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Attachment 3

STRESS CORROSION CRACKING EVALUATION PROGRAM

DUANE ARNOLD ENERGY CENTER

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Iowa Electric Light & Power Company

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ABSTRACT

An intergranular stress corrosion cracking (IGSCC) survey of the austenitic stainless steel piping in the recirculation system and RHR system of the Duane Arnold Energy Center has been completed. The primary objective of the survey was to assist Iowa Electric Light & Power in its inservice inspection program by identifying the weld joints which are most susceptible to IGSCC. In the survey, material properties and fabrication data from the plant records were compiled for each joint. The Stress Rule Index (SRI), a method of evaluating the sustained stress level at the inside surface weld HAZ, was calculated for each joint. The materials data and SRI were then used to rank each weld joint according to its relative susceptibility to IGSCC. An IGSCC Susceptibility Matrix was developed as a means of ranking the weld joints. Through this matrix each weld joint is categorized into one of three regions. Region I represents combinations of SRI and material chemistry which have thus far proven to be immune to IGSCC. Regions II and III represent combinations more susceptible to IGSCC.

In addition to the ranking, all weld joints were categorized as conforming, nonconforming, or service-sensitive according to the guidelines given in NUREG-0313, Revision 0, the Nuclear Regulatory Commission document related to IGSCC of BWR piping.

The following summary highlights the results of the survey.

1. Of a total of 117 welds $\geq$10 inches in diameter, 19 welds were found to meet the requirements for conforming material as defined in NUREG-0313. Of the remaining 98 nonconforming welds, 4 were identified as having a high resistance to IGSCC because the base materials contained a carbon content between 0.035%

and 0.050% or because they are believed to have been fabricated using an inside surface water spray cooling technique.

2. None of the large diameter pipes (≥10 inches diameter) were in service-sensitive lines.

3. All of the 26, 4 inch diameter welds were found to contain base material defined as nonconforming by NUREG-0313, and 18 of these were located in service-sensitive lines. Two of these 18 welds have high resistance to IGSCC because the carbon content of base material was between 0.035% and 0.050%.

4. Forty-seven weld joints (33% of the total welds) were categorized in Region I of the IGSCC Susceptibility Matrix, representing the least susceptible welds. The remainder of the weld joints were evenly divided between Regions II and III.

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1.0 INTRODUCTION AND PROGRAM OBJECTIVE

As a result of the stress corrosion cracking incidents in welded austenitic stainless steel primary coolant piping in Boiling Water Reactors (BWRs) in recent years, Iowa Electric Light and Power instituted a program with NUTECH to evaluate the stress corrosion cracking propensity of stainless steel welds in the recirculation and residual heat removal (RHR) systems at the Duane Arnold Energy Center (DAEC). The objective of the program is to perform a review of plant fabrication records, a metallurgical review of these records to evaluate factors important to intergranular stress corrosion cracking (IGSCC) in the BWR environment, and a Stress Rule evaluation to assist in identifying those joints which are potentially susceptible to IGSCC. The ultimate program aim is to provide input to the DAEC Inservice Inspection Program so that the proper attention can be focused on those joints which are most susceptible to IGSCC. The identification of potentially susceptible pipe locations will also enable Iowa Electric to prepare for potential incidents by providing a repair or replacement plan to address the problem where it may exist. Additionally, this program will assist in addressing, in a more meaningful way, the concerns of the Nuclear Regulatory Commission published in NUREG-0313 and NUREG-0531 regarding materials selection and processing guidelines for BWRs.

The program is divided into the following four major tasks:

Task 1. Review of Plant Records
Task 2. Review of Metallurgical Variables
Task 3. Stress Rule Evaluation
Task 4. Identification of Low Failure Probability Joints

The following sections provide a brief description of the work performed under each of the above mentioned tasks.

2.0 REVIEW OF PLANT RECORDS

The objective of this task activity was to obtain and review all plant records required to complete the detailed evaluations described in Tasks 2 and 3. These records included piping fabrication and isometric drawings, stress reports, material certifications, fabrication procedures, and records regarding repairs and replacements.

An extremely complete and well-compiled set of fabrication records for the entire recirculation system were supplied to NUTECH by Mr. K. V. Harrington of Iowa Electric, greatly facilitating this task activity.

3.0 REVIEW OF METALLURGICAL VARIABLES

The objective of this task was to identify, for each stainless steel joint in the recirculation and RHR systems, the material chemistry, significant fabrication practices that may have an effect on the joint's susceptibility to IGSCC, and determine the NUREG-0313 status. A detailed compilation of this information is presented in the Stress Corrosion Cracking Evaluation Tables included as Appendix A to this report.

3.1 Material Chemistry

Certified material test reports were located for each component of the subject piping systems. The material specification and the associated carbon content are identified in SCC Evaluation Tables, Appendix A.

Unstabilized wrought austenitic stainless steel with a carbon content less than 0.035% has been demonstrated to be highly resistant to stress corrosion cracking and is acceptable to the NRC for installation in BWR piping systems, as stated in NUREG-0313. Welds between materials with a carbon content in the 0.035% to 0.050% range are identified in the SCC Evaluation Tables as having high resistance to IGSCC. While no NRC credit can be taken for these welds relative to NUREG-0313 guidelines, we feel it is appropriate, based on field failure data and the EPRI sponsored pipe test and laboratory test data, to identify these joints as highly resistant to IGSCC. The General Electric test data presented in Figure 3-1 illustrates that at these carbon levels Type 304 stainless steel is highly resistant to IGSCC.

Ferritic steels and cast stainless steels have also been demonstrated to be highly resistant to IGSCC and are acceptable materials for installation in BWR piping systems. Inconel (Alloy 600), not addressed specifically in NUREG-0313, is considered as

a conforming material in this evaluation. In the uncreviced condition this material has provided satisfactory performance in the BWR environment.

3.2 Significant Fabrication Practices

A review of the fabrication procedures revealed that the large diameter shop welds may have been fabricated using an inside surface water spray cooling technique. The pipe fabricator, Southwest Fabricating and Welding Co., commonly uses the spray cool technique to maintain interpass temperature when welding stainless steel pipe having a wall thickness greater than 0.75 in.[1] The main purpose for employing this technique was to control interpass temperature, however, the technique is similar to that currently being studied as a fabrication remedy for stress corrosion cracking mitigation.

This technique, also called heat sink welding (HSW), is used to produce axial compressive residual stress on the inside pipe surface in the weld heat affected zone. The first two layers are deposited by the gas tungsten arc process in the normal manner. The remainder of the weld is made while the inside surface is being cooled by either a water spray or by filling the pipe with flowing water.

It has been documented in General Electric Company's pipe tests on small diameter piping that as much as an order of magnitude performance improvement may be possible for heat sink welded joints.[2] A separate program, supported by the Electric Power

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(1) Robert Pearson, Southwest Fabricating and Welding Co., Private Communication

(2) R. Hughes, Qualification of Solution Heat Treatment, Corrosion Resistant Cladding and Heat Sink Welding. Seminar on Countermeasures for BWR Pipe Cracking, January 22-24, 1980.

Research Institute, is currently underway to evaluate the residual stress benefit for large diameter piping fabricated using this process.

Although no NRC credit can currently be taken for heat sink welded joints in relation to the augmented ISI requirements of NUREG-0313, these welds are specifically highlighted in the SCC Evaluation Tables because of their potentially high resistance to IGSCC. It should also be noted that, although the shop welding procedure used in fabricating the Duane Arnold spools requires interpass temperature control, and allows water spray cooling, specific documentation describing the detailed process and verifying its use on each of the shop welds has not been located. Follow-up discussions with the pipe fabricator will be necessary to provide adequate assurance that the water spray cooling technique was, in fact, employed for each shop weld.

3.3 NUREG-0313 Evaluation

An evaluation of the metallurgical data compiled for each joint was conducted with respect to the NRC technical positions established in NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," published in July 1977.

The SCC Evaluation Tables identify the NUREG-0313 status of each joint based on the following criteria.

Conforming - joints for which each of the adjoining parent materials are one of the following highly resistant materials; ferritic steels, "Nuclear Grade" or L-Grade Type 304 or 316 austenitic stainless steel (<0.035% Carbon), or cast stainless steels. Regular grades of 304 or 316 stainless steel are not

considered conforming unless the as-installed piping, including the weld, is in the solution annealed condition.

Nonconforming - all joints not meeting the above criteria. These joints are subject to augmented inservice inspection requirements as identified in NUREG-0313.

Service Sensitive - nonconforming joints in lines designated by the NRC as having experienced cracking of a generic nature, or that are considered to be particularly susceptible to cracking because of a combination of high local stress material condition, and high oxygen content in lines which have relatively stagnant, intermittent, or low flow coolant. Included in this category of piping runs are: core spray lines, recirculation bypass lines, CRD hydraulic return lines, isolation condenser lines, and shutdown heat exchanger lines. A higher degree of augmented inspection is required for these lines.

A revision of NUREG-0313, currently issued for review and comment, proposes to add recirculation riser piping and internal attachment welds to the service sensitive category.

3.4 Summary

The overall metallurgical review consisted of an examination of 136 joints in the recirculation system and 7 joints in the residual heat removal system. Of the 143 total joints, 19 were evaluated as conforming, 106 were nonconforming, and 18 were both nonconforming and in service sensitive lines.

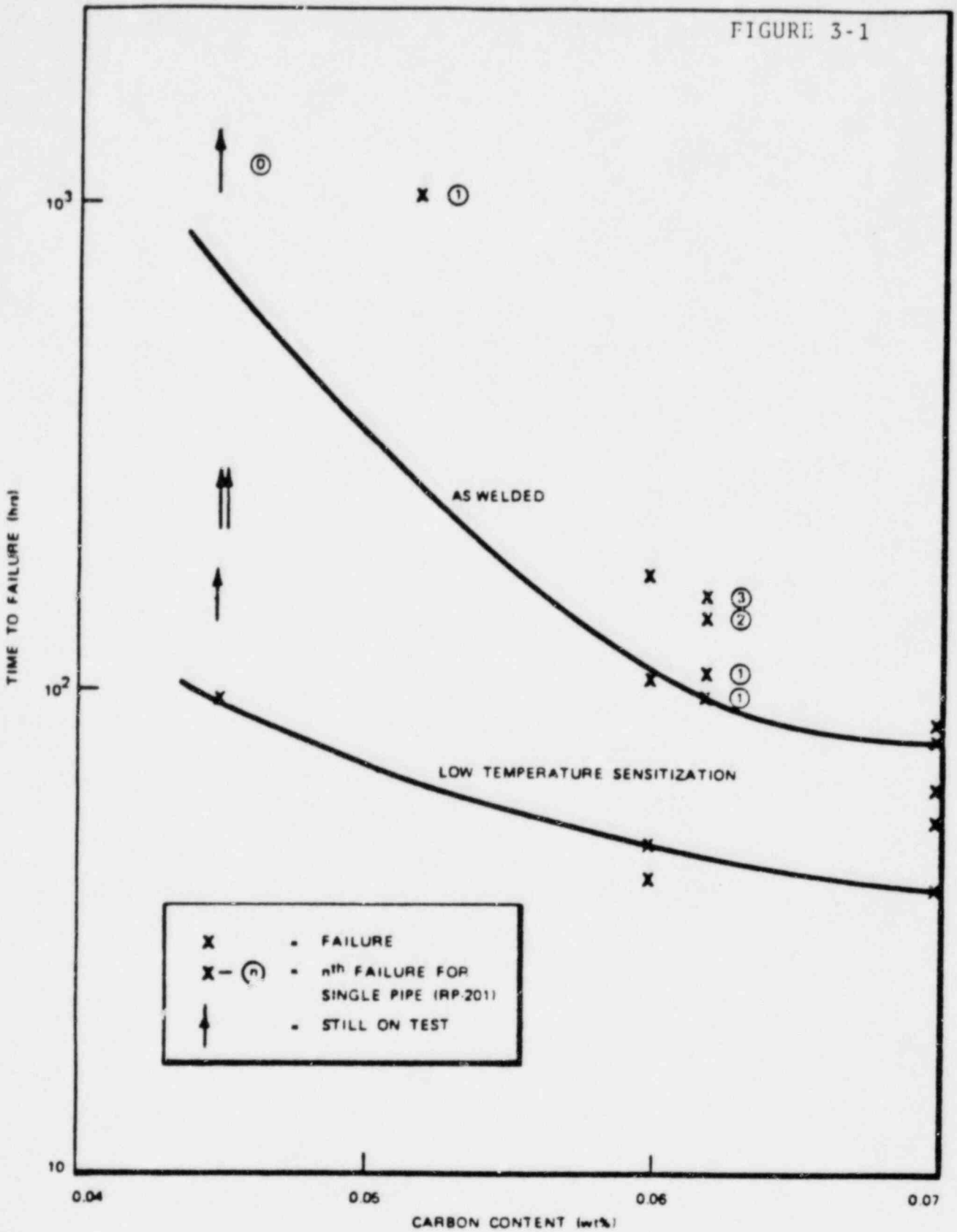
Of a total of 117 welds greater than or equal to 10 inches in diameter, 19 welds were found to meet the requirements for conforming material as defined in NUREG-0313. Of the remaining 98 nonconforming welds, 34 were identified as having a high resistance to IGSCC because the base materials contained a carbon content between 0.035% and 0.050% or because they are believed to

have been fabricated using an inside surface water cooling technique.

All of the 26, 4-inch diameter welds were found to contain base material defined as nonconforming by NUREG-0313, and 18 of these were located in service sensitive lines. Two of these 18 welds were designated as having a high resistance to IGSCC because the carbon content of the base material was between 0.035% and 0.050%.

Table 3-2 provides a tabular summary of the metallurgical evaluation results.

FIGURE 3-1



CARBON CONTENT VERSUS TIME TO FAILURE IN TYPE-304 STAINLESS STEEL PIPE TESTS
(REF: NEDC 23750-2, EPRI CONTRACT RP968)

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TABLE 3-2

SUMMARY OF METALLURGICAL EVALUATION RESULTS

SYSTEM	DIA	TOTAL WELDS	TOTAL CONFORMING WELDS	NON-CONF. WELDS SHOP WATER SPRAY COOLED*	NON-CONF. WELDS WITH .035 <%C <.050	TOTAL NON-CONFORMING WELDS	TOTAL NON-CONFORMING & SERVICE SENSITIVE
RECIRCULATION SUCTION	22	23	2	10	15	21	0
RECIRCULATION DISCHARGE	22	16	0	6	1	16	0
RECIRCULATION RING HEADER	16	8	0	8	0	8	0
RECIRCULATION RISERS	10	64	16	0	0	48	0
RECIRCULATION BYPASS	4	18	0	0	2	0	18
RECIRCULATION BRANCH CONNECTIONS	4	7	0	0	0	7	0
RESIDUAL HEAT REMOVAL	20 18 4	4 2 1	0 1 0	0 0 0	0 0 0	4 1 1	0 0 0
TOTAL		143	19	24**	18**	106	18

*The use of water spray cooling not yet fully verified.

**Each column includes six joints that satisfy both criteria (i.e., .035 < %C <.050 and shop water spray cooled.)

4.0 STRESS RULE EVALUATION

To provide a further means of determining a joint's susceptability to IGSCC, a Stress Rule Index (SRI) evaluation was performed for each joint being studied. The Stress Rule Index is determined in the following manner. The axial stress components resulting from sustained loading conditions (i.e. pressure, deadweight, and steady state thermal expansion) are derived from the elemental force and moment tables of the original Duane Arnold piping stress analysis. These are combined with residual stress estimates and input to the General Electric Company developed Stress Rule Index equation shown below.

$$\frac{P_m + P_b}{S_y} + \frac{Q + F\ (Resid)}{S_y + .002E} = SRI$$

Where
- P_m = Primary Membrane Stress
- P_b = Primary Bending Stress
- S_y = Code Yield Strength
- Q = Sustained Secondary Stress
- F = Sustained Peak Stress
- E = Elastic Modulus
- Resid = Weld Residual Stress

For non-creviced welds, General Electric Company has determined that if the index is less than unity, susceptibility to stress corrosion cracking is mitigated; for crevices, a value somewhat lower than unity may be more suitable. To this date, IGSCC events have not been observed in joints exhibiting a SRI less than 1.2.

The SRI evaluation was facilitated by the use of a NUTECH computer program (SCORE) which calculates the SRI given the appropriate forces and moments from the piping stress report. The SRI for each joint is given in the SCC Evaluation Tables. Detailed results of the SRI evaluation are included in Appendix B.

5.0 IDENTIFICATION OF LOW FAILURE PROBABILITY JOINTS

Three main considerations must be taken into account in determining the susceptibility of a joint to intergranular stress corrosion; material properties, stress, and environment. In this report, we have quantitatively addressed two of these three factors. For both material properties and stress, there exists sufficient analysis, laboratory data, and field experience to provide a basis for determining relative susceptibility. The environmental factor has only been addressed in that stagnant, low flow lines (service sensitive) are considered more susceptible to IGSCC. The degree to which one of these three ingredients must be present for IGSCC to occur is variable, making it extremely difficult to combine what is known about each of these factors to define an absolute scale of susceptibility. There are also other known variables that effect the susceptibility of sensitized austentic stainless steel to IGSCC. These other variables, which must be factored into a final determination of susceptibility, include such effects as cold work, counterbore grinding crevices, temperature, pH, etc. EPRI is currently sponsoring research that may lead to more refined techniques for quantifying the susceptibility of various piping joints.

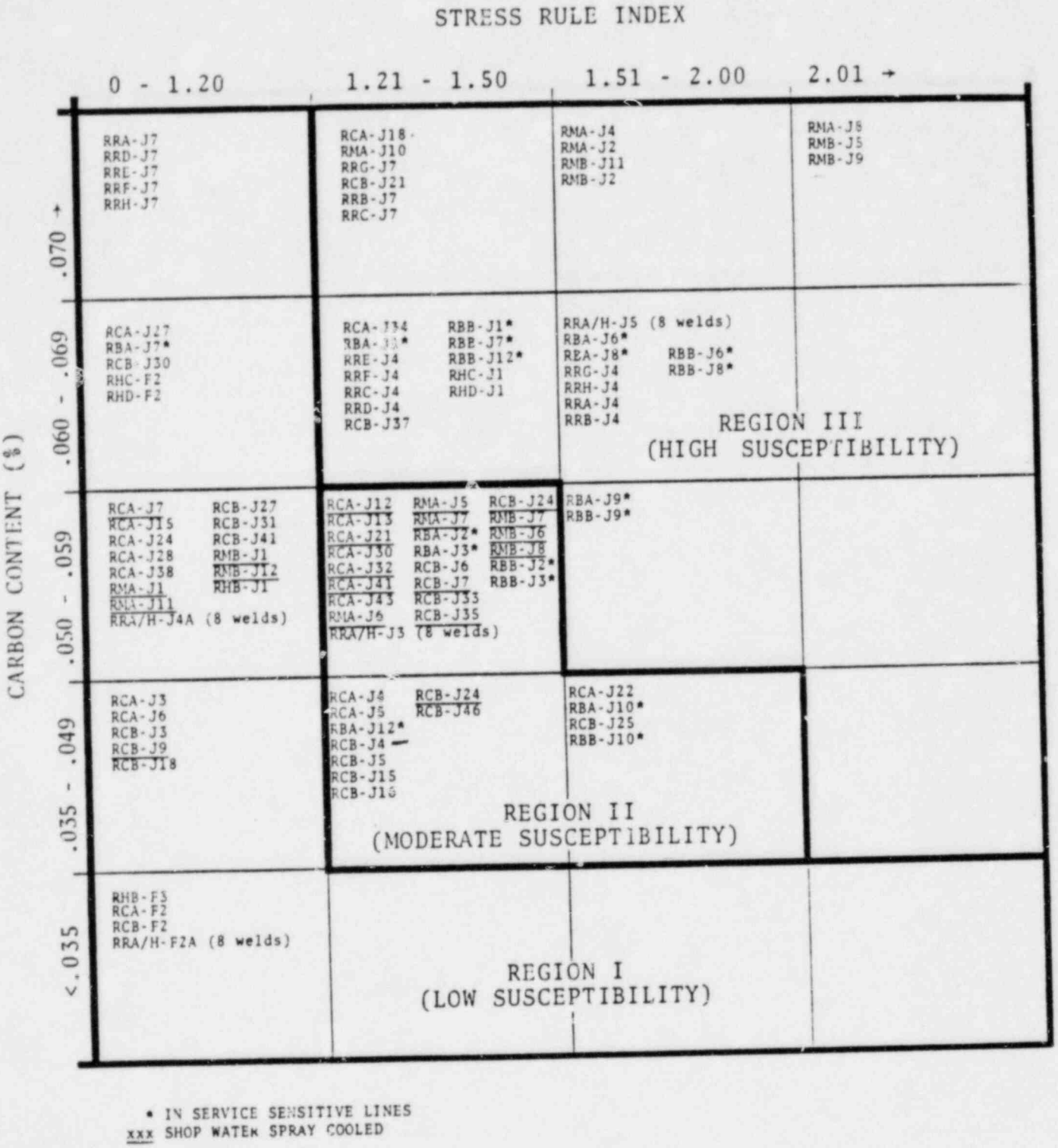
To provide a rudimentary means of ranking each weld, the IGSCC Susceptibility Matrix was developed. It displays the relative susceptibility of each weld based on the information that has been compiled in this study regarding material properties and stress conditions. Figure 5-1 shows the placement of the recirculation and RHR system welds in the matrix based on the stress rule index calculated for that joint and the highest carbon content of the base material on either side of the weld.

The IGSCC Susceptibility Matrix is divided into three regions labeled I, II, and III. Region I contains welds that are either

conforming from a material standpoint (less than 0.035% carbon as defined in NUREG-0313) or have a stress rule index less than 1.2. (IGSCC events have not been observed in weld joints with a SRI < 1.2.) Welds in this region are considered to be the least susceptible to IGSCC.

Region II defines an intermediate zone encompassing welds which exhibit considerable margin to failure, relative to Region III welds, but are somewhat more susceptible than Region I welds. Finally, Region III represents the most susceptible welds, those having the smallest margin to failure.

Other variables, as discussed earlier, can enter in to increase or decrease the susceptibility to IGSCC. Two of the more important factors to be considered for Duane Arnold are the effects of shop water spray cooling and whether specific welds are in service sensitive piping. Welds that are believed to have been shop water spray cooled are underlined in the matrix. These welds are potentially highly resistant to IGSCC because of favorable residual stress distribution. If this is verified and actual measurements determine the extent to which these stresses are reduced, the stress rule index may be significantly lowered, thus shifting the position of the underlined welds to the left. The other important factor to consider is whether welds are in service sensitive piping. Welds which are both nonconfoming and in service sensitive piping are identified in the matrix with an asterisk. These welds are potentially more susceptible to IGSCC than other welds of the same matrix position.



* IN SERVICE SENSITIVE LINES
xxx SHOP WATER SPRAY COOLED

FIGURE 5-1

IGSCC SUSCEPTIBILITY MATRIX

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APPENDIX A

SCC EVALUATION TABLES

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STRESS CORROSION CRACKING EVALUATION

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RCA	RECIRCULATION SUCTION - LOOP A	0 4/11/80	A1

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NON CONF	CONF		
				RECIRC. SUCTION NOZZLE (N1A)	FORGED SA-508 CL.2 LOW ALLOY STEEL	---	NA	---						
RCA-F2	22	NOZ-SE	SW									X	1.01	
				SAFE-END (N1A)	FORGED SA-336 GR F8	7	M57S	0.023						
RCA-J3	22	SE-P	FW								⊖+		1.03	LOWER %C HIGH RESISTANCE TO IGSCC
				PIPE (5-1)	R&W A358 CL.1 FROM A240 T304	1	2P2470-4A	0.045						
RCA-J4	22	P-E	SW								⊖+		1.30	LOWER %C & SHOP WATER SPRAY COOLED HIGH RESISTANCE TO IGSCC
				ELBOW(90°LR)	R&W A403-WP304W FROM A240	2	300223	0.049						
RCA-J5	22	E-P	SW								⊖+		1.32	LOWER %C & SHOP WATER SPRAY COOLED HIGH RESISTANCE TO IGSCC
				PIPE (5-2)	R&W A358 CL.1 FROM A240 T304	1	2P2470-4A	0.045						
RCA-J6	22	P-P	FW								⊖+		0.90	LOWER %C HIGH RESISTANCE TO IGSCC
				PIPE (6-1)	R&W A358 CL.1 FROM A240 T304	1	2P2470-1A	0.045						
RCA-J7	22	P-P	SW								⊖+		0.87	SHOP WATER SPRAY COOLED
				PIPE (6-2)	R&W A358 CL.1 FROM A240 T304	1	300069-1B	0.050						
RCA-J12	22	P-E	SW								⊖+		1.30	SHOP WATER SPRAY COOLED
				ELBOW(90°LR)	R&W A403-WP304W FROM A240	2	300223	0.049						
RCA-J13	22	E-V	FW								⊖+		1.33	LOWER %C TO CASTING HIGH RESISTANCE TO IGSCC
				VALVE (MO-F023A)	CAST A351-65 GR CF-8	7	40298	0.05						9% FERRITE

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RCA	RECIRCULATION SUCTION - LOOP A (Con't)	0 4/11/80	A2

WELD NUMBER	DIA. (IN.)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS SERV	NUREG 0313 STATUS SENS	NUREG 0313 STATUS NONF	NUREG 0313 STATUS CONF	STRESS RULE INDEX	COMMENTS
RCA-J15	22	V-P	FW								X		0.96	
				PIPE (4-1)	R&W A358 CL.1 FROM A240 T304	1	300069-1B	0.050						
RCA-J21	22	P-E	SW								B+		1.43	SHOP WATER SPRAY COOLED
				ELBOW(90°SR)	R&W A403-WP304W-1967 FROM A240	3	K51142-3	0.048						
RCA-J22	22	E-Pp	FW								B+		1.63	LOWER %C TO CASTING HIGH RESISTANCE TO IGSCC
				PUMP	CAST A351 GR. CF8M	7	51510 or 50448	0.06 0.05						14% FERRITE
				PIPE (5-2)	R&W A358 CL.1 FROM A240 T304	1	2P2470-4A	0.045						SPOOL 5-2 ALSO SHOWN ON PG. A1
RCA-J5A	4	BPC	SW								X			
				WELDOLET 22" X 4"	FORGED A182-F304	6	812680 (496E)	0.060						
				PIPE (4-2)	R&W A358 CL.1 FROM A240 T304	1	300069-1B	0.050						SPOOL ALSO SHOWN ON PG. A2
RCA-J18	4	BPC	SW								X		1.32	
				4" WN FLANGE (900# LONG)	FORGED A182-69 F-304	4	41167	0.070						DECONTAMINATION FLANGE
				BLIND FLANGE	FORGED A182-69 F-304	4	41167	0.070						

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STRESS CORROSION CRACKING EVALUATION

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LINE NO	SYSTEM	REVISION	DATE	PAGE
RCA	RECIRCULATION DISCHARGE - LOOP A	0	4/11/80	A3

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERVS	SENS	NON	COMP		
				PUMP	CAST A351 CF8M	7	51510 or 50448	0.06 0.05						14% FERRITE
RCA-J24	22	Pp-P	F								X		0.98	
				PIPE (7-1)	R&W A358 CL.1 FROM A240 T304	1	300075-1B	0.058						
RCA-J28	22	P-V	FW								X		0.97	
				VALVE (MO-F031A)	CAST A351-65 GR. CF8	7	44266	0.04						18% FERRITE
RCA-J30	22	V-E	FW								X		1.27	
				ELBOW(90°LR)	R&W A403-WP304W FROM A240	2	600324-1A	0.055						
RCA-J32	22	E-P	SW								(8)		1.26	SHOP WATER SPRAY COOLED
				PIPE (9-1)	R&W A358 CL.1 FROM A240 T304	1	300075-1B	0.058						
RCA-J38	22	P-P	SW								X		0.89	
				PIPE (9-1)	R&W A358 CL.1 FROM A240 T304	1	300075-1B	0.058						FLOW RESTRICTER WELDED TO PIPE I.D.
RCA-J41	22	P-T	SW								(8)		1.25	SHOP WATER SPRAY COOLED
				REDUCING TEE 22"X22"X20"	R&W A403-WP304W FROM A240	2	6003241	0.055						20" OUTLET EXTRUDED PRIOR TO HEAT TREATMENT
RCA-J43	22	T-Cr	FW								X		1.33	
				REDUCING CROSS 22X22X16X16	R&W A403 WP304W FROM A240-69	2	582533-1	0.040						16" OUTLETS EXTRUDED PRIOR TO HEAT TREATMENT
RCA-J6	22	Cr-Cp	SW								(8)		1.22	SHOP WATER SPRAY COOLED
				WELD CAP	R&W A403-WP-304-67 FROM A240	3	600225-1A	0.058						

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STRESS CORROSION CRACKING EVALUATION

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RMA	RECIRCULATION RING HEADER - LOOP A	0 4/11/80	A5

WELD NUMBER	DIA. (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NCONF	CONF		
				WELD CAP	R&W A403-WP304-67 FROM A240	3	K51404-4D	0.050						
RMA-J1	16	C_p-Hdr	SW								⊕+		0.96	SHOP WATER SPRAY COOLED
				RING HEADER (24-1)	R&W A358 CL.1 FROM A240-67 T304	1	600120-1B	0.059						RISER OUTLETS EXTRUDED PRIOR TO HEAT TREATMENT
RMA-J5	16	Hdr-Cr	SW								⊕+		1.42	SHOP WATER SPRAY COOLED
				REDUCING CROSS 22X22X16X16	R&W A403 WP-304W FROM A240-69	2	582533-1	0.040						ALSO SHOWN ON PG. A3
RMA-J7	16	Cr-Hdr	SW								⊕+		1.37	SHOP WATER SPRAY COOLED
				RING HEADER (24-2)	R&W A358 CL.1 FROM A240-67 T304	1	600120-1B	0.059						RISER OUTLETS EXTRUDED PRIOR TO HEAT TREATMENT
RMA-J11	16	Hdr-Cp	SW								⊕+		0.96	SHOP WATER SPRAY COOLED
				WELD CAP	R&W A403-WP304-67 FROM A240	3	K51404-4D	0.050						

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RRE	RECIRCULATION RISERS - LOOP A (N2E)	0 4/11/80	A6

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS: SERV	NUREG 0313 STATUS: SENS	NUREG 0313 STATUS: NOIJ	NUREG 0313 STATUS: CONF	NUREG 0313 STATUS: CONF	STRESS RULE INDEX	COMMENTS
				16" RING HEADER (24-2)	R&W A358 CL.1 FROM A240 T304	1	600120-1B	0.059							ALSO SHOWN ON PG. A5
RMA-J10	10	Hdr-A	SW								X			1.40	
				ADAPTER	FORGED A182-F304	6	52624	0.070							
RRE-J7	10	A-P	FW								X			1.11	
				PIPE (12-2)	SMLS A376-TP304	5	2P3687	0.051							
RRE-J5	10	P-E	SW								X			1.56	
				ELBOW(90°LR)	R&W A403-WP304W-67 FROM A240	3	37845-1A	0.061							
RRE-J4	10	E-P	SW								X			1.39	
				PIPE (12-1)	SMLS A376-TP304	5	2P3399	0.055							
RRE-J4A	10	P-P	FW								X			0.98	
				PIPE (12-1)	SMLS A376-TP304	5	2P3399	0.055							PORTION OF SPOOL 12-1 WAS CUT OUT AND REWELDED IN 1978
RRE-J3	10	P-P	FW								X			1.23	
				SAFE-END EXTENSION	FORGED SA-336 GR. F8	7	M53S	0.030							
RRE-F2A	10	P-SE	FW										X	1.02	
				SAFE-END (N2E)	SMLS SB-166 INCONEL	7	NX8927	0.07							SAFE-END REPLACED IN 1978
RRE-F2	10	SE-NOZ	FW										X	1.03	
				RECIRC INLET NOZZLE	FORGED SA-508 CL.2 LOW ALLOY STEEL	---	NA	---							

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RRF	RECIRCULATION RISERS - LOOP A (N2F)	0 4/11/80	A7

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NON CONF	CONF		
				16" RING HEADER (24-2)	R&W A358 CL.1 FROM A240 T304	1	600120-1B	0.059						ALSO SHOWN ON PG. A5
RMA-J8	10	Hdr-A	SW								X		2.05	
				ADAPTER	FORGED A182-F304	6	52624	0.070						
RRF-J7	10	A-P	FW								X		1.20	
				PIPE (13-2)	SMLS A376-TP304	5	2P3271	0.061						
RRF-J5	10	P-E	SW								X		1.70	
				ELBOW(90°LR)	R&W A403-WP304W-67 FROM A240	3	37845-1A	0.061						
RRF-J4	10	E-P	SW								X		1.41	
				PIPE (13-1)	SMLS A376 TP304	5	2P3687	0.051						
RRF-J4A	10	P-P	FW								X		0.98	
				PIPE (13-1)	SMLS A376 TP304	5	2P3687	0.051						PORTION OF SPOOL 13-1 WAS CUT OUT AND REWELDED IN 1978
RRF-J3	10	P-P	FW								X		1.23	
				SAFE-END EXTENSION	FORGED SA-336 GR. F8	7	M53S	0.030						
RRF-F2A	10	P-SE	FW									X	1.02	
				SAFE-END (N2F)	SMLS SB-166 INCONEL	7	NX8927	0.07						SAFE-END REPLACED IN 1978
RRF-F2	10	SE-NOZ	FW									X	1.03	
				RECIRC INLET NOZZLE	FORGED SA-508 CL.2 LOW ALLOY STEEL	---	NA	---						

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RRG	RECIRCULATION RISERS - LOOP A (N2G)	0 4/11/80	A8

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NON	CONF		
				16" RING HEADER (24-1)	R&W A358 CL.2 FROM A240 T304	1	600120-1B	0.059						ALSO SHOWN ON A5
RRA-J4	10	Hdr-A	SW								X		1.51	
				ADAPTER	FORGED A182-F304	6	52624	0.070						
RRG-J7	10	A-P	FW								X		1.22	
				PIPE (14-2)	SMLS A376-TP304	5	2P3271	0.061						
RRG-J5	10	P-E	SW								X		1.68	
				ELBOW(90°LR)	R&W A403-WP304W-67 FROM A240	3	37845-1A	0.061						
RRG-J4	10	E-P	SW								X		1.53	
				PIPE (14-1)	SMLS A376-T[illegible]	5	2P3687	0.051						
RRG-J4A	10	P-P	FW								X		0.98	
				PIPE (14-1)	SMLS A376-T[illegible]	5	2P3687	0.051						PORTION OF SPOOL 14-1 WAS CUT OUT AND REWELDED IN 1978
RRG-J3	10	P-P	FW								X		1.23	
				SAFE-END EXTENSION	FORGED SA-336 GR. F8	7	M53S	0.030						
RRG-F2A	10	P-SE	FW									X	1.02	
				SAFE-END (N2G)	SMLS SB-166 INCONEL	7	NX9923	0.06						SAFE-END REPLACED IN 1978
RRG-F2	10	SE-NOZ	FW									X	1.03	
				RECIRC INLET NOZZLE	FORGED SA-508 CL.2 LOW ALLOY STEEL	---	NA	----						

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RRH	RECIRCULATION RISERS - LOOP A (N2H)	0 4/11/80	A9

WELD NUMBER	DIA. (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS: SERV	NUREG 0313 STATUS: SENS	NUREG 0313 STATUS: NONF	NUREG 0313 STATUS: CONF	STRESS RULE INDEX	COMMENTS
				16" RING HEADER (24-1)	R&W A358 CL.1 FROM A240 T304	1	600120-1B	0.059						ALSO SHOWN ON PG. A5
RHA-J2	10	Hdr-A	SW								X		1.90	
				ADAPTER	FORGED A182-F304	6	52624	0.070						
RRH-J7	10	A-P	FW								X		1.14	
				PIPE (15-2)	SMLS A376-TP304	5	2P3687	0.051						
RRH-J5	10	P-E	SW								X		1.55	
				ELBOW	R&W A403-WP304W-67 FROM A240	3	37845-1A	0.061						
RRH-J4	10	E-P	SW								X		1.57	
				PIPE (15-1)	SMLS A376-TP304	5	2P3687	0.051						
RRH-J4A	10	P-P	FW								X		0.98	
				PIPE (15-1)	SMLS A376-TP304	5	2P3687	0.051						PORTION OF SPOOL 15-1 WAS CUTOUT AND REWELDED IN 1978
RRH-J3	10	P-P	FW								X		1.23	
				SAFE-END EXTENSION	FORGED SA-336 GR. F8	7	M53S	0.030						
RRH-F2A	10	P-SE	FW									X	1.02	
				SAFE-END (N2H)	SMLS SB-166 INCONEL	7	NX9923	0.06						SAFE-END REPLACED IN 1978
RRH-F2	10	SE-NOZ	FW									X	1.03	
				RECIRC INLET NOZZLE	FORGED SA-508 CL.2 LOW ALLOY STEEL	---	NA	---						

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RBA	RECIRCULATION BYPASS LINE - LOOP A	0 4/11/80	A10

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NCONF	CONF		
				WELDOLET	FORGED A182-F304	6	812680 (496E)	0.060						ALSO SHOWN ON PG. A4
RBA-J1	4	WOL-P	FW						X	X			1.22	
				PIPE	SMLS A376-TP304	5	2P3535	0.053						
RBA-J2	4	P-E	SW						X	X			1.40	
				ELBOW(90°LR)	SMLS A403-WP304-67 FROM A376	3	20257 CFRO	0.047						
RBA-J3	4	E-P	SW						X	X			1.50	
				PIPE	SMLS A376-TP304	5	2P3371	0.057						
RBA-J6	4	P-T	FW						X	A			1.83	
				TEE	SMLS A403-WP304W-67 FROM A312	3	37368 CFRP	0.060						
RBA-J7	4	T-FL	SW						X	X			1.16	
				WN FLANGE (900 #LONG)	FORGED A182-F316	4	E1460	0.060						
				BLIND FLANGE	FORGED A182-F316	4	E1460	0.060						
				TEE	SMLS A403-WP304W-67 FROM A312	3	37368 CFRP	0.060						ALSO SHOWN ON PG. A4
RBA-J8	4	T-P	FW						X	X			1.94	
				PIPE	SMLS A376-TP304	5	2P3371	0.057						
RBA-J9	4	P-E	SW						X	X			1.72	

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RBA	RECIRCULATION BYPASS LINE - LOOP A (Con't)	0 4/11/80	A11

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERVS	SENS	NCONF	CONF		
				ELBOW(90°LR)	SMLS A403-WP304W-67 FROM A312	3	20257 CFRO	0.047						
RBA-J10	4	E-V	FW						θ+	X			1.52	LOWER %C TO CASTING HIGH RESISTANCE TO IGSCC
				VALVE (MO-F032A)	CAST A351-65 GR. CF8	7	41706	0.08						8% FERRITE
RBA-J12	4	V-WOL	FW						X	X			1.31	
				WELDOLET	FORGED A182-F304	6	812680 (876E)	0.060						ALSO SHOWN ON PG. A4

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RCB	RECIRCULATION SUCTION - LOOP B	0 4/11/80	A12

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS: SERV	SENS	NCONF	CONF	STRESS RULE INDEX	COMMENTS
				RECIRC. SUCTION NOZZLE (N1B)	FORGED SA-508 CL.2 LOW ALLOY STEEL	---	NA	---						
RCB-F2	22	NOZ-SE	SW									X	0.97	
				SAFE-END (N1B)	FORGED SA-336 GR. F8	7	[illegible]57S	0.023						
RCB-J3	22	SE-P	FW								X		1.01	LOWER %C HIGH RESISTANCE TO IGSCC
				PIPE (1-1)	R&W A358 CL.1 FROM A240 T304	1	2P2470-4A	0.045						
RCB-J4	22	P-E	SW								X		1.35	LOWER %C & SHOP WATER SPRAY COOLED HIGH RESISTANCE TO IGSCC
				ELBOW(90°LR)	R&W A403-WP304W FROM A240	2	300223	0.049						
RCB-J5	22	E-P	SW								X		1.24	LOWER %C & SHOP WATER SPRAY COOLED HIGH RESISTANCE TO IGSCC
				PIPE (1-2)	R&W A358 CL.1 FROM A240 T304	1	2P2470-1A	0.045						
RCB-J6	22	P-T	FW								X		1.24	
				REDUCING TEE 22"X22"X18"	R&W A403-WP304W FROM A240-69	2	6003241	0.055						18" OUTLET EXTRUDED PRIOR TO HEAT TREATMENT
RCB-J7	22	T-P	SW								X		1.32	SHOP WATER SPRAY COOLED
				PIPE (1-2)	R&W A358 CL.1 FROM A240 T304	1	2P2470-1A	0.045						
RCB-J9	22	P-P	SW								X		0.89	LOWER %C & SHOP WATER SPRAY COOLED HIGH RESISTANCE TO IGSCC
				PIPE (2-1)	R&W A358 CL. 1 FROM A240 T304	1	2P2431-1A	0.040						
RCB-J15	22	P-E	FW								X		1.31	LOWER %C HIGH RESISTANCE TO IGSCC
				ELBOW(90°LR)	R&W A403-WP304W FROM A240	2	300223	0.049						
RCB-J16	22	E-V	FW								X		1.32	LOWER %C HIGH RESISTANCE TO IGSCC

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RCB	RECIRCULATION SUCTION - LOOP B (Con't)	0 4/11/80	A13

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NCONF	CONF		
				VALVE (MO-F023B)	CAST A351-65 GR. CF8	7	39839	0.06						11% FERRITE
RCB-J18	22	V-P	FW								⊖		0.96	LOWER %C TO CASTING HIGH RESISTANCE TO IGSCC
				PIPE (3-1)	R&W A358 CL.1 FROM A240 T304	1	2P2470-4A	0.045						
RCB-J24	22	P-E	SW								⊖		1.38	LOWER %C & SHOP WATER SPRAY COOLED HIGH RESISTANCE TO IGSCC
				ELBOW(90°SR)	R&W A403-WP304W-67 FROM A240 T304	3	K51142-3	0.048						
RCB-J25	22	E-Pp	FW								⊖		1.57	LOWER %C TO CASTING HIGH RESISTANCE TO IGSCC
				PUMP	CAST A351 GR, CF8M	7	51510 or 50448	0.06 0.05						14% FERRITE
				PIPE (3-1)	R&W A358 CL.1 FROM A240 T304	1	2P2470-4A	0.045						
RCB-J21	4	BPC	SW								X		1.32	
				FLANGE (900# LNW)	FORGED A182-69 F-304	4	41167	0.070						DECONTAMINATION FLANGE
				BLIND FLANGE	FORGED A182-69 F-304	4	41167	0.070						

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RCB	RECIRCULATION DISCHARGE - LOOP B	0 4/11/80	A14

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS: SERVS	NUREG 0313 STATUS: SENS	NUREG 0313 STATUS: NONF	NUREG 0313 STATUS: CONF	STRESS RULE INDEX	COMMENTS
				PUMP	CAST A351 CF8M	7	51510 or 50448	0.06 0.05						14% FERRITE
RCB-J27	22	Pp-P	FW								X		0.97	
				PIPE(8-1)	R&W A358 CL.1 FROM A240 T304	1	300075-1C	0.058						
RCB-J31	22	P-V	FW								X		0.96	
				VALVE (MO-F031B)	CAST A351-65 GR. CF8	7	44691	0.04						15% FERRITE
RCB-J33	22	V-E	FW								X		1.24	
				ELBOW(90°LR)	R&W A403-WP304W FROM A240	2	600324-1A	0.055						
RCB-J35	22	E-P	SW								θ+		1.22	SHOP WATER SPRAY COOLED
				PIPE (10-1)	R&W A358 CL. 1 FROM A240 T304	1	300075-1C	0.058						
RCB-J41	22	P-P	SW								X		0.90	
				PIPE (10-1)	R&W A358 CL.1 FROM A240 T304	1	300075-1C	0.058						FLOW RESTRICTER WELDED TO PIPE I.D.
RCB-J44	22	P-T	SW								θ+		1.43	SHOP WATER SPRAY COOLED
				REDUCING TEE 22X22X20	R&W A403-WP304W FROM A240-69	2	6825331	0.040						20" OUTLET EXTRUDED PRIOR TO HEAT TREATMENT
RCB-J46	22	T-Cr	FW								θ+		1.33	LOWER %C CONTENT - HIGH RESISTANCE TO IGSCC
				REDUCING CROSS 22X22X16X16	R&W A403-WP304W FROM A240-69	2	6825331	0.040						16" OUTLETS EXTRUDED PRIOR TO HEAT TREATMENT
RCB-J7	22	Cr-Cp	SW								θ+		1.22	SHOP WATER SPRAY COOLED
				WELD CAP	R&W A403-67 FROM A240 T304	3	600225-1A	0.058						

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RCB	RECIRCULATION DISCHARGE - LOOP B (Con't)	0 4/11/80	A15

WELD NUMBER	DIA. (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREAT-MENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NON F	CONF		
				22" PIPE (8-1)	R&W A358 CL.1 FROM A240 T304	1	300075-1C	0.058						ALSO SHOWN ON PG. A14
RCB-J30	4	BPC	SW								X		1.08	
				WELDOLET 22"X4"	FORGED A182-F304	6	812680 (496E)	0.060						BRANCH CONNECTION FOR 4" RECIRC. DISCHARGE VALVE BYPASS LINE
				22" PIPE (10-1)	R&W A358 CL. 2 FROM A240 T304	1	300075-1C	0.058						ALSO SHOWN ON PG. A14
RCB-J37	4	BPC	SW								X		1.25	
				WELDOLET 22"X4"	FORGED A182-F304	6	812680 (496E)	0.060						BRANCH CONNECTION FOR 4" RECIRC. DISCHARGE VALVE BYPASS LINE

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RMB	RECIRCULATION RING HEADER - LOOP B	0 4/11/80	A16

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NCONF	CONF		
				WELD CAP	R&W A403-WP304W-67 FROM A240	3	K51404-4D	0.050						
RMB-J1	16	Cp-Hdr	SW								⊖+		0.96	SHOP WATER SPRAY COOLED
				RING HEADER (11-1)	R&W A358 CL.1 FROM A240-67 T304	1	600120-1B	0.059						RISER OUTLETS EXTRUDED PRIOR TO HEAT TREATMENT
RMB-J6	16	Hdr-Cr	SW								⊖+		1.45	SHOP WATER SPRAY COOLED
				REDUCING CROSS 22X22X16X16	R&W A403-WP304W FROM A240-69	2	6825331	0.040						ALSO SHOWN ON PG. B14
RMB-J8	16	Cr-Hdr	SW								⊖+		1.35	SHOP WATER SPRAY COOLED
				RING HEADER (11-2)	R&W A358 CL.1 FROM A240-67 T304	1	600120-1B	0.059						RISER OUTLETS EXTRUDED PRIOR TO HEAT TREATMENT
RMB-J12	16	Hdr-Cp	SW								⊖+		0.96	SHOP WATER SPRAY COOLED
				WELD CAP	R&W A403-WP304W-67 FROM A240	3	K51404-4D	0.050						

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RRA	RECIRCULATION RISERS - LOOP B (N2A)	0 4/11/80	A17

WELD NUMBER	DIA. (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NCONF	CONF		
				16" RING HEADER (11-2)	R&W A358 CL.1 FROM A240-67 T304	1	600120-1B	0.059						SPOOL 11-2 ALSO SHOWN ON PG. A16
RRB-J11	10	Hdr-A	SW								X		1.95	
				ADAPTER	FORGED A182-F304	6	52624	0.070						
RRA-J7	10	A-P	FW								X		1.16	
				PIPE (16-2)	SMLS A376 - TP304	5	2P3687	0.051						
RRA-J5	10	P-E	SW								X		1.57	
				ELBOW(90°LR)	R&W A403-WP304W-67 FROM A240	3	37845-1A	0.061						
RRA-J4	10	E-P	SW								X		1.63	
				PIPE (16-1)	SMLS A376-TP304	5	2P3399	0.055						
RRA-J4A	10	P-P	FW								X		0.98	
				PIPE (16-1)	SMLS A376-TP304	5	2P3399	0.055						PORTION OF SPOOL 16-1 WAS CUT OUT AND REPLACED IN 1978
RRA-J3	10	P-P	FW								X		1.23	
				SAFE-END EXTENSION	FORGED SA-336 GR. F8	7	M53S	0.030						
RRA-F2A	10	P-SE	FW									X	1.02	
				SAFE-END (N2A)	SMLS SB-166 INCONEL	7	NX9923	0.06						SAFE-END REPLACED IN 1978
RRA-F2	10	SE-NOZ	FW									X	1.03	
				RECIRC. INLET NOZZLE	FORGED SA-508 CL.2 LOW ALLOY STEEL	---	NA	---						

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RRB	RECIRCULATION RISERS - LOOP B (N2B)	0 4/11/80	A18

WELD NUMBER	DIA. (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NCONF	CONF		
				16" RING HEADER (11-2)	R&W A358 CL.1 FROM A240-67 T304	1	600120-1B	0.059						SPOOL 11-2 ALSO SHOWN ON PG. A16
RRB-J9	10	Hdr-A	SW								X		2.19	
				ADAPTER	FORGED A182-F304	6	52624	0.070						
RRB-J7	10	A-P	FW								X		1.25	
				PIPE (17-2)	SMLS A376 - TP304	5	2P3687	0.051						
RRB-J5	10	P-E	SW								X		1.75	
				ELBOW(90°LR)	R&W A403-WP304W-67 FROM A240	3	37845-1A	0.061						
RRB-J4	10	E-P	SW								X		1.59	
				PIPE (17-1)	SMLS A376 - TP304	5	2P3399	0.055						
RRB-J4A	10	P-P	FW								X		0.98	
				PIPE (17-1)	SMLS A376 - TP304	5	2P3399	0.055						PORTION OF SPOOL 17-1 WAS CUT OUT AND REPLACED IN 1978
RRB-J3	10	P-P	FW								X		1.23	
				SAFE-END EXTENSION	FORGED SA-336 GR. F8	7	M53S	0.030						
RRB-F2A	10	P-SE	FW									X	1.02	
				SAFE-END (N2B)	SMLS SB-166 INCONEL	7	NX9923	0.06						SAFE-END REPLACED IN 1978
RRB-F2	10	SE-NOZ	FW									X	1.03	
				RECIRC. INLET NOZZLE	FORGED SA-508 CL.2 LOW ALLOY STEEL	---	NA	---						

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STRESS CORROSION CRACKING EVALUATION

DUANE ARNOLD ENERGY CENTER

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RRC	RECIRCULATION RISERS - LOOP B (N2C)	0 4/11/80	A19

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS SERV	NUREG 0313 STATUS SENS	NUREG 0313 STATUS NCONF	NUREG 0313 STATUS CONF	STRESS RULE INDEX	COMMENTS
				16" RING HEADER (11-1)	R&W A358 CL.1 FROM A240-67 T304	1	600120-1B	0.059						SPOOL 11-1 ALSO SHOWN ON PG. A16
RRB-J5	10	Hdr-A	SW								X		2.10	
				ADAPTER	FORGED A182-F304	6	52624	0.070						
RRC-J7	10	A-P	FW								X		1.24	
				PIPE (18-2)	SMLS A376 TP304	5	2P3687	0.051						
RRC-J5	10	P-E	SW								X		1.73	
				ELBOW(90°LR)	R&W A403-WP304W-67 FROM A240	3	37845-1A	0.061						
RRC-J4	10	E-P	SW								X		1.40	
				PIPE (18-1)	SMLS A376-TP304	5	2P3399	0.055						
RRC-J4A	10	P-P	FW								X		0.98	
				PIPE (18-1)	SMLS A376-TP304	5	2P3399	0.055						PORTION OF SPOOL 18-1 WAS CUT OUT AND REPLACED IN 1978
RRC-J3	10	P-P	FW								X		1.23	
				SAFE-END EXTENSION	FORGED SA-336 GR. F8	7	M53S	0.030						
RRC-F2A	10	P-SE	FW									X	1.02	
				SAFE-END (N2C)	SMLS SB-166 INCONEL	7	NX9923	0.06						SAFE-END REPLACED IN 1978
RRC-F2	10	SE-NOZ	FW									X	1.03	
				RECIRC. INLET NOZZLE	FORGED SA-508 CL.2 LOW ALLOY STEEL	---	NA	---						

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RRD	RECIRCULATION RISERS - LOOP B (N2D)	0 4/11/80	A20

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS: SENSITIZED	NUREG 0313 STATUS: NON-CONF	NUREG 0313 STATUS: CONF	STRESS RULE INDEX	COMMENTS
				16" RING HEADER (11-1)	R&W A358 CL.1 FROM A240-67 T304	1	600120-1B	0.059					SPOOL 11-1 ALSO SHOWN ON PG. A16
RMB-J2	10	Hdr-A	SW							X		1.83	
				ADAPTER	FORGED A182-F304	6	52624	0.070					
RRD-J7	10	A-P	FW							X		1.13	
				PIPE (19-2)	SMLS A376-TP304	5	2P3687	0.051					
RRD-J5	10	P-E	SW							X		1.58	
				ELBOW(90°LR)	R&W A403-WP304W-67 FROM A240	3	37845-1A	0.061					
RRD-J4	10	E-P	SW							X		1.44	
				PIPE (19-1)	SMLS A376-TP304	5	2P3399	0.055					
RRD-J4A	10	P-P	FW							X		0.98	
				PIPE (19-1)	SMLS A376-TP304	5	2P3399	0.055					PORTION OF SPOOL 17-1 WAS CUT OUT AND REWELDED IN 1978
RRD-J3	10	P-P	FW							X		1.23	
				SAFE-END EXTENSION	FORGED SA-336 GR. F8	7	M53S	0.030					
RRD-F2A	10	P-SE	FW								X	1.02	
				SAFE-END (N2D)	SMLS SB-166 INCONEL	7	NX9923	0.06					SAFE-END REPLACED IN 1978
RRD-F2	10	SE-NOZ	FW								X	1.03	
				RECIRC. INLET NOZZLE	FORGED SA-508 CL.2 LOW ALLOY STEEL	---	NA	---					

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RBB	RECIRCULATION BYPASS LINE - LOOP B	0 4/11/80	A21

WELD NUMBER	DIA. (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NCONF	CONF		
				WELDOLET 22"X4"	FORGED A182-F304	6	812680 (496E)	0.060						ALSO SHOWN ON PG. A15
RBB-J1	4	WOL-P	FW						X	X			1.23	
				PIPE	SMLS A376-TP304	5	2P3371	0.057						
RBB-J2	4	P-E	SW						X	X			1.39	
				ELBOW(90°LR)	SMLS A403-WP304W-67 FROM A312	3	20257 CFRO	0.047						
RBB-J3	4	E-P	SW						X	X			1.50	
				PIPE	SMLS A376-TP304	5	2P3371	0.057						
RBB-J6	4	P-T	FW						X	X			1.86	
				TEE	SMLS A403-WP304W-67 FROM A312	3	37368 CFRP	0.060						
RBB-J7	4	T-FL	SW						X	X			1.29	
				WN FLANGE (900#-LONG)	FORGED A182-F316	4	E1460	0.060						
				BLIND FLANGE	FORGED A182-F316	4	E1460	0.060						
				TEE	SMLS A403-WP304W-67 FROM A312	3	37368 CFRP	0.060						ALSO SHOWN ON PG. A14
RBB-J8	4	T-P	FW						X	X			1.99	
				PIPE	SMLS A376-TP304	5	2P3371	0.057						
RBB-J9	4	P-E	SW						X	X			1.73	

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RBB	RECIRCULATION BYPASS LINE - LOOP B (Con't)	0 4/11/80	A22

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NONF	CONF		
				ELBOW(90°LR)	SMLS A403-WP304W-67 FROM A376	3	20257 CFRO	0.047						
RBB-J10	4	E-V	FW						⊖		X		1.52	LOWER %C TO CASTING HIGH RESISTANCE TO IGSCC
				VALVE (MO-F032A)	CAST A351-65 GR. CF8	7	41706	0.08						8% FERRITE
RBB-J12	4	V-WOL	FW						X		X		1.25	
				WELDOLET 22"X4"	FORGED A182-F304	6	812680 (496E)	0.060						ALSO SHOWN ON PG. A15

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RHB	RESIDUAL HEAT REMOVAL - LOOP B	0 4/11/80	B1

WELD NUMBER	DIA. (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NCONF	CONF		
				22"x22"x18" TEE	R&W A403 - WP 304 W FROM A240	2	6003241	0.055						TEE ALSO SHOWN ON PG. A12 "B" RECIRC SUCTION LINE
RHB-J1	18	T-P	FW								X		1.18	
				PIPE (P1)	R&W A358 TP304 CL. 1	4	328258	0.033						
RHB-F3	18	P-P	SW									X	0.82	
				PIPE (P2)	SMLS A333 GR. 6 CARBON STEEL	---	NA	---						
				PIPE (P1)	R&W A358 TP304 CL. 1	7	328258	0.033						
RHB-J2	4	BPC	SW								X			
		(P-WOL)		WELDOLET 18"x4"	FORGED A182 F304	7	110G	0.05						BRANCH CONNECTION FOR 4" CLEAN-UP SUCTION LINE

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RHC	RESIDUAL HEAT REMOVAL - LOOP A (20A)	0 4/11/80	B2

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NON CONF	CONF		
				22x22x20" TEE	R&W A403-WP 304 W FROM A240	2	6003241	0.055						TEE ALSO SHOWN ON PG. A3 "A" RECIRC DISCHARGE LINE
RHC-J1	20	T-P	FW								X		1.28	
				PIPE (P1)	R&W A358 TP304 CL. 1	7	318435	0.060						
RHC-F2	20	P-P	SW								X		0.84	
				PIPE (P2)	SMLS A333 GR. 6 CARBON STEEL	---	NA	---						

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LINE NO.	SYSTEM	REVISION - DATE	PAGE
RHD	RESIDUAL HEAT REMOVAL - LOOP B (20B)	0 4/11/80	B3

WELD NUMBER	DIA (IN)	WELD TYPE	SHOP OR FIELD WELD	COMPONENT	MATERIAL TYPE & SPECIFICATION	HEAT TREATMENT	HEAT NUMBER	CARBON CONTENT (%)	NUREG 0313 STATUS				STRESS RULE INDEX	COMMENTS
									SERV	SENS	NON CONF	CONF		
				22"x22"x20" TEE	EXTRUDED A403 - WP304W FROM A240	2	6825331	0.040						TEE ALSO SHOWN ON PG. A14 "B" RECIRC DISCHARGE LINE
RHD-J1	20	T-P	FW								X		1.29	
				PIPE (P1)	R&W A358 TP304 CL. 1	7	318435	0.060						
RHD-F2	20	P-P	SW								X		0.84	
				PIPE (P2)	SMLS A333 GR. 6 CARBON STEEL	---	NA	---						

APPENDIX B

STRESS RULE INDEX EVALUATION SUMMARY

S C O R E
-- VERSION 1.0.0 --

KEY FOR STRESS RULE INDEX EVALUATION - SUMMARY

ISI	ISI Weld Number
WELD ID	Pipe Fabricator's Weld Number
WELD TYPE	Components Adjoining Weld
PIPE SIZE	Pipe Diameter (in.)
NODE NO	NSC Stress Analysis Mode Number
COMP TYPE	Component Type Used in Determining NB-3600 Piping Stress Indices
B1 / B2 C1 / C2 K1 / K2	NB-3600 Piping Stress Indices
SI(PRES)	Pressure Stress Intensity (psi)
SI (DW)	Dead Weight Stress Intensity (psi)
SI(THER)	Thermal Stress Intensity (psi)
PM + PB	Primary Stress Intensity (psi)
PM+PB+Q+F	Primary plus Secondary plus Peak Stress Intensity (psi)
Q + F	Secondary plus Peak Stress Intensity (psi)
RESI ST	Weld Residual Stress (psi)
YIELD ST	Code Minimum Yield Strength of Piping Material at 550°F (psi)
MOD. ELA.	Young's Modulus of Piping Material (psi)
SRI,PRI	Stress Rule Index - Primary Stress Component
SRI,SEC	Stress Rule Index - Secondary Stress Component
SRI TOTAL	Overall Stress Rule Index

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RCA-J3 A1	RCA-J4 RS-N-A1-A	RCA-J5 RS-N-A1-B	RCA-J6 A2	RCA-J7 RS-N-A2-C
WELD TYPE	SE-P	P-E	E-P	P-P	P-P
PIPE SIZE	22.00	22.00	22.00	22.00	22.00
NODE NO	10A	15A	20A	A2	SNA2C
COMP TYPE	TRANS	ELBOWLR	ELBOWLR	PIPE	PIPE
B1 / B2	.50/1.00	1.00/3.52	1.00/3.52	.50/1.00	.50/1.00
C1 / C2	1.37/1.50	1.23/4.70	1.23/4.70	1.10/1.00	1.10/1.00
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12388.70	12388.70	12388.70	12388.70	12388.70
SI (DW)	716.42	140.12	344.64	215.70	0.00
SI(THER)	1145.68	1038.97	699.63	543.29	0.00
PM + PB	6910.78	12882.15	13602.37	6410.06	6194.35
PM+PB+Q+F	25432.10	28324.31	27184.80	17719.27	16353.09
Q + F	18521.33	15442.16	13582.43	11309.22	10158.74
RESI ST	28000.00	28000.00	28000.00	28000.00	28000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.3676	.6852	.7235	.3410	.3295
SRI,SEC	.6633	.6194	.5929	.5605	.5441
SRI TOTAL	1.0309	1.3047	1.3164	.9015	.8736

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RCA-J12 RS-N-A2-B	RCA-J13 A3	RCA-J15 A4	RCA-J18 RS-N-A3-A	RCA-J21 RS-N-A3-D
WELD TYPE	P-E	E-V	V-P	BPC	P-E
PIPE SIZE	22.00	22.00	22.00	22.00	22.00
NODE NO	35A	40A	55A	60A	65A
COMP TYPE	ELBOWLR	ELBOWLR	TRANS	BRANRU#	ELBOWSR
B1 / B2	1.00/3.52	1.00/3.52	.50/1.00	1.00/1.00	1.00/4.62
C1 / C2	1.23/4.70	1.23/4.70	1.37/1.50	2.00/1.00	1.46/6.15
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12388.70	12388.70	12388.70	12388.70	12388.70
SI (DW)	412.59	481.50	176.64	63.29	504.37
SI(THER)	402.18	507.15	450.15	440.38	531.85
PM + PB	13841.66	14084.37	6371.00	12452.00	14716.48
PM+PB+Q+F	25245.06	26714.77	22102.43	30639.51	32083.63
Q + F	11403.39	12630.40	15731.44	18187.51	17367.16
RESI ST	28000.00	28000.00	28000.00	28000.00	28000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.7363	.7492	.3389	.6623	.7828
SRI,SEC	.5618	.5793	.6236	.6586	.6469
SRI TOTAL	1.2981	1.3285	.9624	1.3209	1.4297

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RCA-J22 A5	RCA-J24 A6	RCA-J27 RD-A-A1-A	RCA-J28 A7	RCA-J30 A8
WELD TYPE	E-PP	PP-P	BPC	P-V	V-E
PIPE SIZE	22.00	22.00	6.00	22.00	22.00
NODE NO	70A	90A	95A	100A	115A
COMP TYPE	ELBOWSR	TRANS	TEE	TRANS	ELBOWLR
B1 / B2	1.00/4.62	.50/1.00	1.00/2.35	.50/1.00	1.00/3.18
C1 / C2	1.46/6.15	1.36/1.48	1.50/3.13	1.36/1.48	1.23/4.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12388.70	12748.55	3987.40	12748.55	12748.55
SI (DW)	1061.17	294.64	179.63	94.27	227.62
SI(THER)	526.47	436.32	2766.79	365.14	505.85
PM + PB	17286.24	6668.91	4409.40	6468.55	13472.78
PM+PB+Q+F	39299.10	22814.02	23790.24	22088.29	24459.25
Q + F	22012.85	16145.10	19380.84	15619.74	10986.46
RESI ST	28000.00	28000.00	34000.00	28000.00	28000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.9195	.3547	.2345	.3441	.7166
SRI,SEC	.7131	.6295	.8324	.6220	.5559
SRI TOTAL	1.6326	.9842	1.0670	.9660	1.2725

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RCA-J32 RD-N-A2-A	RCA-J34 RD-N-A2-B	RBA-J1 A18	RBA-J2 RD-N-A8-A	RBA-J3 RD-N-A8-B
WELD TYPE	E-P	BPC	WOL-P	P-E	E-P
PIPE SIZE	22.00	6.00	4.00	4.00	4.00
NODE NO	120A	125A	A18	130A	135A
COMP TYPE	ELBOWLR	TEE	PIPE	ELBOWLR	ELBOWLR
B1 / B2	1.00/3.18	1.00/2.35	.50/1.00	1.00/2.43	1.00/2.43
C1 / C2	1.23/4.24	1.50/3.13	1.10/1.00	1.27/3.24	1.27/3.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12748.55	3987.40	8031.90	8031.90	8031.90
SI (DW)	208.79	1115.00	591.19	76.24	155.46
SI(THER)	444.87	2860.58	9106.68	3049.46	4088.63
PM + PB	13412.87	6606.90	4607.14	8217.26	8409.89
PM+PB+Q+F	23849.85	29593.08	28058.27	30437.64	36963.89
Q + F	10436.99	22986.19	23451.13	22220.38	28554.00
RESI ST	28000.00	39000.00	45000.00	45000.00	45000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.7135	.3514	.2451	.4371	.4473
SRI,SEC	.5441	.9839	.9760	.9585	1.0488
SRI TOTAL	1.2615	1.2353	1.2211	1.3956	1.4961

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RBA-J6 A19	RBA-J8 A20	RBA-J7 RD-N-A9-A	RBA-J9 RD-N-A10-A	RBA-J10 A21
WELD TYPE	P-T	T-P	T-FL	P-E	E-V
PIPE SIZE	4.00	4.00	4.00	4.00	4.00
NODE NO	140A	140A	140A	150A	155A
COMP TYPE	TEE	TEE	TEE	ELBOWLR	ELBOWLR
B1 / B2	1.00/1.69	1.00/1.69	1.00/1.69	1.00/2.43	1.00/2.43
C1 / C2	1.50/2.26	1.50/2.26	1.50/2.26	1.27/3.24	1.27/3.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	8031.90	8031.90	8031.90	8031.90	8031.90
SI (DW)	459.35	1446.17	0.00	740.30	405.85
SI(THER)	10590.04	10406.92	0.00	5588.41	3889.88
PM + PB	8809.42	10479.74	8031.90	9831.86	9018.69
PM+PB+Q+F	59343.71	62608.58	14457.42	49128.28	37265.23
Q + F	50534.30	52128.83	6425.52	39296.42	28246.54
RESI ST	45000.00	45000.00	45000.00	45000.00	45000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.4686	.5574	.4272	.5230	.4797
SRI,SEC	1.3622	1.3849	.7333	1.2020	1.0444
SRI TOTAL	1.8308	1.9424	1.1605	1.7249	1.5241

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	R8A-J12 A22	RCA-J38 RD-N-A2-E	RCA-J41 RD-N-A2-C	RCA-J43 A9	RMA-J6 RD-N-A3-E
WELD TYPE	V-WOL	P-P	P-T	T-CR	CR-CP
PIPE SIZE	4.00	22.00	22.00	22.00	22.00
NODE NO	167A	173A	175A	180A	185A
COMP TYPE	TRANS	PIPE	TEE	TEE	TEE
B1 / B2	.50/1.00	.50/1.00	1.00/2.35	1.00/2.35	1.00/2.35
C1 / C2	1.34/1.45	1.10/1.00	1.50/3.13	1.50/3.13	1.50/3.13
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	8031.90	12748.55	12748.55	12748.55	12748.55
SI (DW)	1623.18	5.23	98.48	398.75	0.00
SI(THER)	5460.72	195.91	219.90	511.41	0.00
PM + PB	5639.13	6379.51	12979.91	13685.35	12748.55
PM+PB+Q+F	31448.36	17190.16	24742.49	28079.18	22947.40
Q + F	25809.23	10810.65	11762.59	14393.84	10198.84
RESI ST	45000.00	28000.00	28000.00	28000.00	28000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.3000	.3393	.6904	.7279	.6781
SRI,SEC	1.0097	.5534	.5670	.6045	.5447
SRI TOTAL	1.3096	.8927	1.2574	1.3324	1.2228

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RMA-J5 RD-N-A3-D	RMA-J4 RD-N-A3-C	RRG-J7 A12	RRG-J5 RD-N-A6-B	RRG-J4 RD-N-A6-C
WELD TYPE	HDR-CR	HDR-A	A-P	P-E	E-P
PIPE SIZE	16.00	10.00	10.00	10.00	10.00
NODE NO	187A	190A	ADATR	195A	200A
COMP TYPE	TEE	TEE	PIPE	ELBOWLR	ELBOWLR
B1 / B2	1.00/2.35	1.00/2.31	.50/1.00	1.00/3.18	1.00/3.18
C1 / C2	1.50/3.13	1.50/3.09	1.10/1.00	1.26/4.24	1.26/4.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12482.49	11930.12	11930.12	11930.12	11930.12
SI (DW)	167.25	870.40	870.40	567.81	227.12
SI(THER)	1941.48	9150.02	9150.02	3204.63	2603.61
PM + PB	12875.42	13944.97	6835.46	13735.73	12652.34
PM+PB+Q+F	34358.26	77144.38	33784.50	46798.68	39611.68
Q + F	21482.84	63199.40	26949.04	33062.95	26959.33
RESI ST	30000.00	33500.00	33500.00	33500.00	33500.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.6849	.7418	.3636	.7306	.6730
SRI,SEC	.7341	1.3788	.8619	.9491	.8621
SRI TOTAL	1.4189	2.1206	1.2255	1.6797	1.5351

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RMA-J2 RD-N-A3-B	RRH-J7 A13	RMA-J1 RD-N-A3-A	RRH-J5 RD-N-A7-B	RRH-J4 RD-N-A7-C
WELD TYPE	HDR-A	A-P	CP-HDR	P-E	E-P
PIPE SIZE	10.00	10.00	16.00	10.00	10.00
NODE NO	215A	ADATR	220A	225A	230A
COMP TYPE	TEE	PIPE	TRANS	ELBOWLR	ELBOWLR
B1 / B2	1.00/2.31	.50/1.00	.50/1.00	1.00/3.18	1.00/3.18
C1 / C2	1.50/3.09	1.10/1.00	1.36/1.48	1.26/4.24	1.26/4.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	11930.12	11930.12	12482.49	11930.12	11930.12
SI (DW)	135.20	133.65	0.00	158.63	132.51
SI(THER)	7874.17	7874.17	0.00	2840.50	3098.50
PM + PB	12243.10	6098.71	6241.25	12434.55	12351.48
PM+PB+Q+F	65971.68	30161.83	20405.23	40896.90	42666.56
Q + F	53728.58	24063.12	14163.98	28462.35	30315.08
RESI ST	33500.00	33500.00	30000.00	33500.00	33500.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.6512	.3244	.3320	.6614	.6570
SRI,SEC	1.2438	.8208	.6297	.8835	.9099
SRI TOTAL	1.8950	1.1452	.9617	1.5449	1.5669

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RMA-J7 RD-N-A3-F	RMA-J8 RD-N-A3-G	RRF-J7 A11	RRF-J5 RD-N-A5-B	RRF-J4 RD-N-A5-C
WELD TYPE	CR-HDR	HDR-A	A-P	P-E	E-P
PIPE SIZE	16.00	10.00	10.00	10.00	10.00
NODE NO	237A	240A	ADATR	245A	2[illegible]9A
COMP TYPE	TEE	TEE	PIPE	ELBOWLR	EL30WLR
B1 / B2	1.00/2.35	1.00/2.31	.50/1.00	1.00/3.18	1.00/3.18
C1 / C2	1.50/3.13	1.50/3.09	1.10/1.00	1.26/4.24	1.26/4.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12482.49	11930.12	11930.12	11930.12	11930.12
SI (DW)	145.50	882.20	882.20	612.61	218.54
SI(THER)	1380.76	8263.53	8263.53	3276.00	1492.08
PM + PB	12824.32	13972.29	6847.26	13878.17	12625.06
PM+PB+Q+F	31074.07	72284.89	32210.06	47685.28	31063.16
Q + F	18249.76	58312.60	25362.80	33807.11	18438.10
RESI ST	30000.00	33500.00	33500.00	33500.00	33500.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.6821	.7432	.3642	.7382	.6715
SRI,SEC	.6880	1.3091	.8393	.9597	.7406
SRI TOTAL	1.3701	2.0523	1.2035	1.6979	1.4121

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RMA-J10 RD-N-A3-H	RRE-J7 A10	RMA-J11 RD-N-A3-J	RRE-J5 RD-N-A4-B	RRE-J4 RD-N-A4-C
WELD TYPE	HDR-A	A-P	HDR-CP	P-E	E-P
PIPE SIZE	10.00	10.00	16.00	10.00	10.00
NODE NO	265A	ADATR	270A	275A	280A
COMP TYPE	TEE	PIPE	TRANS	ELBOWLR	ELBOWLR
B1 / B2	1.00/2.31	.50/1.00	.50/1.00	1.00/3.16	1.00/3.18
C1 / C2	1.50/3.09	1.10/1.00	1.36/1.48	1.26/4.24	1.26/4.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	11930.12	11930.12	12482.49	11930.12	11930.12
SI (DW)	169.86	169.86	0.00	122.30	27.31
SI(THER)	6357.08	6357.08	0.00	3020.30	1726.56
PM + PB	12323.31	6134.91	6241.25	12319.01	12016.96
PM+PB+Q+F	57735.75	27496.24	20405.23	41991.79	31393.27
Q + F	45412.44	21361.33	14163.98	29672.78	19376.30
RESI ST	33500.00	33500.00	30000.00	33500.00	33500.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.6555	.3263	.3320	.6553	.6392
SRI,SEC	1.1252	.7823	.6297	.9008	.7540
SRI TOTAL	1.7807	1.1086	.9617	1.5560	1.3932

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RCB-J3 B1	RCB-J4 RS-N-B1-A	RCB-J5 RS-N-B1-B	RCB-J6 B2	RCB-J7 RS-N-B2-A
WELD TYPE	SE-P	P-E	E-P	P-T	T-P
PIPE SIZE	22.00	22.00	22.00	22.00	22.00
NODE NO	108	158	208	238	238
COMP TYPE	TRANS	ELBOWLR	ELBOWLR	TEE	TEE
B1 / B2	.50/1.00	1.00/3.52	1.00/3.52	1.00/2.59	1.00/2.59
C1 / C2	1.37/1.50	1.23/4.70	1.23/4.70	1.50/3.45	1.50/3.45
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12388.70	12388.70	12388.70	12388.70	12388.70
SI (DW)	628.10	390.10	59.94	0.00	377.71
SI(THER)	843.00	866.06	680.35	400.09	577.96
PM + PB	6822.45	13762.48	12599.78	12388.70	13366.67
PM+PB+Q+F	24378.17	28975.73	24615.61	24785.84	28238.21
Q + F	17555.72	15213.25	12015.83	12397.14	14871.54
RESI ST	28000.00	28000.00	28000.00	28000.00	28000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.3629	.7320	.6702	.6590	.7110
SRI,SEC	.6496	.6162	.5706	.5760	.6113
SRI TOTAL	1.0125	1.3482	1.2408	1.2350	1.3223

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RCB-J9 RS-N-B2-A1	RCB-J15 RS-N-B2-E	RCB-J16 B3	RCB-J18 B4	RCB-J21 RS-N-B3-A
WELD TYPE	P-P	P-E	E-V	V-P	BPC
PIPE SIZE	22.00	22.00	22.00	22.00	22.00
NODE NO	N82A1	35B	40B	55B	60B
COMP TYPE	PIPE	ELBOWLR	ELBOWLR	TRANS	BRANRUN
B1 / B2	.50/1.00	1.00/3.52	1.00/3.52	.50/1.00	1.00/1.00
C1 / C2	1.10/1.00	1.23/4.70	1.23/4.70	1.37/1.50	2.00/1.00
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12368.70	12388.70	12388.70	12388.70	12388.70
SI (DW)	110.77	352.63	465.27	211.92	103.13
SI(THER)	386.75	610.02	506.64	379.84	345.30
PM + PB	6305.13	13630.52	14027.21	6406.27	12491.83
PM+PB+Q+F	17248.63	26495.02	26573.34	22007.99	30540.06
Q + F	10943.51	12864.50	12546.12	15601.72	18048.23
RESI ST	28000.00	28000.00	28000.00	28000.00	28000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.3354	.7250	.7461	.3408	.6645
SRI,SEC	.5553	.5827	.5781	.6217	.6566
SRI TOTAL	.6907	1.3077	1.3243	.9625	1.3211

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RCB-J24 RS-N-B3-D	RCB-J25 B5	RCB-J27 B6	RCB-J30 RD-N-B1-A	RCB-J31 B7
WELD TYPE	P-E	E-PP	PP-P	BPC	P-V
PIPE SIZE	22.00	22.00	22.00	6.00	22.00
NODE NO	658	708	908	958	1008
COMP TYPE	ELBOWSR	ELBOWSR	TRANS	TEE	TRANS
B1 / B2	1.00/4.62	1.00/4.62	.50/1.00	1.00/2.35	.50/1.00
C1 / C2	1.46/6.15	1.46/6.15	1.36/1.48	1.50/3.13	1.36/1.48
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12388.70	12388.70	12748.55	3987.40	12748.55
SI (DW)	445.10	975.82	253.73	199.77	48.20
SI(THER)	277.13	335.77	226.75	2873.99	231.29
PM + PB	14442.93	16892.31	6628.00	4456.73	6422.48
PM+PB+Q+F	29713.34	36241.40	22144.58	24508.27	21607.42
Q + F	15270.41	19349.09	15516.58	20051.54	15184.95
RESI ST	28000.00	28000.00	28000.00	39000.00	28000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.7682	.8985	.3526	.2371	.3416
SRI,SEC	.6170	.6751	.6205	.8420	.6158
SRI TOTAL	1.3852	1.5737	.9730	1.0791	.9574

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RCB-J33 B8	RCB-J35 RD-N-B2-A	RCB-J37 RD-N-B2-B	RBB-J1 B18	RBB-J2 RD-N-B8-A
WELD TYPE	V-E	E-P	BPC	WOL-P	P-E
PIPE SIZE	22.00	22.00	6.00	4.00	4.00
NODE NO	1158	1208	1258	818	1308
COMP TYPE	ELBOWLR	ELBOWLR	TEE	PIPE	ELBOWLR
B1 / B2	1.00/3.18	1.00/3.18	1.00/2.35	.50/1.00	1.00/2.43
C1 / C2	1.23/4.24	1.23/4.24	1.50/3.13	1.10/1.00	1.27/3.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12748.55	12748.55	3987.40	8031.90	8031.90
SI (DW)	223.04	172.81	1124.39	657.56	73.86
SI(THER)	246.12	175.00	2993.71	9459.36	3011.41
PM + PB	13458.21	13298.39	6628.94	4673.50	8211.47
PM+PB+Q+F	22440.95	21514.32	30396.60	28812.56	30201.72
Q + F	8982.74	8215.93	23767.66	24139.05	21990.24
RESI ST	28000.00	28000.00	39000.00	45000.00	45000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.7159	.7074	.3526	.2486	.4368
SRI,SEC	.5273	.5164	.8950	.9858	.9552
SxI TOTAL	1.2432	1.2238	1.2476	1.2344	1.3920

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RBB-J3 RD-N-88-B	RBB-J6 B19	RBB-J8 B20	RBB-J7 RD-N-89-A	RBB-J9 RD-N-810-A
WELD TYPE	E-P	P-T	T-P	T-FL	P-E
PIPE SIZE	4.00	4.00	4.00	4.00	4.00
NODE NO	1358	1408	1408	1458	1508
COMP TYPE	ELBOWLR	TEE	TEE	TEE	ELBOWLR
B1 / B2	1.00/2.43	1.00/1.69	1.00/1.69	1.00/1.69	1.00/2.43
C1 / C2	1.27/3.24	1.50/2.26	1.50/2.26	1.50/2.26	1.27/3.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	8031.90	8031.90	8031.90	8031.90	8031.90
SI (DW)	173.68	477.39	1562.36	1029.63	746.35
SI(THER)	4147.79	11066.86	10910.63	0.00	5674.30
PM + PB	8454.18	8839.95	10676.40	9774.68	9846.56
PM+PB+Q+F	37415.41	61353.99	65126.83	18640.10	49664.76
Q + F	28961.22	52514.04	54450.43	8865.41	39818.20
RESI ST	45000.00	45000.00	45000.00	45000.00	45000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.4497	.4702	.5679	.5199	.5238
SRI,SEC	1.0546	1.3904	1.4180	.7681	1.2094
SRI TOTAL	1.5043	1.8606	1.9859	1.2880	1.7332

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	R88-J10 821	R88-J12 822	RCB-J41 RD-N-B2-E	RCB-J44 RD-N-B2-C	RCB-J46 89
WELD TYPE	E-V	V-WOL	P-P	P-T	T-CR
PIPE SIZE	4.00	4.00	22.00	22.00	22.00
NODE NO	1558	1678	1738	1758	1808
COMP TYPE	ELBOWLR	TRANS	PIPE	TEE	TEE
B1 / B2	1.00/2.43	.50/1.00	.50/1.00	1.00/2.35	1.00/2.35
C1 / C2	1.27/3.24	1.34/1.45	1.10/1.00	1.50/3.13	1.50/3.13
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	8031.90	8031.90	12748.55	12748.55	12748.55
SI (DW)	413.40	1652.74	57.24	431.51	381.12
SI(THERM)	3793.97	3769.66	492.65	1649.72	517.30
PM + PB	9037.03	5668.69	6431.52	13762.30	13643.93
PM+PB+Q+F	36749.58	27101.63	17817.90	34682.07	28013.04
Q + F	27712.55	21432.94	11386.38	20919.77	14369.11
RESI ST	45000.00	45000.00	28000.00	28000.00	28000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.4807	.3015	.3421	.7320	.7257
SRI,SEC	1.0364	.9473	.5616	.6975	.6041
SRI TOTAL	1.5171	1.2488	.9037	1.4296	1.3299

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RMB-J7 RD-N-83-E	RMB-J6 RD-N-83-D	RMB-J5 RD-N-83-C	RRC-J7 B12	RRC-J5 RD-N-86-B
WELD TYPE	CR-CP	HDR-CR	HDR-A	A-P	P-E
PIPE SIZE	22.00	16.00	10.00	10.00	10.00
NODE NO	1858	1878	1908	ADATR	1958
COMP TYPE	TEE	TEE	TEE	PIPE	ELBOWLR
B1 / B2	1.00/2.59	1.00/2.59	1.00/2.31	.50/1.00	1.00/3.18
C1 / C2	1.50/3.45	1.50/3.45	1.50/3.09	1.10/1.00	1.26/4.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	12748.55	12482.49	11930.12	11930.12	11930.12
SI (DW)	0.00	292.96	886.40	886.40	613.22
SI(THEK)	0.00	1775.68	8875.73	9479.33	3591.54
PM + PB	12748.55	13241.01	13982.00	6851.45	13880.13
PM+PB+Q+F	22947.40	35323.04	75709.42	34406.06	50098.12
Q + F	10198.84	22082.03	61727.41	27554.61	36217.98
RESI ST	28000.00	30000.00	33500.00	33500.00	33500.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.6781	.7043	.7437	.3644	.7383
SRI,SEC	.5447	.7426	1.3578	.8706	.9941
SRI TOTAL	1.2228	1.4469	2.1016	1.2350	1.7324

STRESS RULE INDEX EVALUATION - SUMMARY

ISI	RRC-J4	RMB-J2	RRD-J7	RMB-J1	RRD-J5
WELD ID	RD-N-B6-C	RD-N-B3-B	B13	RD-N-B3-A	RD-N-B7-B
WELD TYPE	E-P	MDR-A	A-P	CP-MDR	P-E
PIPE SIZE	10.00	10.00	10.00	16.00	10.00
NODE NO	2008	2158	ADATR	2208	2258
COMP TYPE	ELBOWLR	TEE	PIPE	TRANS	ELBOWLR
B1 / B2	1.00/3.18	1.00/2.31	.50/1.00	.50/1.00	1.00/3.18
C1 / C2	1.26/4.24	1.50/3.09	1.10/1.00	1.36/1.48	1.26/4.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	11930.12	11930.12	11930.12	12482.49	11930.12
SI (DW)	296.90	338.07	338.07	0.00	232.12
SI(THER)	1247.51	6603.35	6603.35	0.00	2974.12
PM + PB	12874.25	12712.71	6303.13	6241.25	12668.26
PM+PB+Q+F	29794.74	60038.48	28242.31	20405.23	42477.59
Q + F	16920.49	47325.77	21939.18	14163.98	29809.33
RESI ST	33500.00	33500.00	33500.00	30000.00	33500.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.6848	.6762	.3353	.3320	.6738
SRI,SEC	.7189	1.1525	.7905	.6297	.9027
SRI TOTAL	1.4037	1.8287	1.1258	.9617	1.5766

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RRD-J4 RD-N-87-C	RMB-J8 RD-N-83-F	RMB-J9 RD-N-83-G	RRB-J7 B11	RRB-J5 RD-N-85-B
WELD TYPE	E-P	CR-HDR	HDR-A	A-P	P-E
PIPE SIZE	10.00	16.00	10.00	10.00	10.00
NODE NO	2308	2378	2408	ADATR	2458
COMP TYPE	ELBOWLR	TEE	TEE	PIPE	ELBOWLR
B1 / B2	1.00/3.18	1.00/2.35	1.00/2.31	.50/1.00	1.00/3.18
C1 / C2	1.26/4.24	1.50/3.13	1.50/3.09	1.10/1.00	1.26/4.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	11930.12	12482.49	11930.12	11930.12	11930.12
SI (DW)	82.51	52.84	827.30	827.28	659.58
SI(THER)	2013.67	1314.65	10130.23	10130.23	3617.92
PM + PB	12192.50	12606.63	13845.21	6792.34	14027.54
PM+PB+Q+F	34005.74	30178.88	82350.72	35471.28	50653.21
Q + F	21813.24	17572.25	68505.51	28678.94	36625.67
MESI ST	33500.00	30000.00	33500.00	33500.00	33500.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.6485	.6706	.7364	.3613	.7461
SRI,SEC	.7887	.6783	1.4545	.8866	.9999
SRI TOTAL	1.4372	1.3489	2.1909	1.2479	1.7461

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RRB-J4 RD-N-B5-C	RMB-J11 RD-N-B3-H	RRA-J7 B10	RMB-J12 RD-N-B3-J	RRA-J5 RD-N-B4-B
WELD TYPE	E-P	MDR-A	A-P	MDR-CP	P-E
PIPE SIZE	10.00	10.00	10.00	16.00	10.00
NODE NO	2503	2658	ADATR	2708	2758
COMP TYPE	ELBOWLR	TEE	PIPE	TRANS	ELBOWLR
B1 / B2	1.00/3.18	1.00/2.31	.50/1.00	.50/1.00	1.00/3.18
C1 / C2	1.26/4.24	1.50/3.09	1.10/1.00	1.36/1.48	1.26/4.24
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	11930.12	11930.12	11930.12	12482.49	11930.12
SI (DW)	474.77	61.87	61.87	0.00	163.19
SI(THER)	2605.35	8729.46	8729.46	0.00	3099.86
PM + PB	13439.87	12073.34	6026.93	6241.25	12449.07
PM+PB+Q+F	41515.03	70315.97	31572.15	20405.23	42911.14
Q + F	28075.17	58242.63	25545.22	14163.98	30462.07
RESI ST	33500.00	33500.00	33500.00	30000.00	33500.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25666000.00	25666000.00	25666000.00	25666000.00	25666000.00
SRI,PRI	.7149	.6422	.3206	.3320	.6622
SRI,SEC	.8760	1.3081	.8419	.6297	.9120
SRI TOTAL	1.5929	1.9503	1.1625	.9617	1.5742

STRESS RULE INDEX EVALUATION - SUMMARY

ISI	RRA-J4
WELD ID	RD-N-54-C
WELD TYPE	E-P
PIPE SIZE	10.00
NODE NO	2d0b
COMP TYPE	ELBOWLR
B1 / B2	1.00/3.10
C1 / C2	1.26/4.24
K1 / K2	1.20/1.90
SI(PRES)	11930.12
SI (DWI	198.78
SI(THERM)	3512.64
PM + PB	12562.23
PM+PB+Q+F	46333.02
Q + F	33770.80
RESI ST	33500.00
YIELD ST	19400.00
MOD. ELA.	25666000.00
SKI,PRI	.6642
SKI,SEC	.9542
SKI TOTAL	1.6274

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RRA/H-J4A	RRA/H-J3	RRA/H-F2A	RRA/H-F2A	RRA/H-F2
WELD TYPE	P-P	P-SEX	P-SE	P-SE	SE-NZ
PIPE SIZE	10.00	10.00	10.00	10.00	12.00
NODE NO	WELD5	WELD6	WELD4	WELD4	WELD2
COMP TYPE	PIPE	PIPE	TRANS	TRANS	TRANS
B1 / B2	.50/1.00	.50/1.00	.50/1.00	.50/1.00	.50/1.00
C1 / C2	1.10/1.00	1.10/1.00	1.36/1.48	1.35/1.46	1.34/1.45
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	9916.97	9916.97	9916.97	7757.14	6833.33
SI (DW)	673.30	3014.93	3251.25	2574.37	5185.24
SI(THER)	3283.88	7026.02	7442.46	5893.48	3431.22
PM + PB	5631.79	7973.41	8209.74	6452.94	8601.91
PM+PB+Q+F	20213.34	31164.11	44653.84	34819.26	33557.56
Q + F	14581.55	23190.69	36444.10	28366.32	24955.65
RESI ST	33500.00	33500.00	33500.00	40000.00	38000.00
YIELD ST	18800.00	18800.00	18800.00	28130.00	28130.00
MOD. ELA.	25778000.00	25778000.00	25778000.00	29416000.00	29416000.00
SRI,PRI	.2996	.4241	.4367	.2294	.3058
SRI,SEC	.6834	.8058	.9941	.7862	.7239
SRI TOTAL	.9830	1.2299	1.4308	1.0156	1.0297

STRESS RULE INDEX EVALUATION - SUMMARY

ISI WELD ID	RCA-F2	RCB-F2
WELD TYPE	SE-NZ	SE-NZ
PIPE SIZE	12.00	12.00
NODE NO	N1A	N1B
COMP TYPE	TRANS	TRANS
B1 / B2	.50/1.00	.50/1.00
C1 / C2	1.34/1.45	1.34/1.45
K1 / K2	1.20/1.80	1.20/1.80
SI(PRES)	6833.33	6833.33
SI (DW)	2085.38	1832.14
SI(THER)	2996.39	2292.12
PM + PB	5502.05	5248.81
PM+PB+Q+F	24302.30	21795.16
Q + F	18800.25	16546.35
RESI ST	32000.00	32000.00
YIELD ST	18800.00	18800.00
MOD. ELA.	25778000.00	25778000.00
SRI,PRI	.2927	.2792
SRI,SEC	.7220	.6900
SRI TOTAL	1.0147	.9692

STRESS RULE INDEX EVALUATION - SUMMARY

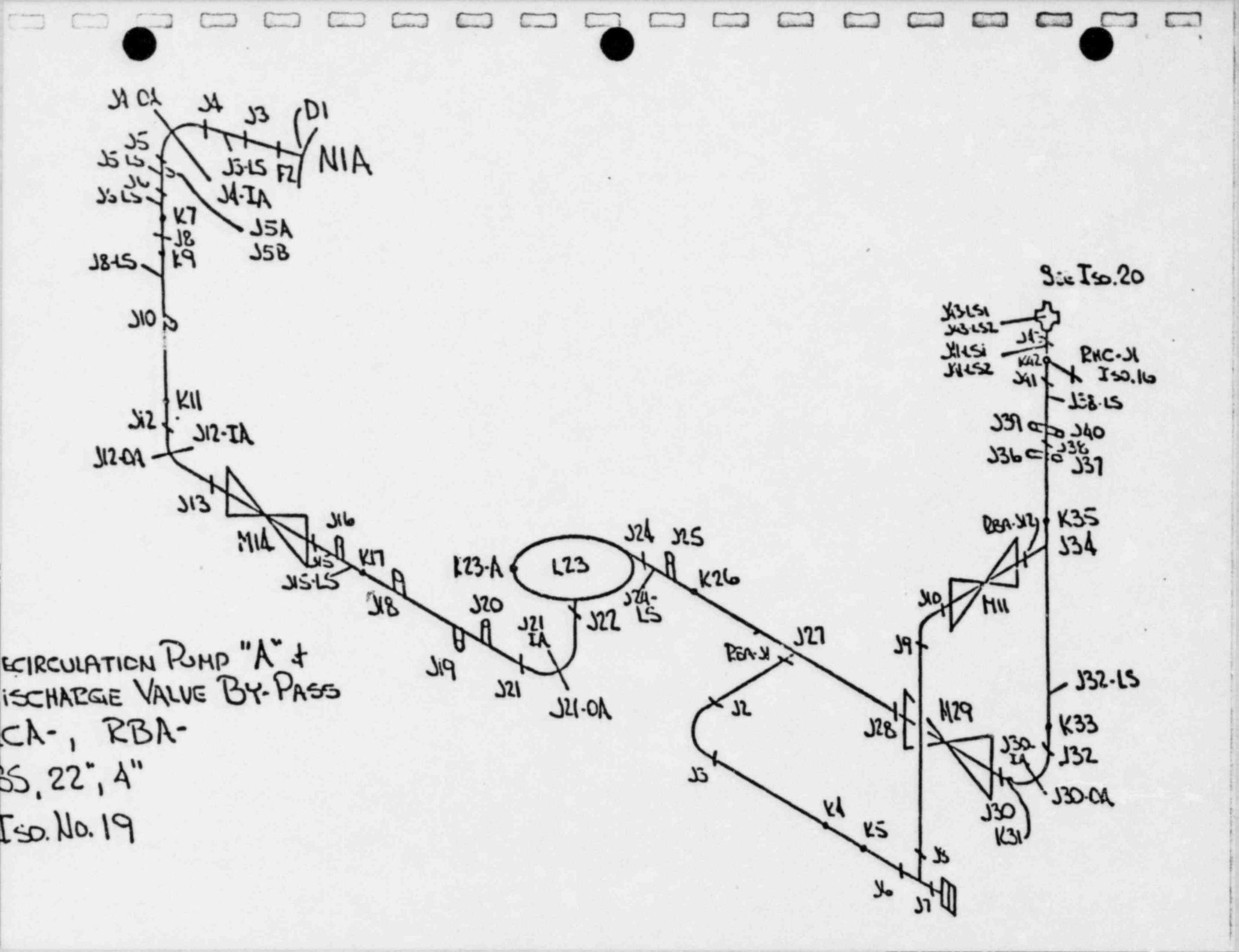
ISI WELD ID	RHC-J1	RHC-F2	RHB-J1	RHB-J2	RHB-F3
WELD TYPE	T-P	P-P	T-P	BP(P-WOL)	P-P
PIPE SIZE	20.00	20.00	18.00	18.00	18.00
NODE NO	175A	290A	238	410B	415B
COMP TYPE	TEE	PIPE	TEE	BRANRUN	PIPE
B1 / B2	1.00/2.59	.50/1.00	1.00/2.59	1.00/1.00	.50/1.00
C1 / C2	1.50/3.45	1.10/1.00	1.50/3.45	2.00/1.00	1.10/1.00
K1 / K2	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80	1.20/1.80
SI(PRES)	9699.32	9699.32	9605.12	9605.12	9605.12
SI (DW)	854.61	546.02	431.29	230.50	441.72
SI(THER)	1004.44	1054.68	769.18	517.63	461.25
PM + PB	11912.05	5395.68	10721.80	9835.62	5244.28
PM+PB+Q+F	29010.94	15702.35	24748.92	24398.92	14304.11
Q + F	17098.89	10306.67	14027.13	14563.30	9059.83
RESI ST	28500.00	28500.00	29000.00	29000.00	29000.00
YIELD ST	18800.00	18800.00	18800.00	18800.00	18800.00
MOD. ELA.	25946000.00	25946000.00	25946000.00	25946000.00	25946000.00
SRI,PRI	.6336	.2870	.5703	.5232	.2790
SRI,SEC	.6450	.5490	.6087	.6162	.5384
SRI TOTAL	1.2787	.8360	1.1790	1.1394	.8173

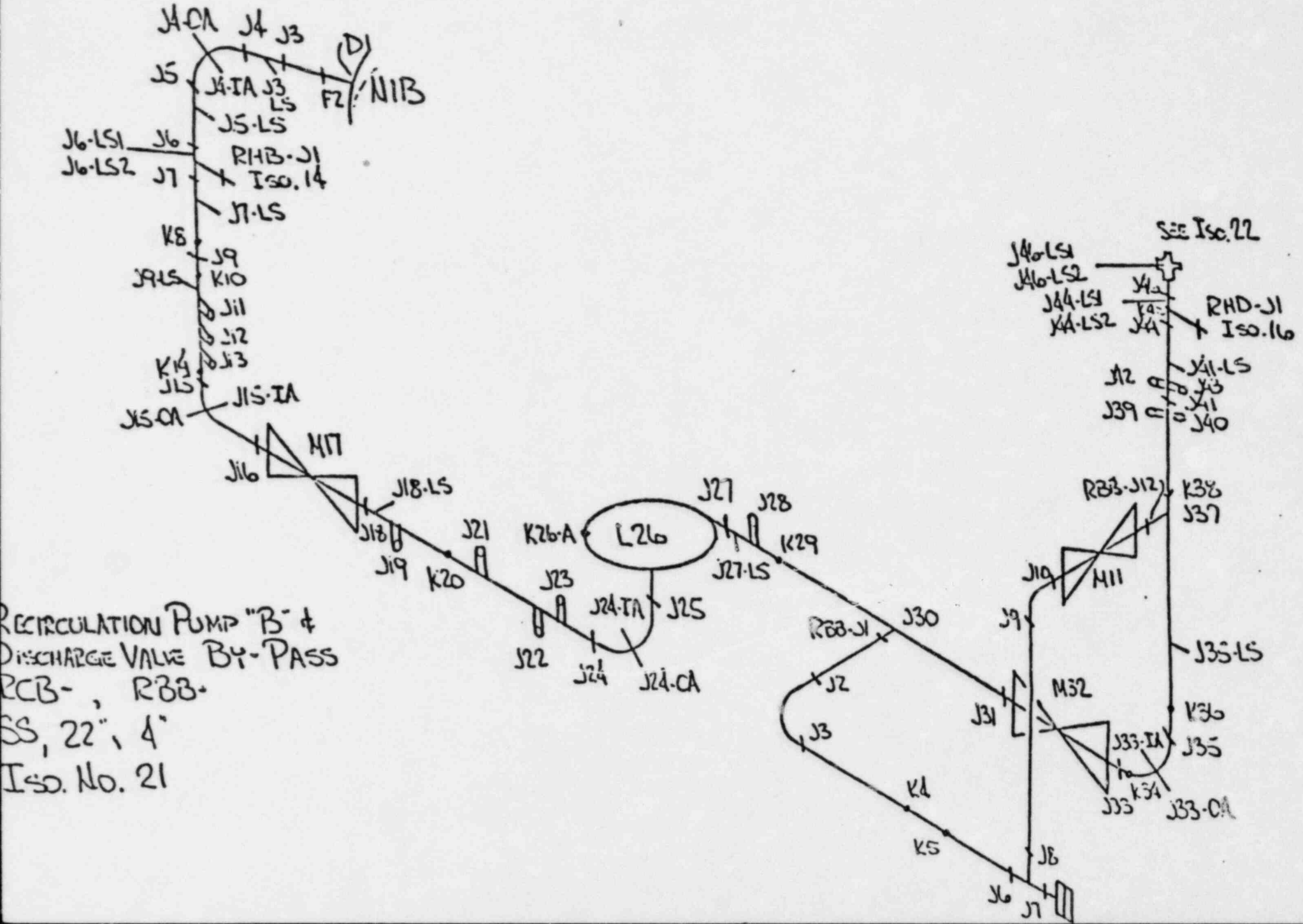
STRESS RULE INDEX EVALUATION - SUMMARY

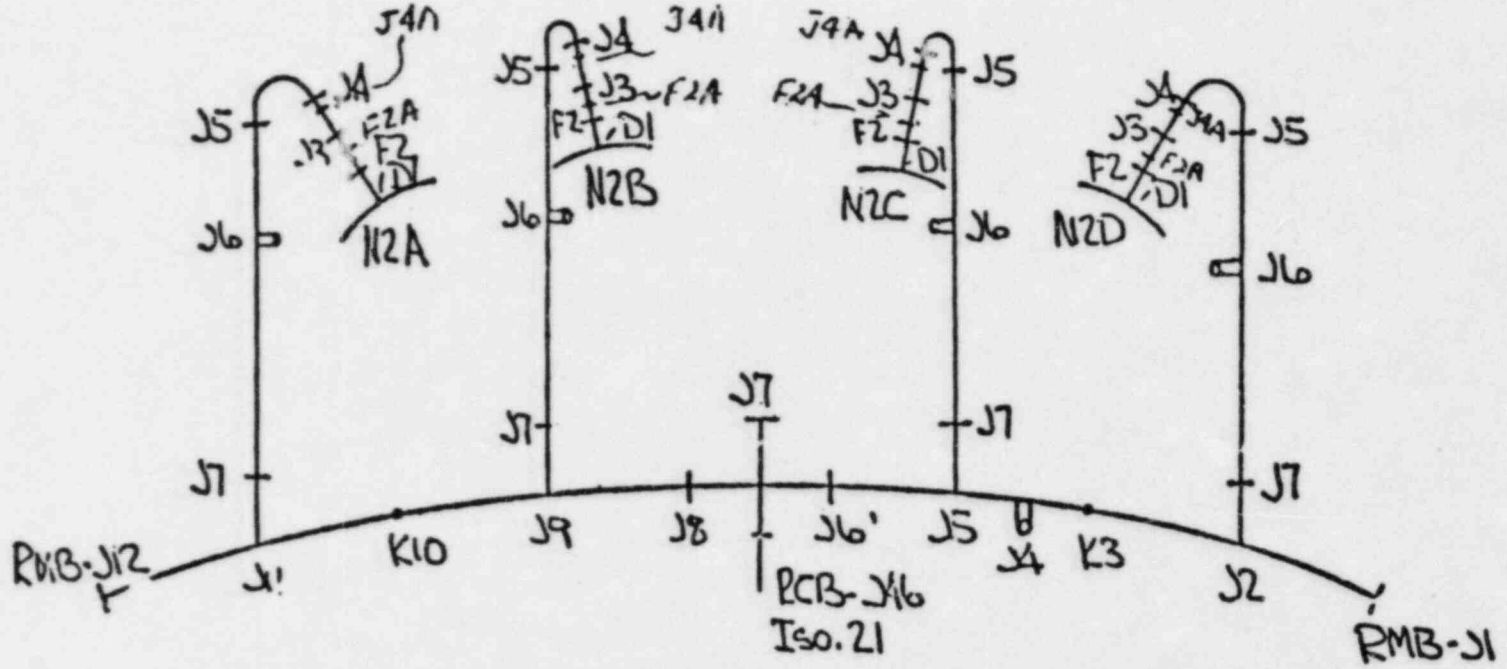
ISI WELD ID	RHD-J1	RHD-F2
WELD TYPE	T-P	P-P
PIPE SIZE	20.00	20.00
NODE NO	1758	2908
COMP TYPE	TEE	PIPE
B1 / B2	1.00/2.59	.50/1.00
C1 / C2	1.50/3.45	1.10/1.00
K1 / K2	1.20/1.80	1.20/1.80
SI(PRES)	9699.32	9699.32
SI (DW)	882.68	538.56
SI(THER)	1077.82	1128.25
PM + PB	11984.72	5388.22
PM+PB+Q+F	29641.28	15803.35
Q + F	17656.57	10415.14
RESI ST	28500.00	28500.00
YIELD ST	18800.00	18800.00
MOD. ELA.	25946000.00	25946000.00
SRI,PRI	.6375	.2866
SRI,SEC	.6529	.5505
SRI TOTAL	1.2904	.8371

APPENDIX C

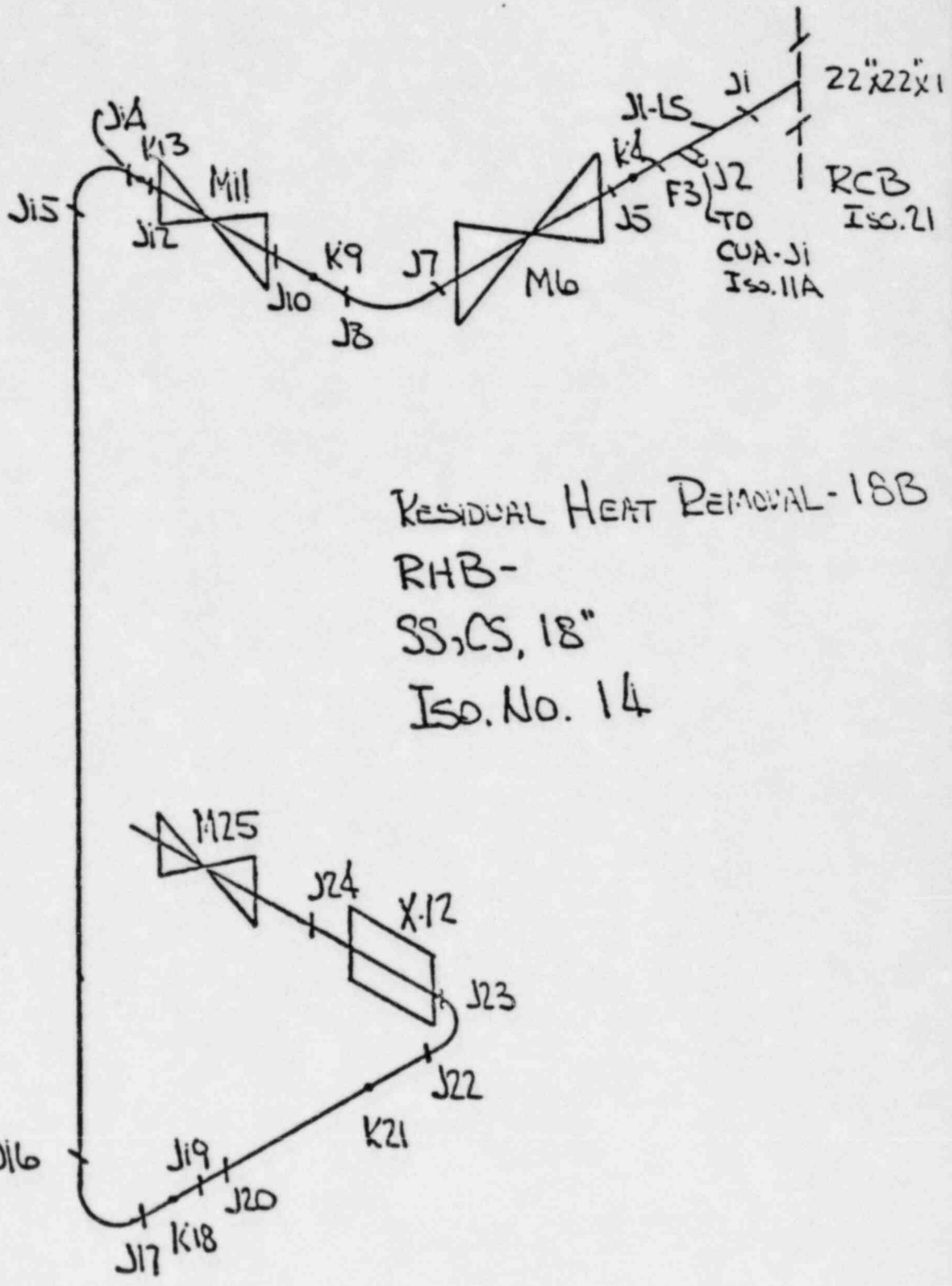
ISI ISOMETRIC DRAWINGS


J1 C1
J4
J3
D1
N1A
J5
J5 LS
J5-LS
F2
J6
J6 LS
J4-IA
J5A
J5B
K7
J8
K9
J8-LS
J10
K11
J12
J12-IA
J12-01
J13
M14
J16
J15
J15-LS
K17
J18
J20
J19
J21
J21 IA
J21-01A
K23-A
L23
J24
J25
K26
J24-LS
J22
J27
RBA-J1
J2
J3
K4
K5
J6
J7
J28
J9
J10
M11
M29
J30
J30-IA
J30-01A
K31
J32
J32-LS
K33
K35
J34
RBA-J2
J36
J36
J37
J39
J40
J38-LS
J41
K42
RHC-J1
Iso.16
J43-LS1
J43-LS2
J44-LS1
J44-LS2
See Iso. 20
ECIRCULATION PUMP "A" &
ISCHARGE VALVE BY-PASS
CA-, RBA-
55, 22", 4"
ISO. NO. 19


J4-CA
J4
J3
D1
J5
J4-IA
J3 LS
F2
N1B
J5-LS
J6-LS1
J6-LS2
J6
J7
RHB-J1
Iso. 14
J7-LS
K8
J9
J9-LS
K10
J11
J12
J13
K14
J15
J15-IA
J15-CA
J16
H17
J18-LS
J18
J19
K20
J21
K26-A
L26
J27
J28
K29
J27-LS
J23
J24-TA
J25
J22
J24
J24-CA
RCB-J1
J30
J2
J3
K4
K5
J6
J7
J31
M32
J33-IA
J33
K34
J33-CA
J35
K36
J35-LS
J9
J19
H11
RBB-J12
K38
J37
J12
J39
J41-LS
J41
J40
J44-LS
J44-LS
K4-LS2
J44
RHD-J1
Iso. 16
SEE Iso. 22
J46-LS1
J46-LS2
RECIRCULATION PUMP "B" &
DISCHARGE VALVE BY-PASS
RCB-, RBB-
SS, 22", 4"
ISO. NO. 21



RECIRCULATION MANIFOLD "B" & RISERS A, B, C, D
RMB-, RRA-, RRB- RRC-, RRD-,
SS, 16", 10"
ISO. NO. 22

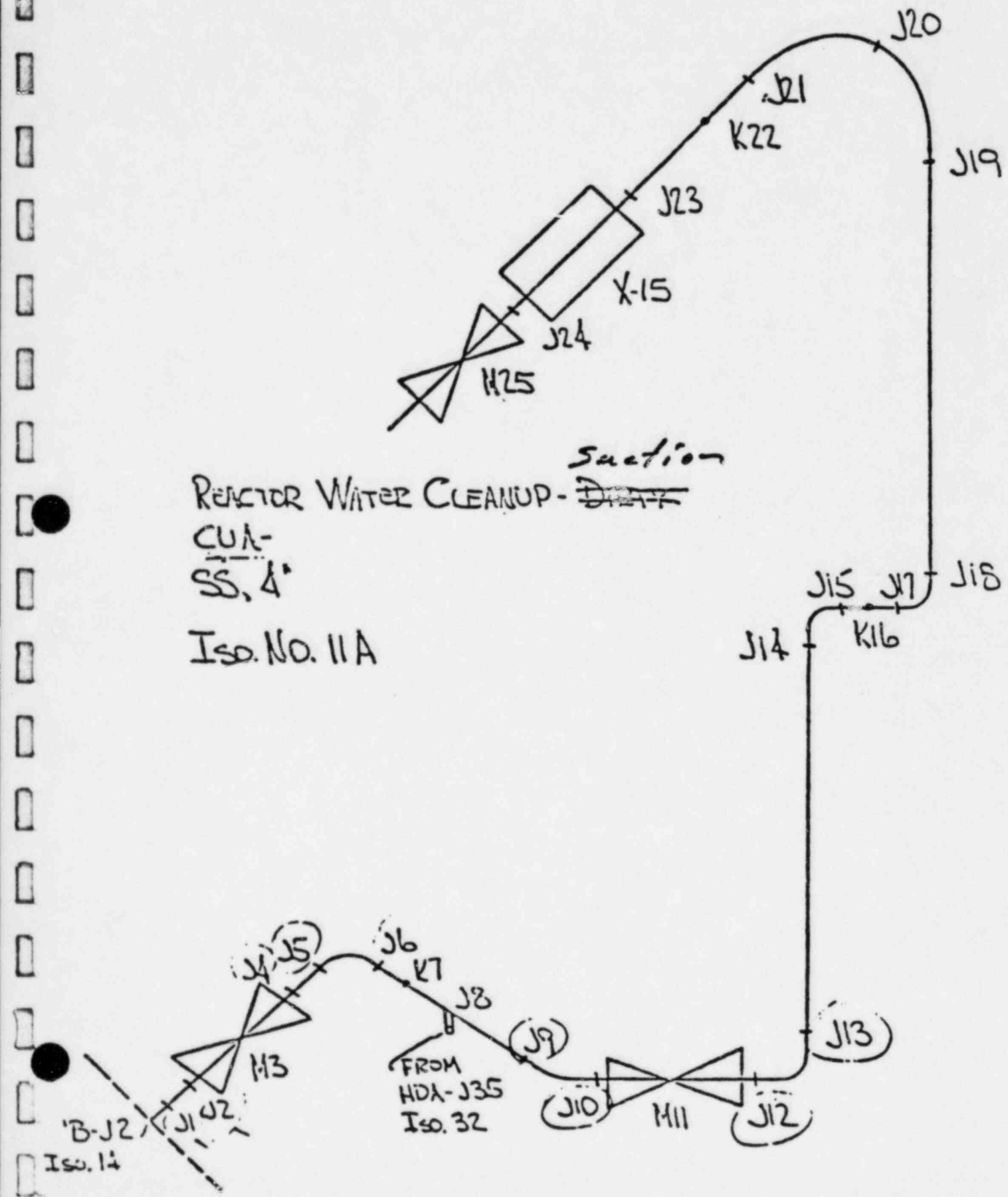


RESIDUAL HEAT REMOVAL-18B

RHB-

SS, CS, 18"

ISO. NO. 14



Section

REACTOR WATER CLEANUP - ~~DRAFT~~

CUA-

SS. 4"

ISO. NO. 11A

ATTACHMENT 4

Summary of Recirculation System UT Results, 1981-1982

1981 - A total of 48 welds were examined with the following results:

A) 17 welds - no indications
B) 21 welds - geometry < 50% DAC
C) 5 welds - geometry 50% to 75% DAC
D) 4 welds - geometry > 75% DAC
E) *1 weld - Linear Indication

*Weld RRC-BJ4 had a linear indication ~ 3 1/4" long = 50% DAC. A decision was made to periodically monitor this weld.

1982 - A Total of 21 Welds Were Examined With The Following Results:

A) 8 Welds - Geometry < 50% DAC
B) 3 Welds - Geometry 50% to 75% DAC
C) 9 Welds - Geometry > 75% DAC
D) *1 Weld - Linear Indication

*Weld RRC-BJ4 was examined with identical results in 1981 and 1982.