2-BHD-5	No	Same as 2-BHA-5	--	Same as 2-BS-1	
2-BHE-5	No	Same as 2-BHA-5	--	Same as 2-BS-1	

TABLE-11 - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR SHUTDOWN COOLING SUCTION LINE

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
10-0-1	Yes	----	No	Nonconforming-304 S.S. to 304 S.S.	
10-0-1/ 12-0	No	1) No 2) 562°F 3) 300 GPM	—	Same as 10-0-1	Weldolet to Pipe Weld Unexaminable REV.1
10-0-2	Yes	----	YES	Same as 10-0-1	
10-0-3	Yes	----	Yes	SAme as 10-0-1	
10-0-4	Yes	----	Yes	SAme as 10-0-1	
10-0-5	Yes	----	Yes	Same as 10-0-1	
10-0-6	Yes	----	Yes	Same as 10-0-1	
10-0-7	Yes	----	No	Same as 10-0-1	
10-0-10	Yes	----	No	Same as 10-0-1	
10-0-11	Yes	----	Yes	Same as 10-0-1	
10-0-12	Yes	----	No	Same as 10-0-1	
10-0-15	Yes	----	No	Same as 10-0-1	
10-0-16	Yes	----	No	Same as 10-0-1	
10-0-17	No	1) Yes 2) < 200°F 3) 0 gpm	—	NONCONFORMING - 304 S.S. TO CARBON STEEL.	• C.S. PIPE TO PENETRATION WELD UNEXAMINABLE • NOT SUSCEPTIBLE TO IGSCC: T < 200°F. REV.1

TABLE-II - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR SHUTDOWN COOLING RETURN LINE "A"

Weld No.	ISI or Post-IASI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
10-1A-14	Yes	----	No	Nonconforming-304 S.S. to Carbon Steel	
10-1A-11	Yes	----	No	Nonconforming-Carbon Steel to 304 S.S.	
10-1A-10	Yes	----	No	Nonconforming-304 S.S. to 304 S.S.	
10-1A-9	Yes	----	No	Same as 10-IA-10	
10-1A-8	Yes	----	No	Same as 10-IA-10	
10-1A-7	Yes	----	No	Same as 10-IA-10	
10-1A-6	Yes	----	No	Same as 10-IA-10	
10-1A-5	Yes	----	No	Same as 10-IA-10	
10-1A-4	Yes	----	No	Same as 10-IA-10	
10-1A-3	Yes	----	No	Same as 10-IA-10	
10-1A-2	No	1) No 2) < 200°F 3) 0 gpm	—	Same as 10-IA-10	• Valve to Penetration Weld Unexaminable. • NOT SUSCEPTIBLE TO IGSCC: T < 200°F.

REV. 1

TABLE II PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR SHUTDOWN COOLING RETURN LINE "B"

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
10-1B-14	Yes	----	No	Nonconforming-304 S.S. to Carbon Steel	REV.1
10-1E 11	Yes	----	No	Nonconforming-Carbon Steel to 304 S.S.	
10-1B-10	Yes	----	No	Nonconforming-304 S.S. to 304 S.S.	
10-1B-9	Yes	----	No	Same as 10-IB-10	
10-1B-8	Yes	----	No	Same as 10-IB-10	
10-1B-7	Yes	----	No	Same as 10-IB-10	
10-1B-6	Yes	----	No	Same as 10-IB-10	
10-1B-5	Yes	----	No	Same as 10-IB-10	
10-1B-4	Yes	----	Yes	Same as 10-IB-10	
10-1B-3	Yes	----	Yes	Same as 10-IB-10	
10-IB-2	No	1) No 2) < 200°F 3) 0 gpm	—	Same as 10-IB-10	• Valve to Penetration Weld Unexaminable • NOT SUSCEPTIBLE TO IGSCC: T < 200°F. REV. 1

TABLE II PBAPS UNIT 2 - PIPING/WELD DATA

SISTEM: RHR HEAD SPRAY LINE

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
10-HS-27R	No	1) No 2) < 562°F 3) 0 gpm	--	Nonconforming-Carbon Steel to 304 S.S.	
10-HS-26R	No	1) No 2) < 562°F 3) 0 gpm	--	Nonconforming-304 S.S. to to 304 S.S.	
10-HS-25A	No	Same as 10-HS-26R	--	Same as 10-HS-26R	
10-HS-25	No	Same as 10-HS-26R	--	Same as 20-HS-26R	
10-HS-24	No	Same as 10-HS-26R	--	Same as 10-HS-26R	
10-HS-23	No	SAME AS 10-HS-26R	--	Same as 10-HS-26R	
10-HS-22	No	SAME AS 10-HS-26R	--	Same as 10-HS-26R	
10-HS-21	No	SAME AS 10-HS-26R	--	Same as 10-HS-26R	
10-HS-20	No	2) NO 3) < 200°F 3) 0 GPM	--	Same as 10-HS-26R	NOT SUSCEPTIBLE TO IGSCC: T<200°F
10-HS-19	No	Same as 10-HS- 20	--	Nonconforming-304 S.S. to 316 S.S.	Same as 10-HS-20
10-HS-18	No	Same as 10-HS-20	--	Same as 10HS-19	Same as 10-HS-20
10-HS-17	No	Same as 10-HS-20	--	Same as 10-HS-26R	Same as 10-HS-20
10-HS-16	No	Same as 10-HS-20	--	Same as 10-HS-26R	Same as 10-HS-20
10-HS-15	No	Same as 10-HS-20	--	Same as 10-HS-26R	Same as 10-HS-20
10-HS-14	No	Same as 10-HS-20	--	Same as 10-HS-26R	Same as 10-HS-20
10-HS-13	No	Same as 10-HS-20	--	Same as 10-HS-26R	Same as 10-HS-20

REV. 1

TABLE II PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR HEAD SPRAY LINE

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
10-HS-12	No	Same as 10-HS-20	--	SAME AS 10-HS-26R	Same as 10-HS-20
10-HS-11	No	Same as 10-HS-20	--	SAME AS 10-HS-26R	Same as 10-HS-20
10-HS-10	No	Same as 10-HS-20	--	SAME AS 10-HS-26R	Same as 10-HS-20
10-HS-9	No	Same as 10-HS-20	--	Nonconforming-304 S.S. to Carbon Steel	Same as 10-HS-20
10-HS-6	No	1) Yes 2) < 200°F 3) 0 gpm	--	Same as 10-HS-9	Same as 10-HS-20
10-HS-5	No	Same as 10-HS-6	--	SAME AS 10-HS-26R	Same as 10-HS-20
10-HS-4	No	Same as 10-HS-6	--	SAME AS 10-HS-26R	Same as 10-HS-20
10-HS-3	No	Same as 10-HS-6	-	Nonconforming-304 S.S. to Carbon Steel	Same as 10-HS-20

REV. 1

TABLE-II - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: REACTOR WATER CLEAN UP LINE

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
12-0-20	No	1) No 2) 562°F 3) 300 gpm	--	CONFORMING -304 S.S. to 316L S.S. - HEAT SINK WELD	REV.1
12-0-21	No	Same as 12-0-20	--	Conforming-Cast S.S. Valve to 316L S.S.	
12-0-22	No	Same as 12-0-20	--	Same as 12-0-21	
12-0-23	No	Same as 12-0-20	--	Same as 12-0-21	
12-0-24	No	1) Yes 2) 562°F 3) 300 GPM	--	Same as 12-0-21	REV.1
12-0-25	No	Same as 12-0-24	--	Conforming-316L S.S. to 316L S.S.	
12-0-26	No	Same as 12-0-24	--	Same as 12-0-25	
12-0-27	No	Same as 12-0-24	--	Same as 12-0-25	
12-0-28	No	Same as 12-0-24	--	Same as 12-0-25	
12-0-29	No	Same as 12-0-24	--	Same as 12-0-25	
12-0-30	No	Same as 12-0-24	--	Same as 12-0-25	
12-0-31	No	Same as 12-0-24	--	Same as 12-0-25	
12-0-32	No	Same as 12-0-24	--	Same as 12-0-25	
12-0-33	No	Same as 12-0-24	--	Same as 12-0-25	
12-0-34	Yes	----	No	NONCONFORMING-316L S.S. to 304 S.S.	REV.1
12-0-17	Yes	----	No	NONCONFORMING - 304SS To 304 S.S.	
12-0-18	Yes	----	No	Same as 12-0-17	

TABLE II - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "A"

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
14-A-27	No	1) No 2) < 562°F 3) 0 gpm	--	Conforming: Carbon Steel to Low Carbon 304 S.S.	
14-A-43	No	Same as 14-A-27	--	Conforming: Low Carbon 304 S.S. to 316L S.S.	
14-A-42	No	Same as 14-A-27	--	Conforming: 316L S.S. to 316L S.S.	
14-A-41	No	Same as 14-A-27	--	Same as 14-A-42	
14-A-40	No	Same as 14-A-27	--	Same as 14-A-42	
14-A-39	No	Same as 14-A-27	--	Same as 14-A-42	
14-A-38	No	Same as 14-A-27	--	Same as 14-A-42	
14-A-37	No	Same as 14-A-27	--	Same as 14-A-42	
14-A-36	No	Same as 14-A-27	--	Same as 14-A-42	
14-A-35	No	Same as 14-A-27	--	Same as 14-A-42	
14-A-34	No	Same as 14-A-27	--	Same as 14-A-42	
14-A-33	No	SAME AS 14-A-27	--	Same as 14-A-42	
14-A-32	No	SAME AS 14-A-27	--	Same as 14-A-42	
14-A-31	No	SAME AS 14-A-27	--	Same as 14-A-42	
14-A-30	No	1) NO 2) < 200°F 3) 0 GPM	--	Same as 14-A-42	
14-A-29	No	Same as 14-A-30	--	Same as 14-A-42	
14-A-28	No	Same as 14-A-30	--	Conforming: 316L S.S. to Carbon Steel	
14-A-12	No	Same as 14-A-30	--	Nonconforming: Carbon Steel to 304 S.S.	Not Susceptible to IGSCC: T < 200°F
14-A-11	No	Same as 14-A-30	--	Nonconforming: 304 S.S. to 304 S.S.	Not Susceptible

REV. 1

TABLE-II - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "A"

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
14-A-10	No	Same as 14-A-30	--	Nonconforming: 304 S.S. to 304 S.S.	Not Susceptible to IGSCC T < 200°F
14-A-9	No	Same as 14-A-30	--	Nonconforming: 304 S.S. to 304 S.S.	Not Susceptible to IGSCC: T < 200°F
14-A-8	No	Same as 14-A-30	--	Nonconforming: 304 S.S. to 304 S.S.	Not Susceptible to IGSCC: T < 200°F
14-A-7	No	Same as 14-A-30	--	Nonconforming: 304 S.S. to 304 S.S.	Not Susceptible to IGSCC: T < 200°F REV. 1
14-A-6	No	Same as 14-A-30	--	Nonconforming: 304 S.S. to 304 S.S.	Not Susceptible to IGSCC: T < 200°F
14-A-5	No	Same as 14-A-30	--	Nonconforming: 304 S.S. to 304 S.S.	Not Susceptible to IGSCC: T < 200°F
14-A-4	No	Same as 14-A-30	--	Nonconforming: 304 S.S. to 304 S.S.	Not Susceptible to IGSCC: T < 200°F
14-A-3	No	Same as 14-A-30	--	Nonconforming: 304 S.S. to 304 S.S.	Not Susceptible to IGSCC: T < 200°F
14-A-2	No	Same as 14-A-30	--	Nonconforming: 304 S.S. to 304 S.S.	Not Susceptible to IGSCC: T < 200°F

TABLE-II - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "B"

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
14-B27	No	1) No 2) < 562°F 3) 0 gpm	—	Conforming-Carbon Steel to Low Carbon 304 S.S.	
14-B-41	No	Same as 19-B-17	—	Conforming: Low Carbon 304 S.S. to 316L S.S.	
14-B-40	No	Same as 14-B-27	—	Conforming: 316L S.S. to 316L S.S.	
14-B-39	No	Same as 14-B-27	—	Same as 14-B-40	
14-B-38	No	Same as 14-B-27	—	Same as 14-B-40	
14-B-37	No	Same as 14-B-27	—	Same as 14-B-40	
14-B-36	No	Same as 14-B-27	—	Same as 14-B-40	
14-B-35	No	Same as 14-B-27	—	Same as 14-B-40	
14-B-34	No	Same as 14-B-27	—	Same as 14-B-40	
14-B-33	No	Same as 14-B-27	—	Same as 14-B-40	
14-B-32	No	Same as 14-B-27	—	Same as 14-B-40	
13-B-31	No	Same as 14-B-27	—	Same as 14-B-40	
14-B-30	No	1) No 2) < 200°F 3) 0 gpm	—	Same as 14-B-40	
14-B-29	No	Same as 14-B-30	—	Same as 14-B-40	
14-B-28	No	Same as 14-B-30	—	Conforming-316L S.S. to Carbon Steel	
14-B-11	No	SAME AS 14-B-30	—	Nonconforming: Carbon Steel to 304 S.S.	Not Susceptible to IGSCC: T < 200°F REV.1
14-B-10	No	SAME AS 14-B-30	—	Nonconforming : 304 S.S. to 304 S.S.	Same as 14-B-11
14-B-9	No	SAME AS 14-B-30	—	Same as 14-B-10	Same as 14-B-11

TABLE-II - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "B"

Weld No.	ISI or Post-IHSI NDE 1983?	IF NO ISI OR NDE: 1) Weld Isolatable? 2) Weld Temp. During Norm. Oper.? 3) Flow Rate in Line Dur. Norm. Oper.?	IGSCC Detected?	Weld Classification: Conforming or Nonconforming/Reasons Why.	Remarks
14-B-8	No	SAME AS 14-B-30	--	Same as 14-B-10	Same as 14-B-11
14-B-7	No	SAME AS 14-B-30	--	Same as 14-B-10	Same as 14-B-11
14-B-6	No	SAME AS 14-B-30	--	Same as 14-B-10	Same as 14-B-11
14-B-5	No	SAME AS 14-B-30	--	Same as 14-B-10	Same as 14-B-11
14-B-4	No	SAME AS 14-B-30	--	Same as 14-B-10	Same as 14-B-11
14-B-3	No	SAME AS 14-B-30	--	Same as 14-B-10	Same as 14-B-11
14-B-2	No	SAME AS 14-B-30	--	Same as 14-B-10	Same as 14-B-11

REV.1

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION [illegible] "A"

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?	Weld by: Chicago Bridge and Iron	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
2-AS-1	S			No	--
2-AS-2	F	B	Root: ER308 Fillout: E308	No	--
2-AS-3	S	K	Root: ER308 Fillout: E308	No	--
2-AS-4	F	B	Root: ER308 Fillout: E308	No	--
2-AS-5	F	B	Root: ER308 Fillout: E308	No	--
2-AS-6	S	K	Root: ER308 Fillout: E308	No	--
2-AS-7	S	K	Root: ER308 Fillout: E308	No	--
2-AS-8	F	B	Root: ER308 Fillout: E308	No	--
2-AS-9	F	B	Root: ER308 Fillout: E308	No	--
2-AS-10	S	K	Root: ER308 Fillout: E308	No	--
2-AS-11	F	B	Root: ER308 Fillout: E308	No	--
2-AD-12	F	B	Root: ER308 Fillout: E308	No	--
2-AD-13	F	B	Root: ER308 Fillout: E308	No	--
2-AD-14	F	B	Root: ER308 Fillout: E308	No	--
2-AD-15	S	K	Root: ER308 Fillout: E308	No	--
2-AD-16	S	K	Root: ER308 Fillout: E308	No	--

REV. 1

REV. 1

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "A"

Weld No.	Shop or Field Weld?	Weld by: M.W.Kellogg (K) Bechtel Power (B) PECo. (P) Catalytic (C)	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate	
2-AD-17	F	B	Root: ER308 Fillout: E308	No	--	
2-AD-18	S	K	Root: ER308 Fillout: E308	No	--	REV. 1
2-AD-12/ BPA	S	K	Root: ER308 Fillout: E308	No	--	
2-BPA-I-A	F	C		No	--	
2-AD-15/ BPA	S	K	Root: ER308 Fillout: E308	No	--	
2-BPA-10-A	F	C		No	--	
2-AH-3	F	B	Root: ER308 Fillout: E308	No	--	
2-AH-2	F	B	Root: ER308 Fillout: E308	No	--	
2-AH-1	F	B	Root: ER308 Fillout: E308	No	--	
2-AH-4	S	K	Root: ER308 Fillout: E308	No	--	
2-AH-5	S	K	Root: ER308 Fillout: E308	No	--	REV. 1
2-AH-1/ AHK	S	K	Root: ER308 Fillout: E308	Yes	SEE ATTACHMENT 2	
2-AH-1/ AHJ	S	K	Root: ER308 Fillout: E308	Yes	SEE ATTACHMENT 2	
2-AH-4/ AHG	S	K	Root: ER308 Fillout: E308	Yes	SEE ATTACHMENT 1	
2-AH-4/ AHF	S	K	Root: ER308 Fillout: E308	Yes	SEE ATTACHMENT 1	
2-AHK-1	F	B	Root: ER308 Fillout: E308	No	--	

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "A"

Weld No.	Shop or Field Weld?	Weld by: M.W.Kellogg (K), Bechtel Power (B), PECo. (P), Catalytic (C)	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
2-AHJ-1	F	B	Root: ER308 Fillout: E308	No	--
2-AHH-1	F	B	Root: ER308 Fillout: E308	No	--
2-AHG-1	F	B	Root: ER308 Fillout: E308	No	--
2-AHP-1	F	B	Root: ER308 Fillout: E308	No	--
2-AHK-2	S	K	Root: ER308 Fillout: E308	No	--
2-AHJ-2	S	K	Root: ER308 Fillout: E308	No	--
2-AHH-2	S	K	Root: ER308 Fillout: E308	No	--
2-AHG-2	S	K	Root: ER308 Fillout: E308	No	--
2-AHP-2	S	K	Root: ER308 Fillout: E308	No	--
2-AHK-3	S	K	Root: ER308 Fillout: E308	No	--
2-AHJ-3	S	K	Root: ER308 Fillout: E308	No	--
2-AHH-3	S	K	Root: ER308 Fillout: E308	No	--
2-AHG-3	S	K	Root: ER308 Fillout: E308	No	--
2-AHP-3	S	K	Root: ER308 Fillout: E308	No	--
2-AHK-4	F	B	Root: ER308 Fillout: E308	No	--
2-AHJ-4	F	B	Root: ER308 Fillout: E308	No	--

REV. 1

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION [illegible] "A"

Weld No.	Shop or Field Weld?	Weld by: M.W.Kellogg (K), Bechtel Power (B), PECo. (P), Catalytic (C)	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
2-AHN-4	F	B	Root: ER308 Fillout: E308	No	--
2-AHG-4	F	B	Root: ER308 Fillout: E308	No	--
2-AHP-4	F	B	Root: ER308 Fillout: E308	No	--
2-AHK-5	S	Chicago Bridge and Iron		No	--
2-AHJ-5	S	Chicago Bridge and Iron		No	--
2-AHN-5	S	Chicago Bridge and Iron		No	--
2-AHG-5	S	Chicago Bridge and Iron		No	--
2-AHP-5	S	Chicago Bridge and Iron		No	--

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "B"

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?	Weld by	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate	
2-BS-1	S	Chicago Bridge and Iron		No	--	
2-BS-2	F	B	Root: ER308 Fillout: E308	No	--	
2-BS-3	S	K	Same as 2-BS-2	No	--	
2-BS-4	F	B	Same as 2-BS-2	No	--	
2-BS-5	F	B	Same as 2-BS-2	No	--	
2-BS-6	S	K	Same as 2-BS-2	No	--	
2-BS-7	F	B	Same as 2-BS-2	No	--	
2-BS-8	F	B	Same as 2-BS-2	No	--	
2-BS-9	S	K	Same as 2-BS-2	No	--	
2-BS-10	F	B	Same as 2-BS-2	No	--	
2-BD-11	F	B	Same as 2-BS-2	No	--	
2-BD-12	F	B	Same as 2-BS-2	No	--	
2-BD-13	F	B	Same as 2-BS-2	No	--	
2-BD-14	S	K	Same as 2-BS-2	No	--	
2-BD-15	S	K	Same as 2-BS-2	No	--	
2-BD-16	F	B	Same as 2-BS-2	No	--	REV.1
2-BD-17	S	K	Same as 2-BS-2	No	--	
2-BD-11/ BPB	S	K	Same as 2-BS-2	No	--	REV.1
2-BPB-1-A	F	C				
2-BD-14/ BPB	S	K	Same as 2-BS-2	No	--	
2-BPB-10-A	F	C			--	
2-BM-3	F	B	Same as 2-BS-2	No	--	

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RECIRCULATION LOOP "B"

Weld by:
B.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?	Weld by:	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate	
2-BM-2	F	B	Same as 2-BS-2	No	--	
2-BM-1	F	B	Same as 2-BS-2	No	--	
2-BM-4	S	K	Same as 2-BS-2	No	--	
2-BM-5	S	K	Same as 2-BS-2	No	--	REV. 1
2-BM-1/ BHA	S	K	Same as 2-BS-2	Yes	SEE ATTACHMENT 3	REV. 1
2-BM-1/ BHB	S	K	Same as 2-BS-2	Yes	SEE ATTACHMENT 3	REV. 1
2-BM-4/ BHD	S	K	Same as 2-BS-2	Yes	SEE ATTACHMENT 4	REV. 1
2-BM-4/ BHE	S	K	Same as 2-BS-2	Yes	SEE ATTACHMENT 4	REV. 1
2-BHA-1	F	B	Same as 2-BS-2	No	--	
2-BHB-1	F	B	Same as 2-BS-2	No	--	
2-BHC-1	F	B	Same as 2-BS-2	No	--	
2-BHD-1	F	B	Same as 2-BS-2	No	--	
2-BHE-1	F	B	Same as 2-BS-2	No	--	
2-BHA-2	S	K	Same as 2-BS-2	No	--	
2-BHB-2	S	K	Same as 2-BS-2	No	--	REV. 1
2-BHC-2	S	K	Same as 2-BS-2	No	--	REV. 1
2-BHD-2	S	K	Same as 2-BS-2	No	--	REV. 1
2-BHE-2	S	K	Same as 2-BS-2	No	--	REV. 1
2-BHA-3	S	K	Same as 2-BS-2	No	--	REV. 1
2-BHB-3	S	K	Same as 2-BS-2	No	--	REV. 1
2-BHC-3	S	K	Same as 2-BS-2	No	--	REV. 1

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SISTEM: RECIRCULATION LOOP "B"

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?		Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
2-BHD-3	S	K	Same as 2-BS-2	No	--
2-BHE-3	S	K	Same as 2-BS-2	No	--
2-BHA-4	F	B	Same as 2-BS-2	No	--
2-BHB-4	F	B	Same as 2-BS-2	No	--
2-BHC-4	F	B	Same as 2-BS-2	No	--
2-BHD-4	F	B	Same as 2-BS-2	No	--
2-BHE-4	F	B	Same as 2-BS-2	No	--
2-BHA-5	S	Chicago Bridge and Iron		No	--
2-BHB-5	S	Chicago Bridge and Iron		No	--
2-BHC-5	S	Chicago Bridge and Iron		No	--
2-BHD-5	S	Chicago Bridge and Iron		No	--
2-BHE-5	S	Chicago Bridge and Iron		No	--

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR SHUTDOWN COOLING SUCTION LINE

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?	Weld by	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate	
10-0-1	FIELD	B	Root: ER308 Fillout: E308	No	--	REV.1
10-0-1/ 12-0	Shop	K		No	--	
10-0-2	FIELD	B	Root: ER308 Fillout: E308	No	--	REV.1
10-0-3	Shop	K	Root: ER308 Fillout: E308	No	--	
10-0-4	Field	B	Root: ER308 Fillout: E308	No	--	
10-0-5	Shop	K	Root: ER308 Fillout: E308	No	--	
10-0-6	Field	B	Root: ER308 Fillout: E308	No	--	
10-0-7	Shop	K	CS Buttered with 309 Root: ER308 Fillout: E308	No	--	
10-0-10	Shop	K	Same as 10-0-7	No	--	
10-0-11	Shop	K	Root: ER308 Fillout: E308	No	--	
10-0-12	Shop	K	Same as 10-0-7	No	--	
10-0-15	Shop	K	Same as 10-0-7	No	--	
10-0-16	Field	B	Root: ER308 Fillout: E308	No	--	
10-0-17	Field	B	Same as 10-0-7	No	--	

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR SHUTDOWN COOL[illegible] RETURN LINE "A"

Weld No.	Shop or Field Weld?	Weld by: M.W.Kellogg (K), Bechtel Power (B), PECo. (P), Catalytic (C)	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
10-1A-14	Field	B	CS Buttered with 309 Root: ER308 Fillout: E309	No	--
10-1A-11	Shop	K	Same as 10-1A-14	No	--
10-1A-10	Shop	K	Root: ER308 Fillout: E308	No	--
10-1A-9	Shop	K	Same as 10-1A-10	No	--
10-1A-8	Shop	K	Same as 10-1A-10	No	--
10-1A-7	Shop	K	Same as 10-1A-10	No	--
10-1A-6	Field	B	Same as 10-1A-10	No	--
10-1A-5	Field	B	Same as 10-1A-10	No	--
10-1A-4	Shop	K	Same as 10-1A-10	No	--
10-1A-3	Field	B	Same as 10-1A-10	No	--
10-1A-2	Field	B	Same as 10-1A-10	No	--

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR SHUTDOWN COOLING [illegible]URE LINE "B"

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?		Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
10-1B-14	Field	B	CS Buttered with 309 Root: ER308 Fillout: E 309	No	--
10-1B-11	Shop	K	Same as 10-1B-14	No	--
10-1B-10	Shop	K	Root: ER308 Fillout: E308	No	--
10-1B-9	Shop	K	Same as 10-1B-10	No	--
10-1B-8	Shop	K	Same as 10-1B-10	No	--
10-1B-7	Shop	K	Same as 10-1B-10	No	--
10-1B-6	Field	B	Same as 10-1B-10	No	--
10-1B-5	Field	B	Same as 10-1B-10	No	--
10-1B-4	Shop	K	Same as 10-1B-10	No	--
10-1B-3	Field	B	Same as 10-1B-10	No	--
10-1B-2	Field	B	Same as 10-1B-10	No	--

REV. 1

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: RHR HEAD SPRAY LIN

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?		Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Anne ing Temp. 2) Holding Time 3) Cooling Rate	
10-HS-27R	Field	P	Root: ER309 Fillout: E 309	No	--	REV.1
10-HS-26R	Field	P	Root: ER308 Fillout: E 308	No	--	
10-HS-25A	Field	P	Same as 10-HS-26R	No	--	
10-HS-25	Shop	K	Root: ER308 Fillout: E308	No	--	
10-HS-24	Field	B	Same as 10-HS-25	No	--	
10-HS-23	Shop	K	Same as 10-HS-25	No	--	
10-HS-22	Shop	K	Same as 10-HS-25	No	--	
10-HS-21	Shop	K	Same as 10-HS-25	No	--	
10-HS-20	Field	B	Same as 10-HS-25	No	--	
10-HS-19	Shop	K	Same as 10-HS-25	No	--	
10-HS-18	Shop	K	Same as 10-HS-25	No	--	
10-HS-17	Field	B	Same as 10-HS-25	No	--	
10-HS-16	Field	B	Same as 10-HS-25	No	--	
10-HS-15	Field	B	Same as 10-HS-25	No	--	
10-HS-14	Field	B	Same as 10-HS-25	No	--	
10-HS-13	Field	B	Same as 10-HS-25	No	--	
10-HS-12	Field	B	Same as 10-HS-25	No	--	
10-HS-11	Field	B	Same as 10-HS-25	No	--	
10-HS-10	Shop	K	Same as 10-HS-25	No	--	
10-HS-9	Shop	K	Same as 10-HS-25	No	--	
10-HS-6	Shop	K	Same as 10-HS-25	No	--	
10-HS-5	Field	B	Same as 10-HS-25	No	--	

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SISTEM: RHR HEAD SPRAY LIN

Weld No.	Shop or Field Weld?	Weld by: M.W.Kellogg (K), Bechtel Power (B), PECo. (P), Catalytic (C)	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
10-HS-4	Field	B	Same as 10-HS-25	No	--
10-HS-3	Field	B	Same as 10-HS-25	No	--

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: REACTOR WATER CLEANUP LINE

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?	Weld by	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
12-0-20	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-21	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-22	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-23	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-24	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-25	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-26	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-27	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-28	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-29	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-30	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-31	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-32	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-33	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-34	Field	C	Root: ER308L Fillout: E308L	No	--
12-0-17	Field	B	Root: ER308 Fillout: E308	No	--

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: REACTOR WATER CLEANUP [illegible]PE

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?	Weld by	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
12-0-18	Field	B	Root: ER308 Fillout: E308	No	--

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "A"

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?	Weld by:	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
14-A-27	Shop	Chicago Bridge and Iron		No	--
14-A-43	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-42	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-41	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-40	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-39	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-38	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-37	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-36	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-35	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-34	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-33	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-32	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-31	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-30	Field	C	Root: ER308L Fillout: E308L	No	--
14-A-29	Field	C	Root: ER308L Fillout: E308L	No	--

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "A"

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?		Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
14-A-28	Shop	K	CS Buttered with 309 Root: ER309L Fillout E309L	No	--
14-A-12	Shop	K	CS Buttered with 309 Root: ER308 Fillout: E308	No	--
14-A-11	Shop	K	Root: ER308 Fillout: E308	No	--
14-A-10	Shop	K	Root: ER308 Fillout: E308	No	--
14-A-9	Shop	K	Root: ER308 Fillout: E308	No	--
14-A-8	Shop	K	Root: ER308 Fillout: E308	No	--
14-A-7	Shop	K	Root: ER308 Fillout: E308	No	--
14-A-6	Field	C	Root: ER308 Fillout: E308	No	--
14-A-5	Field	C	Root: ER308 Fillout: E308	No	--
14-A-4	Field	C	Root: ER308 Fillout: E308	No	--
14-A-3	Field	C	Root: ER308 Fillout: E308	No	--
14-A-2	Field	C	Root: ER308 Fillout: E308	No	--

TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "B"

Weld No.	Shop or Field Weld?	Weld by: M.W.Kellogg (K), Bechtel Power (B), PECo. (P), Catalytic (C)	Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
14-B-27	Shop	Chicago Bridge and Iron		No	--
14-B-41	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-40	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-39	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-38	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-37	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-36	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-35	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-34	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-33	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-32	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-31	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-30	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-29	Field	C	Root: ER308L Fillout: E308L	No	--
14-B-28	Shop	K	CS Buttered with 309 Root: ER309L Fillout: E309L	No	--

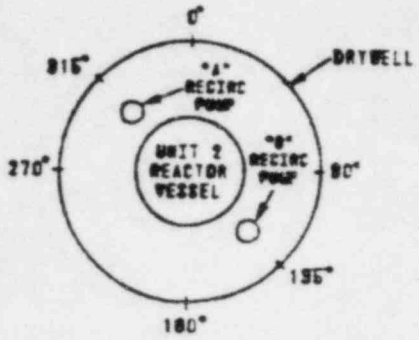
TABLE-III - PBAPS UNIT 2 - PIPING/WELD DATA

SYSTEM: CORE SPRAY LINE "B"

Weld by:
M.W.Kellogg (K)
Bechtel Power (B)
PECo. (P)
Catalytic (C)

Weld No.	Shop or Field Weld?		Weld Material	Weld Solution Annealed?	If Solution Annealed: 1) Annealing Temp. 2) Holding Time 3) Cooling Rate
14-B-11	Shop	K	CS Buttered with 309 Root: ER308 Fillout: E308	No	--
14-B-10	Shop	K	Root: ER308 Fillout: E308	No	--
14-B-9	Shop	K	Root: ER308 Fillout: E308	No	--
14-B-8	Shop	K	Root: ER308 Fillout: E308	No	--
14-B-7	Shop	K	Root: ER308 Fillout: E308	No	--
14-B-6	Field	C	Root: ER308 Fillout: E308	No	--
14-B-5	Field	C	Root: ER308 Fillout: E308	No	--
14-B-4	Field	C	Root: ER308 Fillout: E308	No	--
14-B-3	Field	C	Root: ER308 Fillout: E308	No	--
14-B-2	Field	C	Root: ER308 Fillout: E308	No	--

PBAPS-UNIT 2 "A" RECIRCULATION PIPING & RHR SHUTDOWN COOLING SUCTION/RETURN PIPING

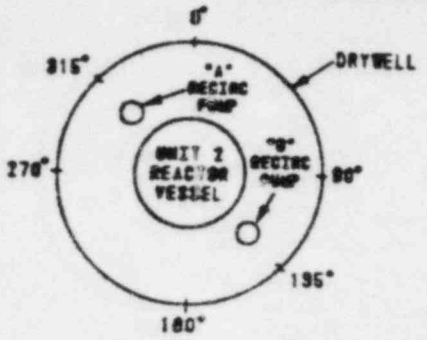


KEY:
- ▲ - CONFORMING WELDS, ALL OTHERS NON-CONFORMING
- ● - NOT UT EXAMINED, ALL OTHERS EXAMINED
- ■ - WELD OVERLAY REPAIRED

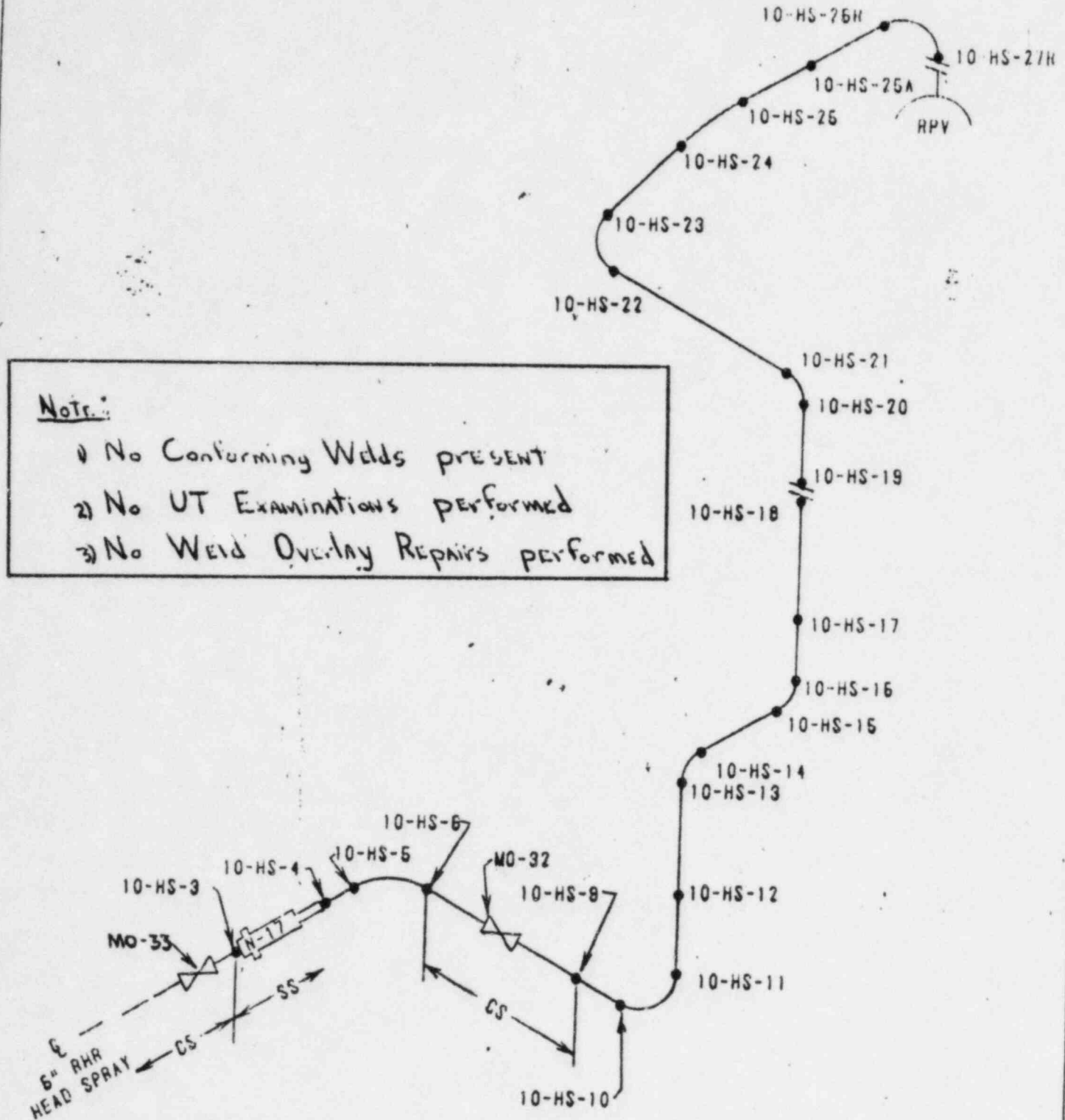
REV. 1

REV. 1

PBAPS-UNIT 2 "B" RECIRCULATION PIPING & RHR SHUTDOWN COOLING SUCTION/RETURN PIPING



KEY: ▲ - CONFORMING WELDS, ALL OTHERS NON-CONFORMING
● NOT UT-EXAMINED, ALL OTHERS EXAMINED
■ - WELD OVERLAY REPAIRED

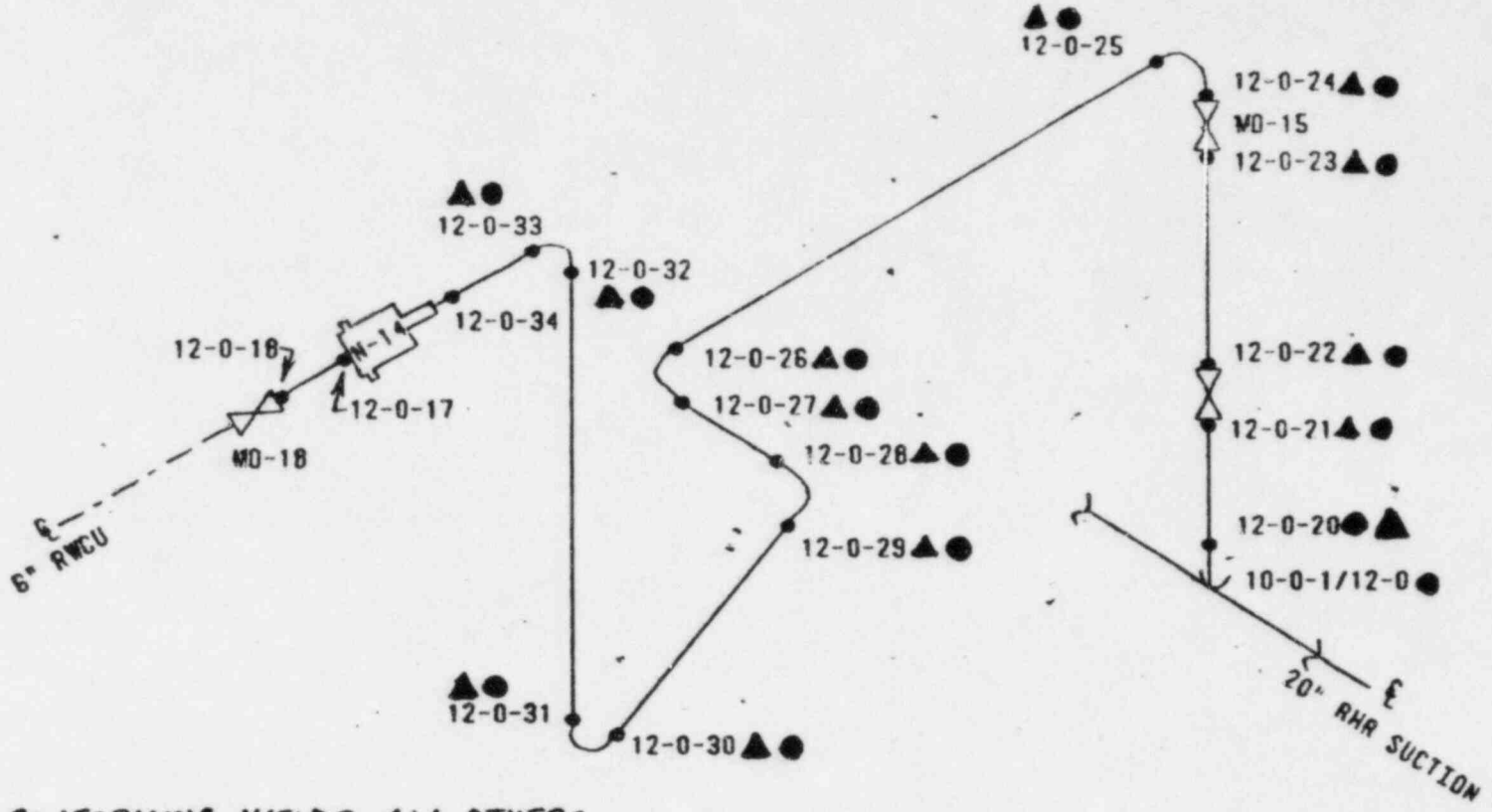


Note:

1) No Conforming Welds present
2) No UT Examinations performed
3) No Weld Overlay Repairs performed

PBAPS UNIT #2
RHR HEAD SPRAY

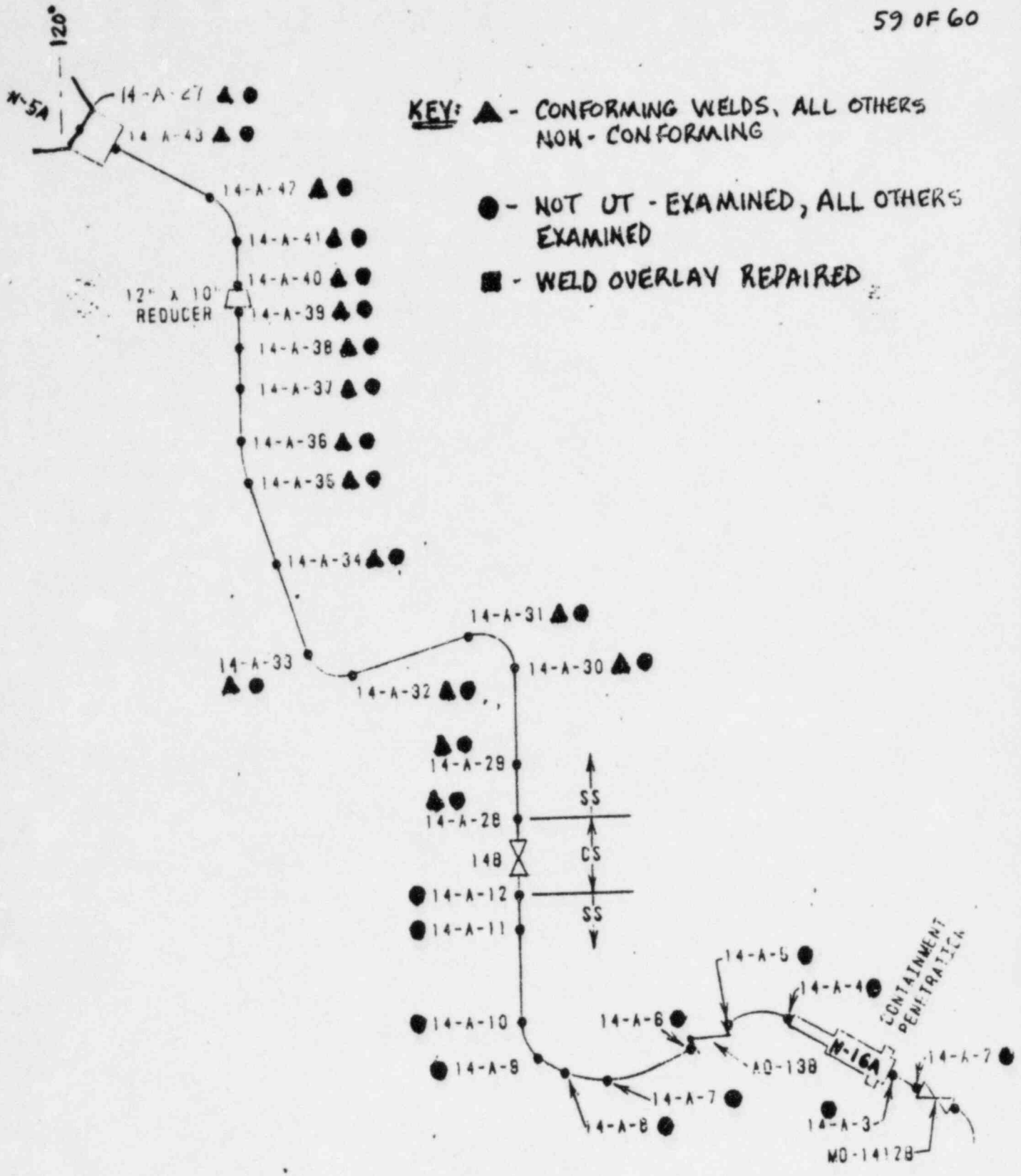
PBAP UNIT #2
REACTOR WATER CLEAN-UP



KEY: ▲ - CONFORMING WELDS, ALL OTHERS NON-CONFORMING

● - NOT UT-EXAMINED, ALL OTHERS EXAMINED

■ - WELD OVERLAY REPAIRED

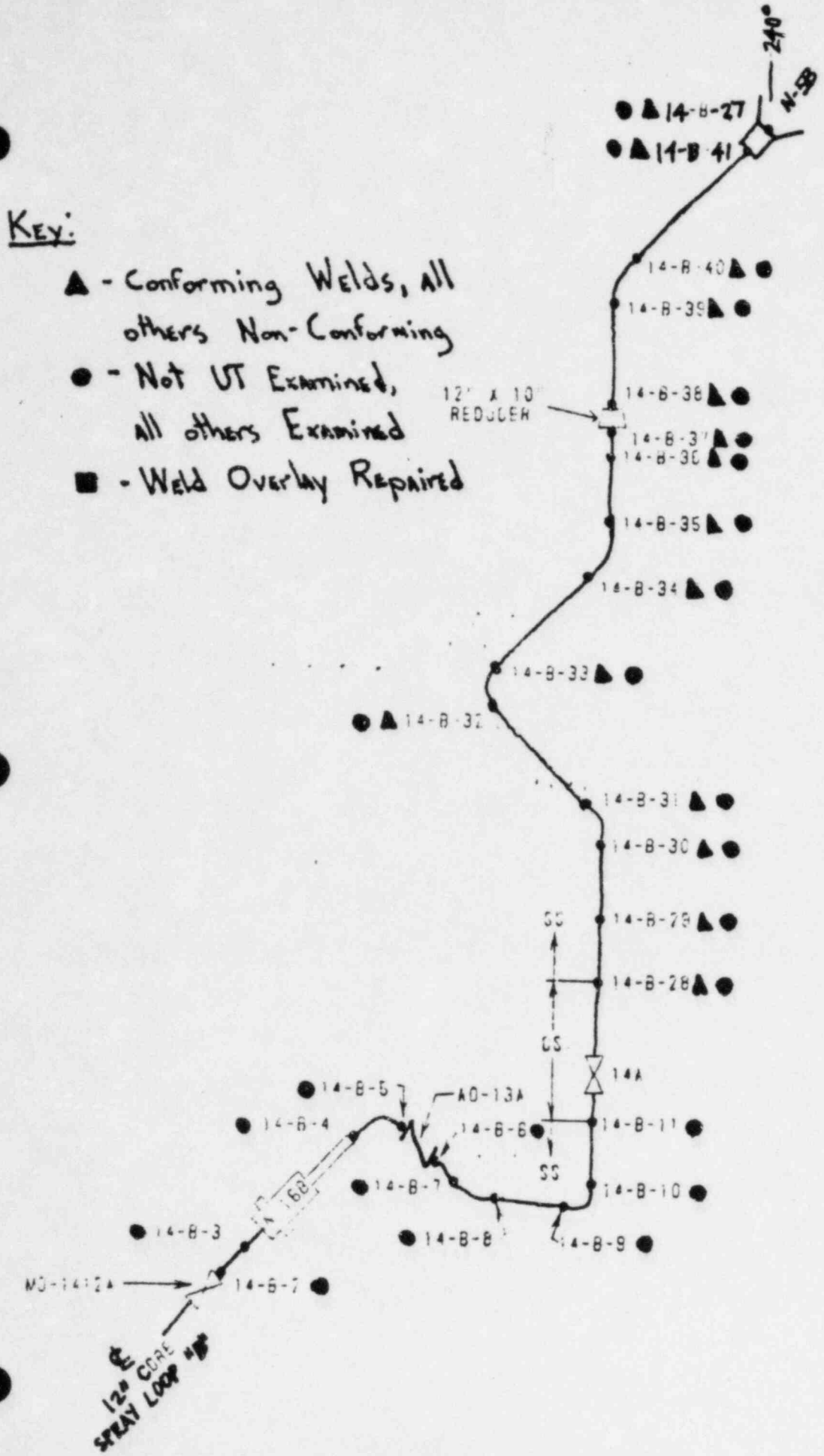


KEY: ▲ - CONFORMING WELDS, ALL OTHERS NON-CONFORMING

● - NOT UT-EXAMINED, ALL OTHERS EXAMINED

■ - WELD OVERLAY REPAIRED

PBAPS UNIT #2
CORE SPRAY-LOOP "A"



PBAPS UNIT #2
CORE SPRAY LOOP "B"

ATTACHMENT B

PEACH BOTTOM - UNIT #2

Summary of Post IHSI Weld Indications

PEACH BOTTOM UNIT 2

SUMMARY OF POST ISI WELD INDICATIONS

N/I = No Indication
N/E = Not Examined

Date October 12, 1983

WELD I.D.	BY	DATE	NO	PIPE SIDE LENGTH	PIPE SIDE DEPTH	PIPE SIDE LOCATIONS	NO	ELBOW/OTHER SIDE LENGTH	ELBOW/OTHER SIDE DEPTH	ELBOW/OTHER SIDE LOCATION
2-AS-2	GE	10/08/83	N/I	---	---	---	N/I	---	---	---
2-AS-3	GE	10/05/83	N/I	---	---	---	1	7"	59%	15" - 22"
-3	LMT	10/06/83	N/E	---	---	---	2	22" INT.,4"	* 52%,41%	0"-22", 28"-32"
-3	SWRI	10/10/83	N/E	---	---	---	2	2.25 INT. 11.87 INT.	17%, 20%	1.25" - 3.5" 20.37" - 32.25"
2-AS-4	GE	10/05/83	N/I	---	---	---	1	14" INT.	40%	68" - 82"
-4	LMT	10/06/83	N/E	---	---	---	** N/I	---	---	---
-4	SWRI	10/10/83	N/E	---	---	---	1	13.75" INT.	32%	65" - 78.75"
2-AS-5	GE	10/07/83	N/I	---	---	---	N/E	---	---	---
2-AS-6	GE	10/07/83	N/I	---	---	---	N/E	---	---	---
2-AS-7	GE	10/06/83	N/I	---	---	---	1	12"	19%	27" - 39"
-7	LMT	10/11/83	N/E	---	---	---	1	15"	23%	25" - 40"
2-AS-8	GE	10/08/83	N/E	---	---	---	N/I	---	---	---
2-AS-10	GE	10/07/83	N/I	---	---	---	N/I	---	---	---
2-BS-5	GE	10/07/83	N/I	---	---	---	N/I	---	---	---
2-BS-6	GE	10/06/83	N/I	---	---	---	1	15"	20%	42" - 57"
-6	LMT	10/11/83	N/E	---	---	---	1	9"	44%	42" - 51"
2-BS-10	GE	10/06/83	N/E	---	---	---	N/I	---	---	---

* Depths changed after sizing with 60° transducer.

** After evaluating with 60° transducer, indication was resolved as a geometric reflector.

PEACH BOTTOM UNIT 2

SUMMARY OF POST THSI WELD INDICATIONS

Date October 12, 1983

N/I = No Indication
N/E = Not Examined

WELD I.D.	BY	DATE	NO	PIPE SIDE			NO	ELBOW/OTHER SIDE		
				LENGTH	DEPTH	LOCATIONS		LENGTH	DEPTH	LOCATION
2-AD-15	GE	10/08/83	N/I	---	---	---	N/I	---	---	---
2-BD-13	GE	10/06/83	N/E	---	---	---	N/I	---	---	---
2-BD-14	GE	10/06/83	2	6",5"	23%,20%	51"-57", 37"-42"	1	15"	23%	80" - 7"
-14	LMT	10/11/83	1	24"	40%	36" - 60"	1	6"	30%	75" - 81"
10-IB-7	GE	10/08/83	N/I	---	---	---	N/I	---	---	---
10-IB-8	GE	10/08/83	N/I	---	---	---	N/I	---	---	---

ATTACHMENT C

PEACH BOTTOM - UNIT #2

Recirculation and Residual Heat Removal Fracture Mechanics Evaluation and Weld Overlay Design

DRF #137-0010
RSEA 83-71 (Rev 0)
CHL06.DA

FRACTURE MECHANICS EVALATION AND WELD OVERLAY DESIGN FOR THE INDICATIONS IN THE PEACH BOTTOM 2 RECIRCULATION AND RHR PIPING SUBJECT TO IHSI

October 1983

Prepared By: _____
C. H. Lange, Engineer
Mechanics Analysis

Approved By: _____ for S. Ranganath
S. Ranganath, Manager
Mechanics Analysis

Table of Contents

1. INTRODUCTION

Following the application of Induction Heating Stress Improvement (IHSI) process to the Peach Bottom Unit 2 Recirculation Loops A and B, UT (ultrasonic testing) examination revealed that 5 welds subjected to IHSI had reportable indications. In addition, reevaluation of the UT data on one more weld, 10-0-2, revealed crack indications in the weld HAZ. Table 1 provides a summary of the lengths and depths of the indications at the six welds while Figures 1a and 1b show the locations of each weld on the Recirculation Piping System. For evaluation purposes, the greater of the depths and lengths reported by the three methods was used. Inspection of Table 1 shows that all indications are circumferential.

2. SUMMARY AND RESULTS

A fracture mechanics analysis was performed for all six welds and results show that 2 of the welds (2-AS-3, 10-0-2) require weld overlays for more than 18 months of continued operation. Although only 2 welds require overlays, minimum required weld overlay thickness and width calculations were performed for all 6 welds. This information is provided so that weld overlays can be applied to all 6 welds if added margin is desired.

It is important to note that due to the application of the Induction Heating Stress Improvement (IHSI) process, the GE screening criteria was not used.* The beneficial effects of IHSI stress was not included in the crack growth calculations. A complete discussion of the impact the IHSI process on the fracture mechanics evaluation is given in the analysis. Weld 10-0-2, which was not subjected to IHSI, was analyzed using conventional methods.

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*Application of the GE screening criteria shows that welds 2-AS-3 and 10-0-2 require repair and welds 2-AS-4, 2-AS-7, and 2-BD-14 are in the evaluation region. Weld 2-BS-6 was bordering on the evaluation/repair classification.

3. FRACTURE MECHANICS EVALUATION

The purpose of the fracture mechanics/crack growth evaluation of the crack-like indications reported on the piping welds in Table 1 is to determine if a weld overlay is necessary for continued operation. All indications reported in Table 1 are circumferential in orientation. The GE screening criteria is really not necessary for the evaluation of the indications examined in this report because the welds were subjected to the IHSI process. The purpose of IHSI is to change the tensile, weld residual stress on the inner surface of the pipe to a compression stress that inhibits IGSCC. The application of IHSI to these welds changes the normal assumptions made on weld residual stresses used in the crack growth calculations. Since the fracture mechanics evaluation is different, it was decided not to use the screening criteria and perform crack growth calculations on all six welds. It is noted that weld 10-0-2, which was not subjected to IHSI, fails the screening criteria. However, a fracture mechanics analysis was performed on this weld and the results show that repair is necessary.

3.1 Fracture Mechanics Methodology

The fracture mechanics evaluation of the welds reported in Table 1 were performed according to the recently approved Appendix X to Section XI of the ASME Code [1], and the new Paragraph IWB-3640, 'Acceptance Criteria for Flaws in Austenitic Stainless Steel Piping.' These evaluations can be summarized into four basic steps.

I. Determine the sustained operating stresses necessary for the crack growth calculations. The sustained operating stresses are those due to pressure, weight, and thermal expansion. No weld residual stress was assumed (except for 10-0-2) due to the application of IHSI. The weld residual stress assumed for 10-0-2 is shown in Figure 2. This stress information was obtained from the recirculation system piping stress report [2].

II. Determine the stress intensity factor, K, as a function of crack depth. These factors (K) for short, part-through flaws (aspect ratio a/l, greater than 0.1) were calculated using the procedures outlined in Appendix A, Section XI of the ASME Code. The formulation developed by Bumford and Buchalet [3] was used.

III. Based on the calculated values of K and the crack growth relationship (K vs. da/dt; Figure 3, Reference 4), determine the crack growth as a function of time and establish the final crack size.

IV. Plot the final crack size at the end of 18,000 hours (~24 months) on the appropriate flaw acceptance diagram. The flaw acceptance diagram is based on the primary stresses (pressure, weight, and OBE seismic).

3.2 Fracture Mechanics Evaluation Results

Fracture mechanics analyses were performed for all 6 welds. The sustained stresses used in the calculations are presented in Table 2. The results of the calculations, printed out for every 1000 hours, are presented in Tables 3 through 8.

A flaw acceptance diagram based on the enveloping primary membrane stress (pressure) plus primary bending stresses (dead weight plus seismic) for welds 2-AS-3, 2-AS-4, and 10-0-2 was constructed and is presented in Figure 4. Weld 2-AS-4 is seen to be acceptable for 18 months of continued operation as-is. Welds 2-AS-3 and 10-0-2 are not acceptable for 18 months of operation and weld overlays are recommended. A flaw acceptance diagram based on the enevloping primary stresses for welds 2-AS-7, 2-BS-6, and 2-BD-14 was also constructed and is shown in Figure 5. All three welds are seen to be acceptable for 24 months of continued operation as-is.

3.3 Impact of the IHSI and Shrinkage Stresses on the Fracture Mechanics Analysis

The application of IHSI to the welds in Table 1 where crack-like indications have been reported changes the usual assumptions made regarding weld residual stresses. Figure 2 shows the axial residual distribution based on the experimental data for large diameter (>16 inch) pipes reported in Reference 4. This is the through-wall distribution that is normally assumed for crack growth calculations in welds without IHSI. Figure 6 shows the residual stress distribution that is produced by the IHSI process. Note that IHSI virtually replaces the residual stresses due to welding with a beneficial compressive stress on the inner surface. This analysis has conservatively assumed that there *are* no residual stresses present in the weld locations.

Examination of Figure 6 shows that the IHSI stress is compressive for only 50% of the wall thickness; the remaining portion is tensile. In order to properly account for the IHSI stress variation, the stress intensity factor should be determined as a function of crack depth. Figure 7 shows K vs. a/t for the stress shown in Figure 6. It is seen that the stress intensity factor is compressive for crack depth up to 80%. Since maximum crack depth of the IHSI treated welds is 50%, it is conservative to neglect the benefit IHSI stress in the crack growth analysis.

Finally, it is necessary to account for shrinkage stresses at the six weld locations in Table 1 due to the installation of weld overlays on other portions of the recirculation piping system. All of the indications reported in Table 1 are on large diameter (20-28 inch) pipes. Previous analyses have shown that amount of sustained stress due to shrinkage is small. Furthermore, its effect on the crack growth calculations is known to be negligible, so this analysis did not include any shrinkage stresses in the fracture mechanics analysis. This is further supported by measured shrinkage results on 28-inch overlays already applied to other weld locations. This data shows axial shrinkage values across the overlay to be in the range of 0.12-0.19 inch which is much lower than shrinkage previously measured and evaluated for the Peach Bottom Unit 3 recirculation and RHR systems.

4. WELD OVERLAY ANALYSIS

The depth of a fully circumferential crack at which net section collapse occurs is a function of the pipe material flow stress, the overall wall thickness including the weld overlay, and the primary loads. The primary membrane stress (P_m) is due to pressure, and the primary bending stress is the sum of the dead weight and seismic (OBE) stresses.

Paragraph IBW-3640 of Appendix X to Section XI, Reference 1 contains tables of the allowable circumferential flaw depth to pipe thickness ratios (a/t) for various applied primary stress ratios: $(P_m + P_b)/S_m$. The recirculation piping welds are subjected to primary loads where the $(P_m + P_b)/S_m$ ratios are less than 0.6 (assuming a design stress intensity S_m of 16.9 ksi for Type 304 stainless steel). The tables of Reference 1 do not apply for these low stress ratios. Instead, the allowable flaw depth ratio must be calculated from the actual applied loads, as described in Reference 5. Equations (1) and (2), from Reference 5, define the relationship for a fully circumferential flaw.

$$\beta = \frac{\pi \left(1 - \frac{a}{t} - \frac{P_m}{\sigma_f}\right)}{2 - \frac{a}{t}} \qquad (1)$$

$$P_b = \frac{2\sigma_f}{\pi} \left(2 - \frac{a}{t}\right) \sin \beta \qquad (2)$$

where σ_f = Material Flow Stresses = 3 S_m

P_m = Primary Membrane Stress

P_b = Primary Bending Stress

t = Total Thickness (pipe wall + weld overlay thickness)

Using these equations, the minimum required weld overlay thickness was

determined by an iterative method in which (i) the circumferential flaw depth is assumed to extend through the original pipe wall, (ii) the total thickness 't' equals pipe wall + weld overlay thickness, (iii) the applied primary stresses are adjusted for the new thickness, and (iv) a safety factor of 3 is applied.

The iterative calculations wre performed at each of the 6 weld locations reported in Table 1. The results of the calculations identified the minimum required overlay thickness necessary to maintain the ASME Code safety factor of 3.0. This minimum required overlay thickness was then used as a basis for selecting the recommended/applied overlay thickness. Tables 9-14 present the results of the iterative calculations while Figures 8, and 9 present the weld overlay designs for each of the 6 welds. Note that weld overlays are recommended only for welds 2-AS-3 and 10-0-2.

5. CONCLUSIONS

Weld overlay designs are provided for welds 2-AS-3 and 10-0-2. Justification of operation as-is is provided for welds 2-AS-4, 2-AS-7, 2-BS-6, and 2-BD-14. This assures that the safety margins of the ASME Code are maintained for 18 months of continued operation.

If PECO chooses to apply weld overlays on these welds for added margin, full structural overlay designs are also provided in this report.

6.0 REFERENCES

1. ASME Boiler and Pressure Vessel Code, Section XI, 1980 Edition including the Appendix X, 'Acceptance Criteria for Flaws in Austenitic Piping,' approved by the Section XI Main Committee in April 1983.

2. 'Stress Report—Recirculation System, Peach Bottom Nuclear Station,' General Electric Document No. 22A2619, Rev. 0, October 1970.

3. Buchalet, C. B. and Bamford, W. H., 'Stress Intensity Factor Solutions for Continuous Surface Flaws in Reactor Pressure Vessels,' Mechanics of Crack Growth, ASTM STP 590, American Society for Testing and Materials, 1976.

4. 'The Growth and Stability of Stress Corrosion Cracks in Large Diameter BWR Piping,' prepared by General Electric Company, EPRI NP-2472 Final Report, July 1982, Electric Power Research Institute, Palo Alto, California.

5. Ranganath, S. and Mehta, H. S., 'Engineering Methods for the Assessment of Ductile Fracture Margin in Nuclear Plower Plant Piping,' Elastic-Plastic Fracture: Second Symposium, Volume II--Fracture Resistance Curves and Engineering Applications, ASTM STP803, C. F. Shih and J. P. Gudas, Eds., American Society for Testing and Materials, 1983, pp. 309-330.

TABLE 1

PEACH BOTTOM 2 ULTRASONIC TESTING

Weld #	Type	Pre IHSI Insp.	Post IHSI Insp.	Location	Azimuth Position	Wall Thick.	Depth in.	Depth %	Length	Comments
2-AS-3	28" Elbow to Horizontal Pipe	LMT	GE	Elbow	15-22"	1.35"	0.3" Avg.	22-59%	7"	intermittent depth up to 0.8"
			LMT	Elbow	0-22"	1.35"	0.70"	52%	22" inter.	
			LMT	Elbow	28-32"	1.35"	0.55"	41%	4"	
			SWRI	Elbow	1.25-3.5"	1.35"	0.23"	17%	2.25" inter.	
			SWRI	Elbow	20.37-32.25"	1.35"	0.27"	20%	11.87" inter.	
2-AS-4	28" Elbow to Vertical Pipe	LMT	GE	Elbow	68-82"	1.25"	0.5" Avg.	40%	14" inter.	
			LMT	--	--	--	--	--	--	Not IGSCC Geometric
			SWRI	Elbow	65-78.75"	1.25"	0.4"	32%	13.75" inter.	
2-AS-7	28" Elbow to Vertical Pipe	LMT	GE	Elbow	27-39"	1.3"	0.25"	19%	12"	
			LMT	Elbow	25-40"	1.3"	0.30"	23%	15"	

Table 1 (Continued)

Weld #	Type	Pre IHSI Insp.	Post IHSI Insp.	Location	Azimuth Position	Wall Thick.	Depth in.	Depth %	Length	Comments
2-BS-6	28" Vertical Pipe to Elbow	GE	GE	Elbow	42-57"	1.35"	0.3"	22%	15"	
			LMT	Elbow	42-51"	1.35"	0.59"	44%	9"	
2-BD-14	28" Elbow to Vertical Pipe	GE	GE	Elbow	80-7"	1.5"	0.35"	23%	15"	
				Pipe	37-42"	1.5"	0.30"	20%	5"	
				Pipe	51-57"	1.5"	0.35"	23%	6"	
			LMT	Elbow/ Pipe	36-60"	1.5"	0.6"	40%	24"	Plots at Weld Centerline
				Pipe	75-81"	1.5"	0.45"	30%	6"	
10-0-2	20" Horizontal Pipe to Elbow	LMT	N/A	Pipe	43-51"	0.9"	0.31"	34%	8"	
		GE	N/A		15-28"	0.9"	0.40"	44%	13"	Inter.
		GE	N/A		33-56"	0.9"	0.45"	50%	23"	Inter.

LEGEND: IHSI Induction Heating Stress Improvement
LMT Lambert MacGill and Thomas
GE General Electric, Domestic Apparatus & Engineering Service. Eastern Department
SWRI Southwest Research Institute
N/A Not applicable since this weld was not IHSI treated.

Table 2

Peach Bottom 2 Primary and Sustained Stresses (Ksi)

Weld #	(1050 psi)	Expansion	Deadweight	Seismic
2-AS-3	5.64	2.64	1.10	1.10
2-AS-4	5.88	1.53	1.36	1.14
2-AS-7	5.65	0.81	0.70	0.61
2-BS-6	5.45	0.35	0.12	0.52
2-BD-14	5.60*	0.80	0.18	0.91
10-0-2	5.83	6.12	0.38	2.00

*pressure = 1200 psi

Table 3

Crack Growth Calculations for Weld 2-AS-3

TIME HRS.	A IN.	A/T	K	DA/DT IN/HR
0.	0.700	0.5185	24.32	0.270E-04
1000.	0.729	0.5396	25.51	0.309E-04
2000.	0.761	0.5636	26.90	0.347E-04
3000.	0.798	0.5909	28.55	0.399E-04
4000.	0.841	0.6227	30.56	0.472E-04
5000.	0.892	0.6609	33.10	0.569E-04
6000.	0.952	0.7049	36.22	0.600E-04
7000.	1.012	0.7493	39.57	0.600E-04
8000.	1.072	0.7938	43.14	0.600E-04
9000.	1.132	0.8382	46.92	0.600E-04
10000.	1.192	0.8827	50.92	0.600E-04
11000.	1.252	0.9271	55.15	0.600E-04
12000.	1.312	0.9716	59.60	0.600E-04

Table 4

Crack Growth Calculations for Weld ?-AS-4

TIME HRS.	A IN.	A/T	K	DA/DT IN/HR
0.	0.500	0.4000	17.13	0.144E-04
1000.	0.515	0.4118	17.63	0.150E-04
2000.	0.530	0.4240	18.17	0.158E-04
3000.	0.546	0.4370	18.74	0.168E-04
4000.	0.564	0.4509	19.37	0.179E-04
5000.	0.582	0.4656	20.06	0.191E-04
6000.	0.602	0.4813	20.80	0.202E-04
7000.	0.622	0.4977	21.61	0.214E-04
8000.	0.644	0.5155	22.50	0.230E-04
9000.	0.668	0.5346	23.49	0.250E-04
10000.	0.694	0.5555	24.61	0.278E-04
11000.	0.724	0.5791	25.92	0.318E-04
12000.	0.758	0.6061	27.47	0.364E-04
13000.	0.797	0.6374	29.36	0.428E-04
14000.	0.843	0.6746	31.72	0.519E-04
15000.	0.900	0.7198	34.76	0.600E-04
16000.	0.960	0.7678	38.21	0.600E-04
17000.	1.020	0.8158	41.90	0.600E-04
18000.	1.080	0.8638	45.82	0.600E-04

Table 5

Crack Growth Calculation for Weld 2-AS-7

TIME HRS.	A IN.	A/T	K	DA/DT IN./HR
0.	0.300	0.2308	9.00	0.439E-05
1000.	0.304	0.2342	9.09	0.447E-05
2000.	0.309	0.2376	9.19	0.454E-05
3000.	0.314	0.2412	9.29	0.462E-05
4000.	0.318	0.2447	9.39	0.470E-05
5000.	0.323	0.2484	9.50	0.478E-05
6000.	0.328	0.2521	9.60	0.487E-05
7000.	0.333	0.2559	9.71	0.495E-05
8000.	0.338	0.2597	9.82	0.504E-05
9000.	0.343	0.2636	9.93	0.513E-05
10000.	0.348	0.2676	10.05	0.522E-05
11000.	0.353	0.2716	10.16	0.531E-05
12000.	0.358	0.2757	10.28	0.540E-05
13000.	0.364	0.2799	10.41	0.550E-05
14000.	0.369	0.2842	10.53	0.560E-05
15000.	0.375	0.2885	10.66	0.570E-05
16000.	0.381	0.2930	10.79	0.580E-05
17000.	0.387	0.2975	10.93	0.591E-05
18000.	0.393	0.3020	11.07	0.602E-05

Table 6

Crack Growth Calculations for Weld 2-BS-6

TIME HRS.	A IN.	A/T	K	DA/DT IN/HR
0.	0.590	0.4370	13.15	0.844E-05
1000.	0.599	0.4434	13.35	0.869E-05
2000.	0.607	0.4499	13.56	0.895E-05
3000.	0.616	0.4566	13.78	0.922E-05
4000.	0.626	0.4635	14.00	0.950E-05
5000.	0.635	0.4707	14.24	0.979E-05
6000.	0.646	0.4782	14.49	0.104E-04
7000.	0.656	0.4860	14.76	0.108E-04
8000.	0.667	0.4942	15.04	0.113E-04
9000.	0.679	0.5028	15.33	0.118E-04
10000.	0.691	0.5117	15.65	0.124E-04
11000.	0.703	0.5211	15.99	0.130E-04
12000.	0.717	0.5308	16.34	0.134E-04
13000.	0.730	0.5409	16.71	0.139E-04
14000.	0.744	0.5514	17.11	0.144E-04
15000.	0.759	0.5622	17.52	0.149E-04
16000.	0.774	0.5734	17.96	0.154E-04
17000.	0.790	0.5851	18.42	0.162E-04
18000.	0.807	0.5974	18.92	0.171E-04

Table 7

Crack Growth Calculations for Weld 2-BD-14

TIME HRS.	A IN.	A/T	K	DA/DT IN/HR
0.	0.600	0.4000	14.08	0.964E-05
1000.	0.610	0.4065	14.31	0.100E-04
2000.	0.620	0.4134	14.55	0.105E-04
3000.	0.631	0.4205	14.80	0.109E-04
4000.	0.642	0.4279	15.07	0.114E-04
5000.	0.653	0.4356	15.35	0.119E-04
6000.	0.666	0.4437	15.65	0.124E-04
7000.	0.678	0.4521	15.97	0.129E-04
8000.	0.691	0.4609	16.30	0.134E-04
9000.	0.705	0.4699	16.65	0.138E-04
10000.	0.719	0.4793	17.02	0.143E-04
11000.	0.733	0.4889	17.40	0.148E-04
12000.	0.748	0.4987	17.81	0.153E-04
13000.	0.764	0.5093	18.23	0.159E-04
14000.	0.780	0.5201	18.69	0.167E-04
15000.	0.797	0.5315	19.17	0.176E-04
16000.	0.815	0.5435	19.69	0.185E-04
17000.	0.834	0.5560	20.25	0.194E-04
18000.	0.854	0.5692	20.85	0.203E-04

Table 8

Crack Growth Calculations for Weld 10-0-2

TIME HRS.	A IN.	A/T	K	DA/DT IN/HR
0.	0.450	0.5000	20.26	0.194E-04
1000.	0.470	0.5218	20.66	0.200E-04
2000.	0.490	0.5444	21.14	0.207E-04
3000.	0.511	0.5678	21.73	0.216E-04
4000.	0.533	0.5924	22.43	0.229E-04
5000.	0.557	0.6186	23.20	0.246E-04
6000.	0.582	0.6469	24.32	0.270E-04
7000.	0.611	0.6780	25.65	0.310E-04
8000.	0.644	0.7157	27.41	0.362E-04
9000.	0.684	0.7596	29.82	0.444E-04
10000.	0.734	0.8154	33.43	0.580E-04
11000.	0.794	0.8818	38.61	0.600E-04
12000.	0.854	0.9484	44.87	0.600E-04

Table 9

Weld Overlay Calculations for 2-AS-3

WELD ID: 2-AS-3

PIPE THICKNESS = 1.35 INCH
PIPE DIAMETER = 28.0 INCH

PRIMARY LOADS (STRESS):
PRESSURE = 5.44 KSI
DEAD WEIGHT = 1.10 KSI
SEISMIC = 1.10 KSI

WOT	I / T+WOT	PM (KSI)	PB (KSI) ACTUAL	PB (KSI) CALC	EM±EB SM (ACTUAL)	EM±EB SM (CALC)
0.395	0.774	4.331	1.702	13.983	0.357	0.361

PRIMARY STRESS RATIOS (ADJUSTED):
PM/SM = 0.256
(PM+PB)/SM = 0.357

MINIMUM REQUIRED WELD OVERLAY THICKNESS = 0.395 INCH
MINIMUM REQUIRED WELD OVERLAY WIDTH = 4.3 INCH

Table 10

Weld Overlay Calculations for 2-AS-4

WELD ID: 2-AS-4

PIPE THICKNESS = 1.25 INCH
PIPE DIAMETER = 28.0 INCH

PRIMARY LOADS (STRESS):
PRESSURE = 5.88 KSI
DEAD WEIGHT = 1.36 KSI
SEISMIC = 1.14 KSI

WOT	I / T+WOT	PM (KSI)	PB (KSI) ACTUAL	PB (KSI) CALC	PM+PB / SM (ACTUAL)	PM+PB / 3SM (CALC)
0.400	0.758	4.582	1.894	15.041	0.383	0.387

PRIMARY STRESS RATIOS (ADJUSTED):
PM/SM = 0.271
(PM+PB)/SM = 0.383

MINIMUM REQUIRED WELD OVERLAY THICKNESS = 0.400 INCH
MINIMUM REQUIRED WELD OVERLAY WIDTH = 4.2 INCH

Table 11

Weld Overlay Calculations for 2-AS-7

WELD ID: 2-AS-7

PIPE THICKNESS = 1.30 INCH
PIPE DIAMETER = 28.0 INCH

PRIMARY LOADS (STRESS):
PRESSURE = 5.65 KSI
DEAD WEIGHT = 0.70 KSI
SEISMIC = 0.61 KSI

WOT	T+WOT	PM (KSI)	PB (KSI) ACTUAL	PB (KSI) CALC	PB±EB SM (ACTUAL)	PB±EB 3SM (CALC)
0.355	0.785	4.554	1.029	12.425	0.330	0.335

PRIMARY STRESS RATIOS (ADJUSTED):
PM/SM = 0.269
(PM+PB)/SM = 0.330

MINIMUM REQUIRED WELD OVERLAY THICKNESS = 0.355 INCH
MINIMUM REQUIRED WELD OVERLAY WIDTH = 4.3 INCH

Table 12

Weld Overlay Calculations for 2-BS-6

WELD ID: 2-BS-6

PIPE THICKNESS = 1.35 INCH
PIPE DIAMETER = 28.0 INCH

PRIMARY LOADS (STRESS):
PRESSURE = 5.44 KSI
DEAD WEIGHT = 0.12 KSI
SEISMIC = 0.52 KSI

			PB (KSI)		PM±EB	PM±EB
WOT	I/(T+WOT)	PM (KSI)	ACTUAL	CALC	SM (ACTUAL)	3SM (CALC)
0.325	0.806	4.490	0.516	10.558	0.296	0.297

PRIMARY STRESS RATIOS (ADJUSTED):
PM/SM = 0.266
(PM+PB)/SM = 0.296

MINIMUM REQUIRED WELD OVERLAY THICKNESS = 0.325 INCH
MINIMUM REQUIRED WELD OVERLAY WIDTH = 4.3 INCH

Table 13

Weld Overlay Calculations for 2-BD-14

WELD ID: 2-BD-14

PIPE THICKNESS = 1.50 INCH
PIPE DIAMETER = 26.0 INCH

PRIMARY LOADS (STRESS):
PRESSURE = 5.60 KSI
DEAD WEIGHT = 0.18 KSI
SEISMIC = 0.91 KSI

			PB (KSI)		PM+PB	PM+PB
	I	PM			SM	3SM
WOT	T+WOT	(KSI)	ACTUAL	CALC	(ACTUAL)	(CALC)
0.395	0.792	4.558	0.863	11.831	0.321	0.323

PRIMARY STRESS RATIOS (ADJUSTED):
PM/SM = 0.270
(PM+PB)/SM = 0.321

MINIMUM REQUIRED WELD OVERLAY THICKNESS = 0.395 INCH
MINIMUM REQUIRED WELD OVERLAY WIDTH = 4.6 INCH

Table 14

Weld Overlay Calculations for 10-0-2

WELD ID: 10-0-2

PIPE THICKNESS = 0.90 INCH
PIPE DIAMETER = 20.0 INCH

PRIMARY LOADS (STRESS):
PRESSURE = 5.83 KSI
DEAD WEIGHT = 0.38 KSI
SEISMIC = 2.00 KSI

			PB (KSI)		PM+PB	PM+PB
	I	PM			SM	3SM
WOT	T+WOT	(KSI)	ACTUAL	CALC	(ACTUAL)	(CALC)
0.285	0.759	4.557	1.808	14.906	0.377	0.384

PRIMARY STRESS RATIOS (ADJUSTED):
PM/SM = 0.270
(PM+PB)/SM = 0.377

MINIMUM REQUIRED WELD OVERLAY THICKNESS = 0.285 INCH
MINIMUM REQUIRED WELD OVERLAY WIDTH = 3.0 INCH

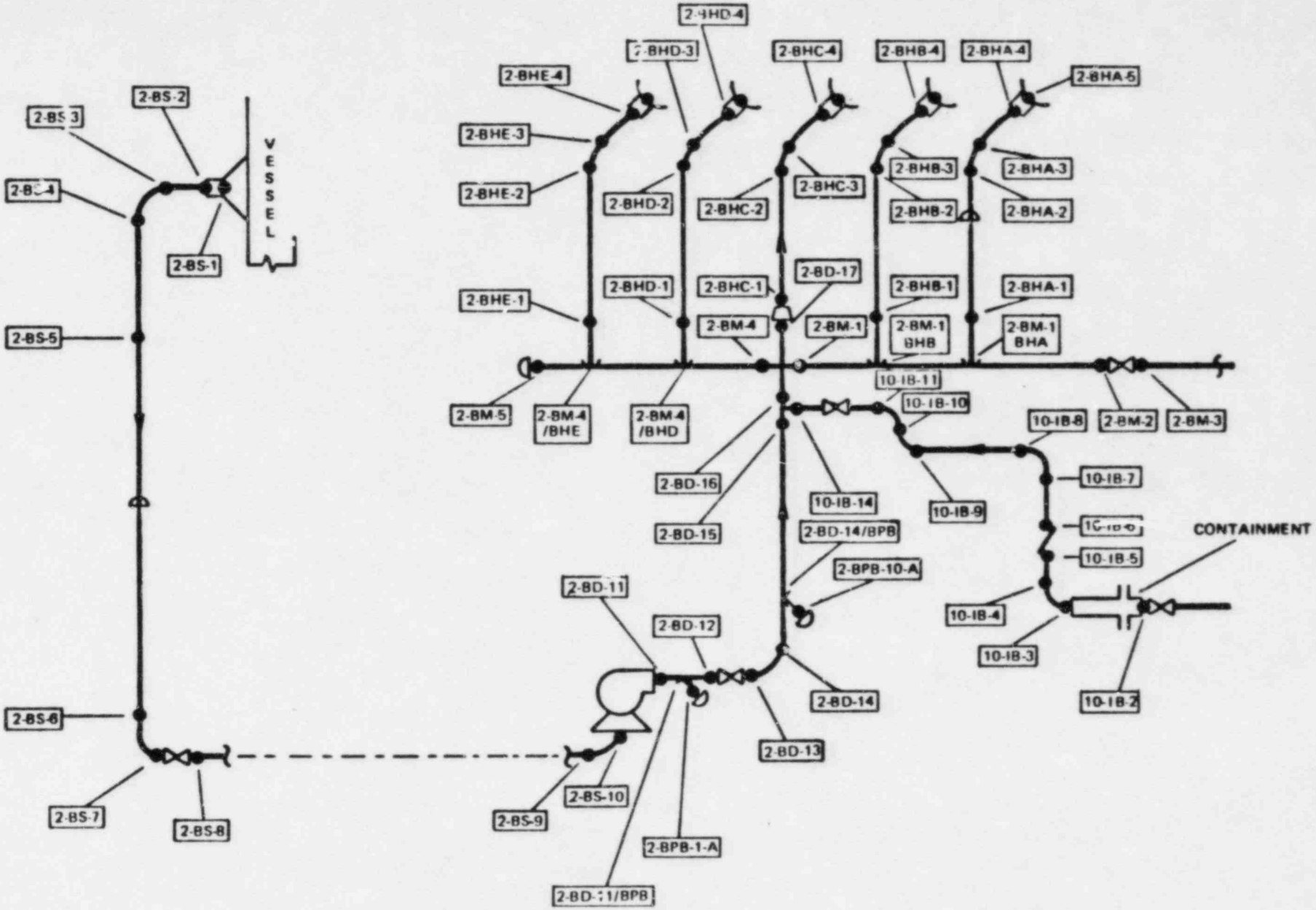


Figure 1a. Peach Bottom 2 Recirculation Piping Loop B Weld Identification

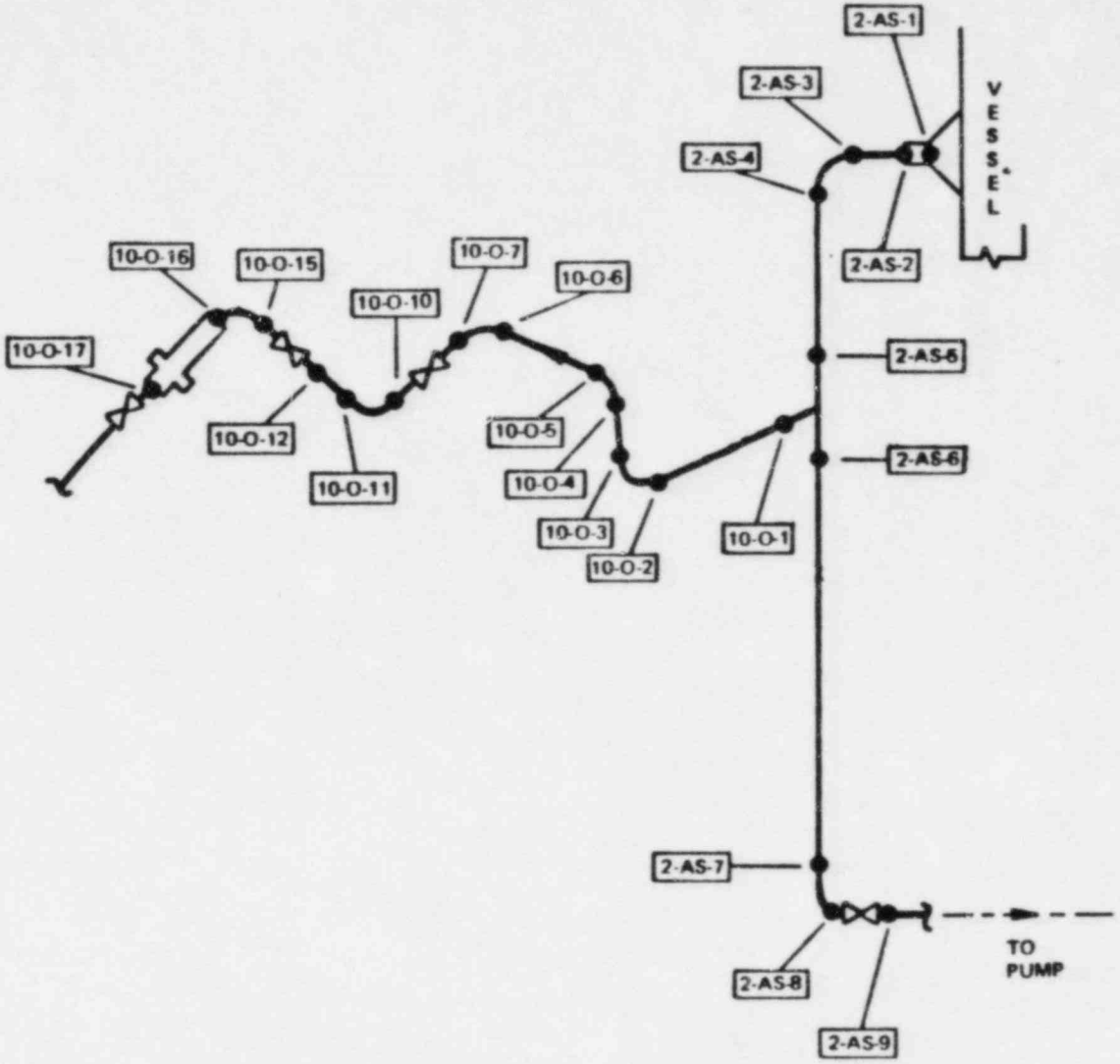


Figure 1b. Peach Bottom 2 Recirculation Piping Loop A - Suction Side - Weld Identification

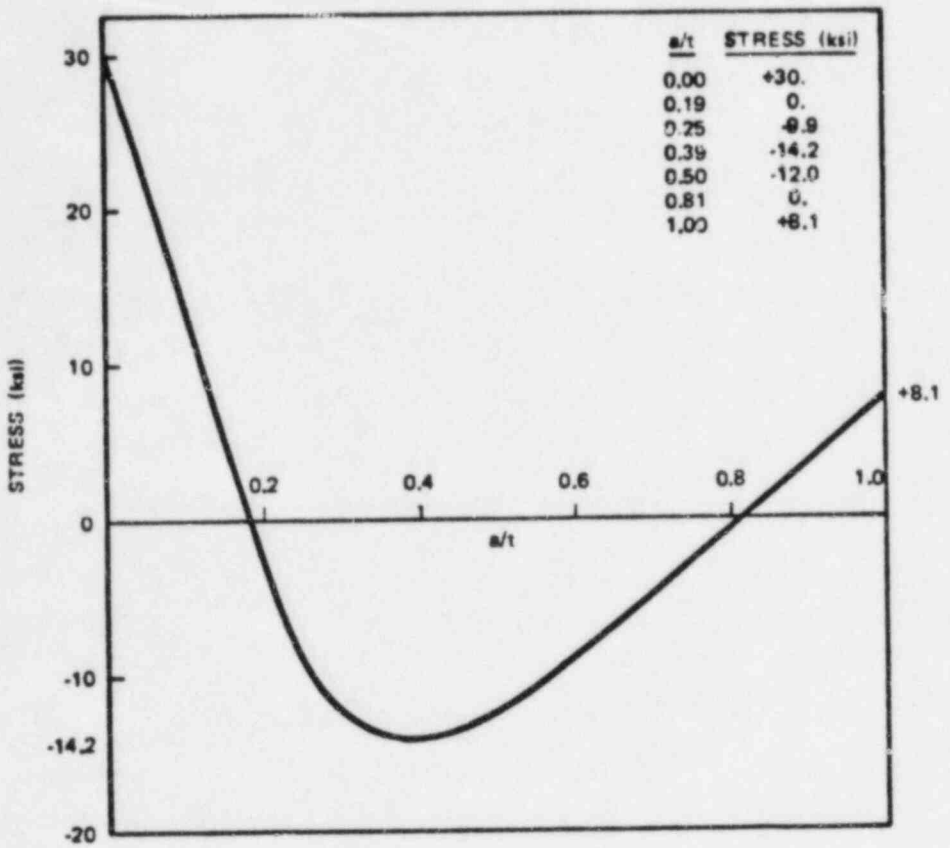


Figure 2. Axial Weld Residual Stress in Large Diameter Pipe (22 in. to 28 in.)

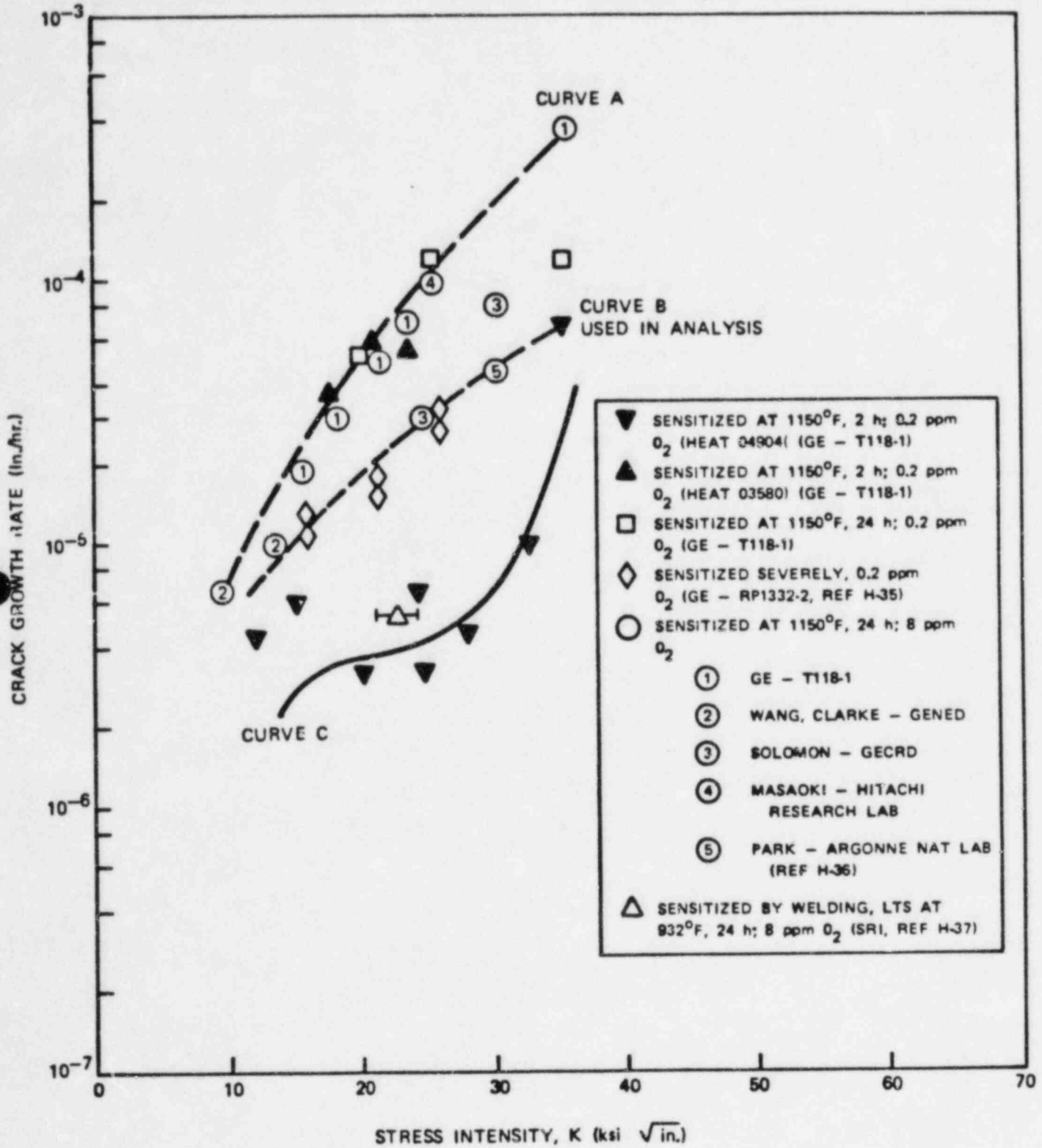


Figure 3. Summary of Constant Load Crack Growth Data (Curves are evaluation curves.) Data collected in 0.2 ppm O_2 and 8 ppm O_2 water. Different Levels of Sensitization examined.

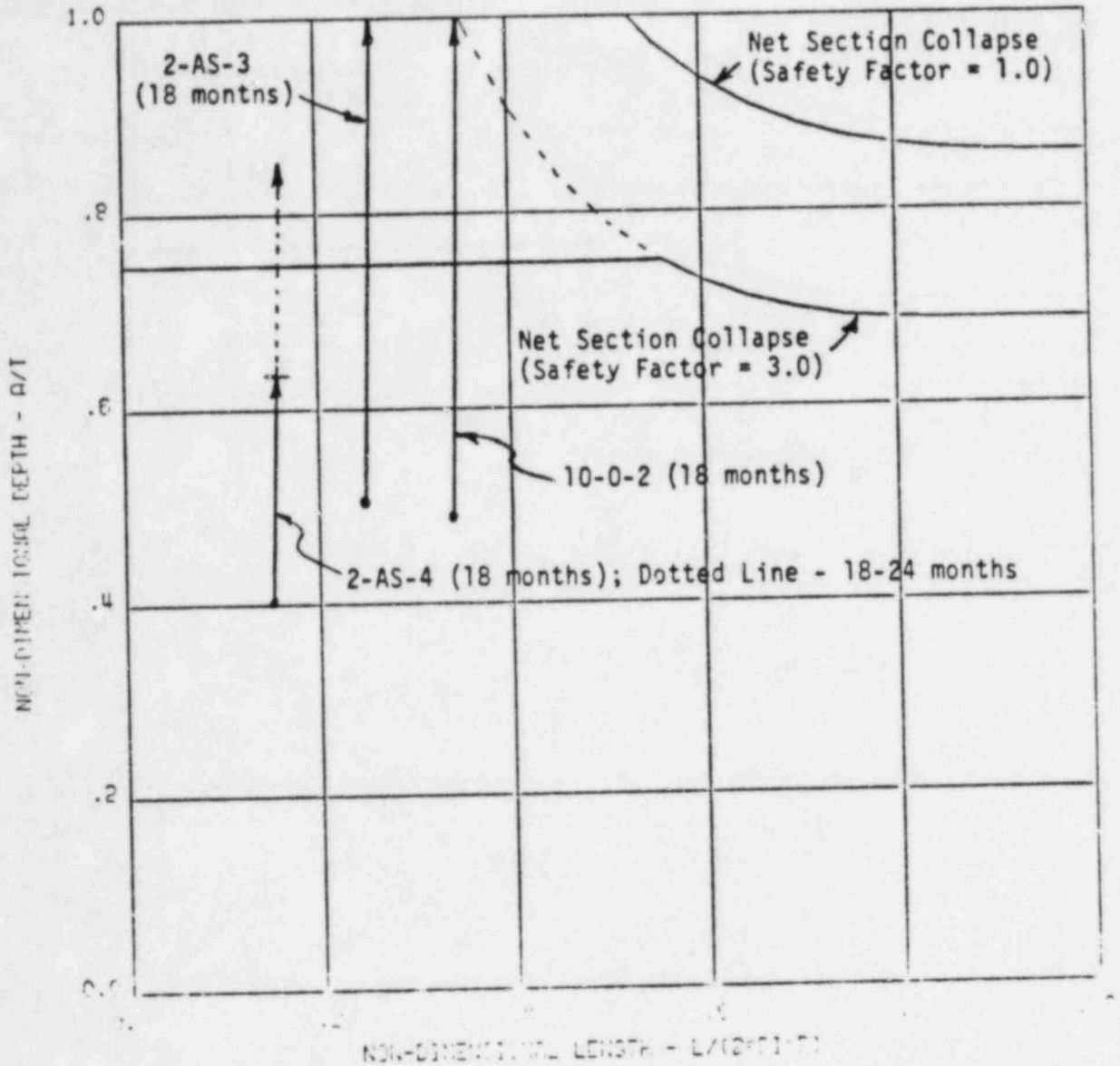


Figure 4. Flaw Acceptance Diagram for Welds 2-AS-3, 2-AS-4, and 10-0-2.

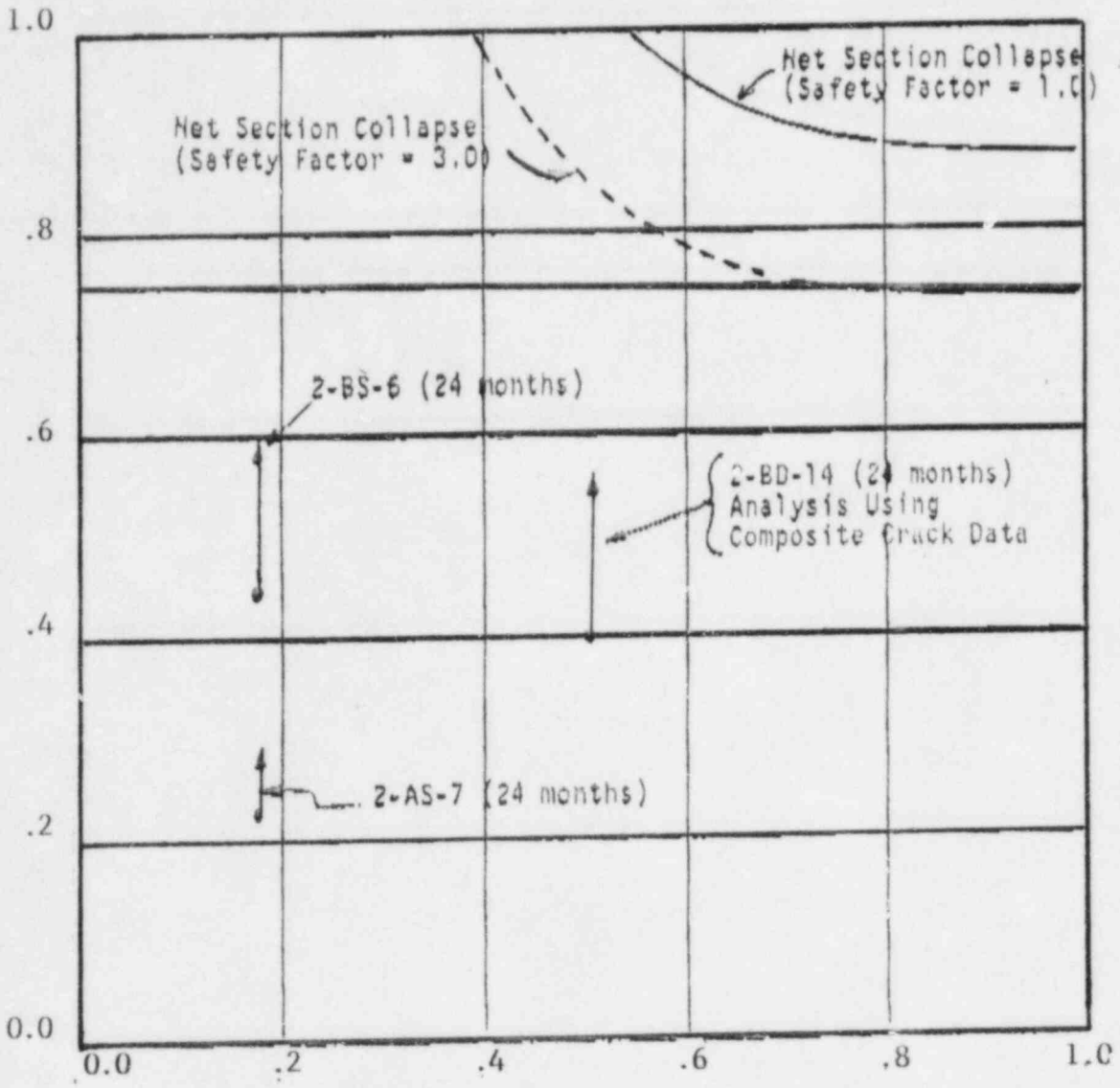


Figure 5. Flaw Acceptance Diagram for Welds 2-AS-7, 2-BS-6, and 2-BD-14.

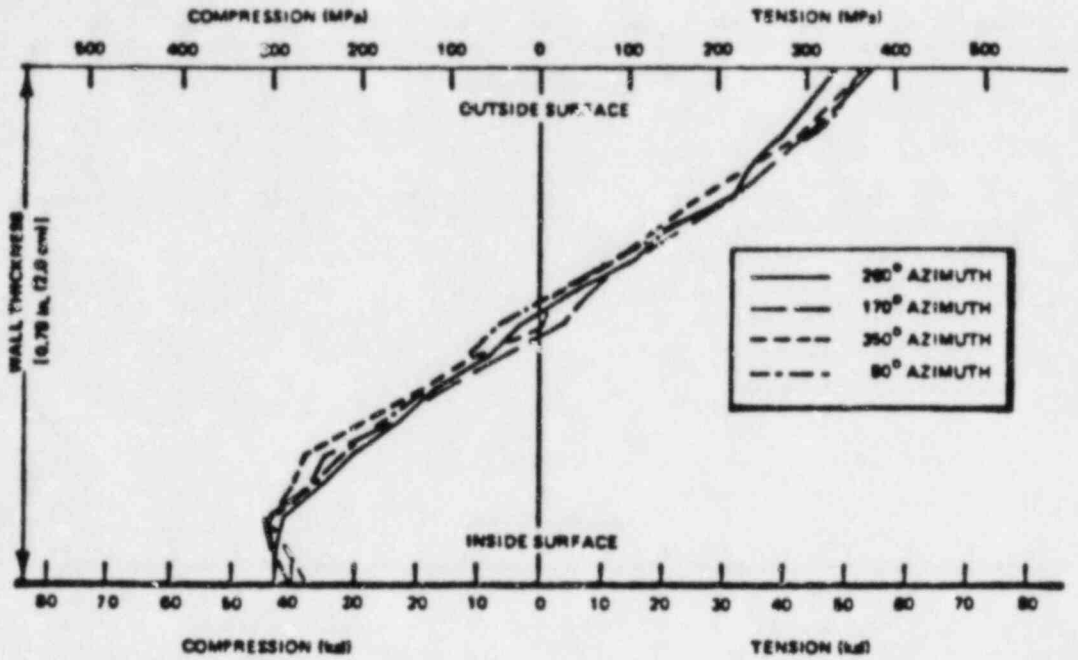


Figure 6. 16 in. Diameter Pipe, Welded + IHSI, Through-wall Axial Residual Stress 0.25 cm (0.1 in.) from Fusion Line, Strain Gage Residual Stress Data

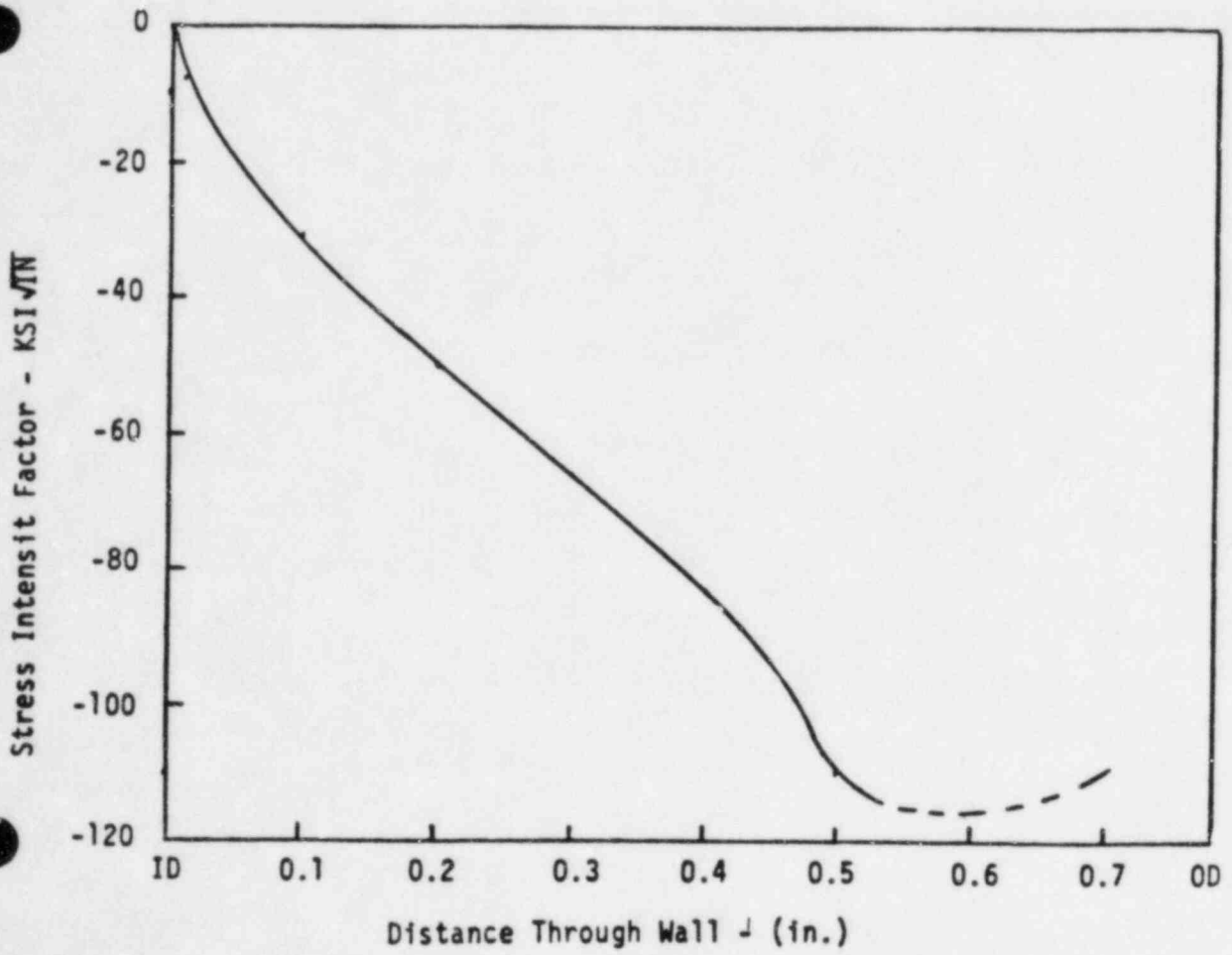
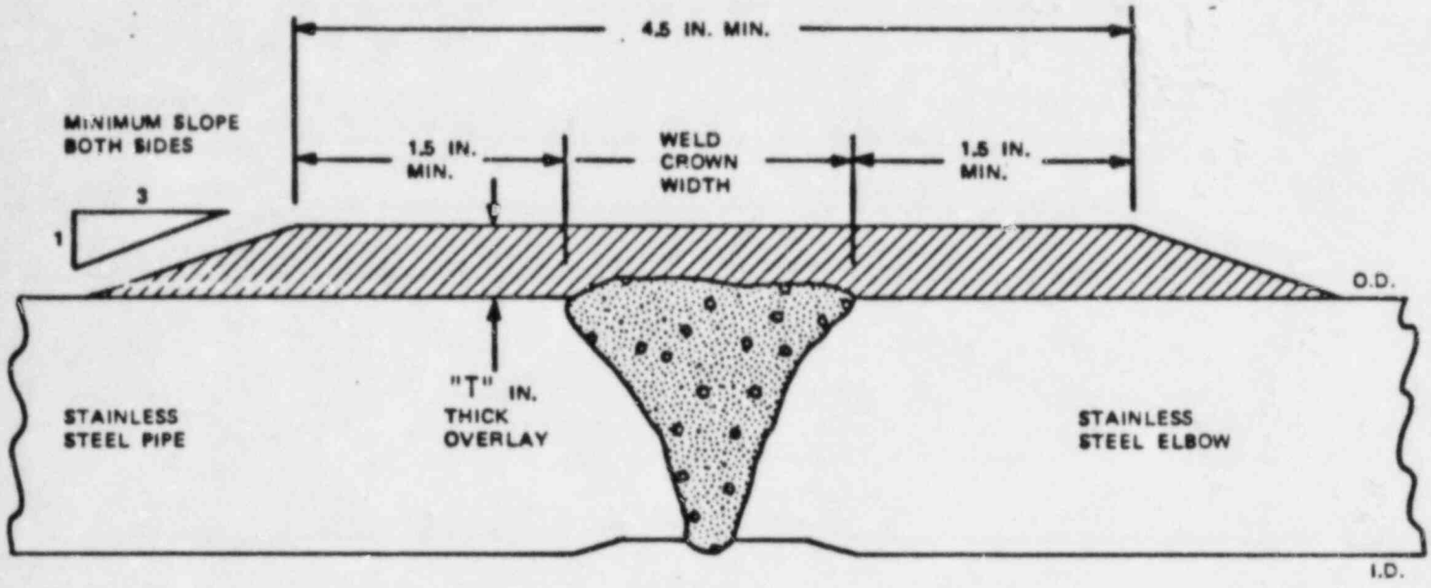


Figure 7. Stress Intensity Factor vs. Depth for 16 inch Pipe



WELD ID	RECOMMENDED OVERLAY THICKNESS (T)
2-AS-4	0.438" (7/16)
2-AS-7	0.375" (3/8)
2-BS-6	0.375" (3/8)
2-BD-14	0.438" (7/16)
2-AS-3	0.438" (7/16)

Figure 8. Recommended Weld Overlay Design for Welds 2-AS-3, 2-AS-4 2-AS-7, 2-BS-6, and 2-BD-14.

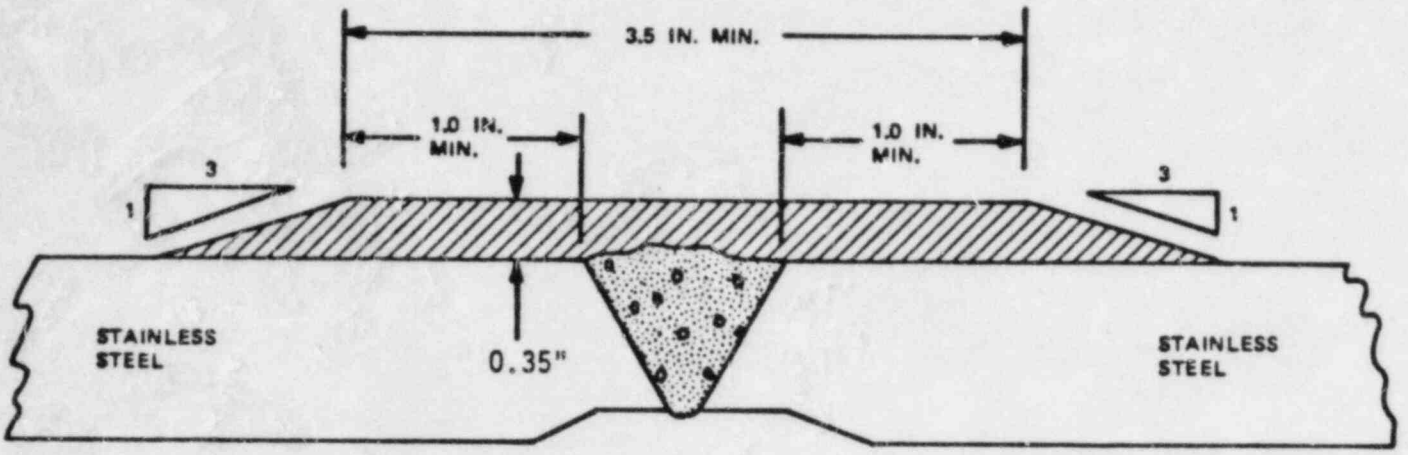


Figure 9. Recommended Weld Overlay Design for Weld 10-0-2.

ATTACHMENT D

PEACH BOTTOM - UNIT #2

Safety Evaluation for the Operation of Peach Bottom Atomic Power Station Unit #2

SUBJECT: Safety Evaluation for the Operation of Peach Bottom Atomic Power Station Unit #2

INTRODUCTION

Philadelphia Electric Company initiated a partial Induction Heating Stress Improvement Program (IHSI) on sixteen (16) welds as part of the weld overlay repair outage in order to reduce the susceptibility of these welds to Intergranular Stress Corrosion Cracking (IGSCC). Initially these welds were volumetrically examined and found to be acceptable.

The 16 welds on which IHSI was performed are located in the recirculation suction and discharge lines and one RHR return line. A volumetric examination was performed upon completion of the IHSI and 5 of these 16 welds were found to contain crack-like indications. In addition, all of the ultrasonic data for the 126 welds previously examined as part of the IE Bulletin 83-02 were reviewed. As a result of this review, it was decided that reflectors on weld 10-0-2, previously evaluated as geometric in nature should be conservatively dispositioned as crack-like reflectors. These crack-like reflectors were later confirmed to be crack indications by independent ultrasonic examination.

Philadelphia Electric Company contracted General Electric Company to analyze these indications and to provide their recommendations for disposition. General Electric analyzed and proposed temporary weld overlay repairs in accordance with Section XI of the ASME Boiler and Pressure Vessel Code on RHR weld 10-0-2 and recirculation weld 2-AS-3. Philadelphia Electric Company also elected to overlay recirculation suction welds 2-AS-4, 2-BS-6, and 2-BD-14. Procedures were prepared to perform these temporary weld overlay repairs with the concurrence of the on-site representative of Hartford Steam Boiler Inspection & Insurance Company and the Nuclear Regulatory Commission. The weld overlays were designed and sized as full structural overlays which provide the safety margins required by the ASME Code. Fracture mechanics evaluations have verified that these 5 welds have the necessary structural reinforcements for 24 months of full power operation.

The remaining recirculation suction line weld (2-AS-7) was shown to be acceptable "as is" for 24 months of full power operation. The final flaw size for this weld is well within the allowable limits of ASME Code Section XI, App. X.

Philadelphia Electric Company has elected to continue operation of this weld "as is" for only the 6 to 7 months run to the next scheduled refuel outage. Philadelphia Electric will reinspect this weld during the next refuel outage and will either replace with conforming material or overlay with a full structural overlay.

BACKGROUND

Of the six welds that showed reportable indications, three of these are located in the "A" recirculation suction line (2-AS-3, 2-AS-4, 2-AS-7), one is located in the "B" recirculation suction line (2-BS-6), one is located in the "B" recirculation discharge line (2-BD-14), and the remaining weld (10-0-2) is located in the Residual Heat Removal (RHR) suction line.

Four welds (2-AS-3, 2-AS-4, 2-AS-7, 2-BS-6) are located in the recirculation suction lines. The recirculation suction lines are 28" in diameter by 1.08" minimum wall thickness (M.W.T.) TP 304 stainless steel pipe material. A 0.438" thick by 4.5" long weld overlay was designed for the 2-AS-3 and 2-AS-4 welds and a 0.375" thick by 4.5" long weld overlay was designed for the 2-BS-6 weld. These weld overlays are full structural overlays which can sustain a through wall fully circumferential flaw and provide the ASME Code required safety factor of 3 for 24 months of full power operation.

Weld 2-BD-14 is located in a recirculation discharge line 28" in diameter by 1.25" nominal wall thickness, TP 304 stainless steel pipe material. A 0.438" thick by 4.5" long weld overlay was designed for the 2-BD-14 weld. This overlay is also a full structural overlay which can sustain a through wall fully circumferential flaw and provide the ASME Code required safety factor of 3 for 24 months of full power operation.

Weld 10-0-2 is located in the RHR suction line which is a 20" diameter by 0.775" M.W.T. ASTM Type A358, grade TP 304 stainless steel pipe material. A 0.350" thick by 3.5" long weld overlay was designed for this weld. This overlay is a full structural overlay which can sustain a through wall fully circumferential flaw and provide the ASME Code required safety factor of 3 for 24 months full power operation.

The final flaw size of weld 2-AS-7 has been determined to be well within the allowable limits of the ASME Code Section XI, Paragraph IWB-3640 for 24 months of full power operation. The General Electric fracture mechanics analysis for this weld utilized the most limiting condition for crack growth analysis. Therefore, this technique should be considered conservative. Philadelphia Electric Company

requests continued full power operation for the six to seven months run to the next refueling outage, at which time weld 2-AS-7 will be re-inspected and will either be replaced with conforming material or overlaid with a full structural overlay.

EVALUATION

The ultrasonic examination techniques used in the detection of the crack-like indications have been demonstrated to be capable of finding IGSCC cracking at Battelle Columbus Laboratories or the EPRI NDT Center in Charlotte, North Carolina. The technicians participating in the examination have been certfied as being able to detect service-induced IGSCC in accordance with NUREG IE Bulletin 83-02.

Independent ultrasonic examinations were performed by both Lambert-MacGill-Thomas, Inc. and General Electric Company personnel on all welds that were found to contain indications. This was done to obtain the maximum confidence in crack detection. Where there was a discrepancy, a third vendor, Southwest Research Institute, was called in to provide additional verification.

It is recognized that under field conditions, one team may report crack indications of different lengths and depths than that previously reported by another independent team. This is because equipment may vary slightly as to transducer frequency and beam spread; calibration sensitivity may be different depending on whether side drilled holes or notches were used; environmental conditions such as high radiation levels, respirator requirements, etc. may all lead to differences in reported crack characterization. In addition, once an indication has been evaluated as being a crack, sizing for lengths may tend to be less critical and adjacent I.D. geometric reflections may be included, particularly if the recording sensitivity levels are high.

The crack characterization method used by Lambert-MacGill-Thomas, Inc., General Electric Company, and Southwest Research Institute to describe crack indications was conservative since it ignored the down bending of ultrasound as it is transmitted through weld material. Therefore, the crack indications as characterized for fracture analysis represent a maximum depth indication since straight line plots were used in their characterization. In all cases, the most limiting ultrasonic data was used in the fracture mechanics evaluation.

The welding procedures and welders used to perform the weld overlays were qualified to procedures which meet the requirements of the ASME Code, Section IX 1980 Edition including the Winter 1981 Addenda. The welding procedure required an adequate cooling water flow inside the pipe during welding to produce compressive stresses on the inside surface of the pipe similar to those produced by IHSI. Crack propagation into the weld metal is not likely to occur by IGSCC since the high ferrite weld material is not susceptible to IGSCC.

The fracture mechanics analysis was done in accordance with Section XI, Appendix X to the ASME Code. The analysis performed by General Electric Company has been independently reviewed by Philadelphia Electric Company and Structural Integrity Associates of LaJolla, California.

CONCLUSION

1. The Peach Bottom Unit #2 ultrasonic examination was conducted by personnel trained in the detection of IGSCC cracking and certified by ultrasonic technique demonstration at Battelle Laboratories in Columbus Ohio, and the EPRI NDT Center in Charlotte, N.C., in accordance with IE Bulletin 83-02. The procedure and instrumentation used in this examination has been proven capable of detecting and characterizing intergranular stress corrosion cracking.

2. The crack characterizations and the fracture mechanics analyses utilized are inherently conservative. The fracture mechanics analyses performed on the crack indications and the weld overlay repairs possess an inherent safety factor of three.

3. The overwhelming laboratory and industry experience to date has shown that IGSCC will fail in a leak before break manner.

It can be concluded that Unit #2 of the Peach Bottom Atomic Power Station can operate at full-load power for the six to seven months run to the next scheduled refueling outage with reasonable assurance that the health and safety of the public will not be endangered.