Enclosure I

Vermont Yankee Recirculation and
RHR Weld Joint Inspection Program -
1984 Refueling Outage

1.0 ULTRASONIC EXAMINATION CRITERIA

1.1 Scope

Vermont Yankee intends to include 46 welds of the Recirculation and Residual Heat Removal Systems in the initial sample selected for examination during the 1984 refueling outage. The sample size has been determined based upon the following table:

Condition	Available Population	Percent in Initial Sample	Number of Resultant Examinations
Overlays of repaired welds with IGSCC greater than or equal to 10% of circumference	17	70*	12
Unrepaired welds with known IGSCC	12	100	12
Previously inspected welds with no indication of IGSCC	26	20	7
Previously uninspected welds	60	20	16
Repaired welds with IGSCC less than 10% of the circumference	5	0	0
		Total	47

Further distribution of the sample set will include assurance that the different pipe sizes are represented in the sample.

If additional IGSCC is detected in the samples representing the welds not previously inspected or the previously inspected welds not found to contain IGSCC, the sample size will be increased in accordance with the rules of IWB 2430 of Section XI as defined in I&E Bulletin 83-02.

* Ten overlayed joints are identical (sweepolet to riser). The overlay thickness is greater than 75% T_{min} at each joint, greatly exceeding wall thickness required for design loads. The inspection approach here is to UT <u>five</u> of these joints (most affected by IGSCC) for weld metal integrity and bond to base metal. If no indications are found, the remaining five will not be re-inspected.

1.2 Personnel

All examination personnel shall be qualified to basic levels, I, II, and III of SNT-TC-1A as applicable. Additionally, all examination personnel will be demonstrated to be qualified to a level of competence commensurate with their functions. Examiners involved in equipment setup or scanning operations will be trained and demonstrated proficient to assure both their technical ability and their ability to perform activities consistent with the rules of ALARA.

The process for qualification of all personnel who will perform evaluations, either of manual examinations or examinations utilizing advanced data acquisition and processing shall be that process presently in effect at the EPRI NDE Center.

Limited numbers of personnel are qualified through the NDE Center for all systems, methods, and techniques currently under consideration. Additional personnel, if required, shall receive the same level of qualification and examination.

Due to the complexity of the equipment, methods, and techniques involved no plant-specific training and qualifications requirements have been developed. When decisions as to exactly what equipment will be used are made, a program will be established to assure proper training of those individuals involved in the examinations.

1.3 Equipment

A number of vendors and their equipment are being reviewed for their abilities with regard to detection, discrimination, and sizing. No decision has been made with respect to the equipment to be used in order that Vermont Yankee may take full advantage of developments in this technology.

Three separate systems for automatic and semi-automatic data acquisition, storage, and display are presently under consideration. Each of these systems is presently undergoing extensive evaluation.

Automated and semi-automated scanning employing the Ultra Image III System as developed by General Dynamics and utilized by General Electric Company is being reviewed. This system, as demonstrated, relies heavily on spatial information for discrimination of IGSCC. A-scan signals are displayed in order that signal characteristic evaluation can be employed in discriminating IGSCC reflectors from geometric reflectors. This system is being evaluated considering this limitation and an effort to provide additional information with regard to other parameters of the ultrasonic signal may be obtained by selective utilization of the ALN 4060.

Vermont Yankee plant-specific considerations for employing the AMAPs automatic scanner now being utilized with Ultra Image III

are being considered. Overall clearances, interferences, and weld crown position and conditions will be reviewed.

The P-scan System as deployed by ITL is being investigated. As with Ultra Image III, this system relies heavily on spatial information for IGSCC identification. Additional investigative utilization of the ALN 4060 is again being considered.

Scanners, both automatic and semi-automatic for use with P-scan are being reviewed.

The UDRPS as utilized by NES of Danbury, Connecticut is being reviewed as another possible tool for IGSCC detection and discrimination. This unit also applies spatial analysis to IGSCC discrimination. UDRPS utilizes enhanced signal processing to reduce the effects of grain boundary noise. As with Ultra Image III and P-scan some signal discrimination capability is being considered through use of ALN 4060 for those indications which cannot be discriminated on spatial and A-scan characteristics alone.

At this time UDRPS utilizes the AMAPS scanner and is only functional in an automatic mode. Utilization of the AMAPS scanner is already being considered. Manual examinations are at this time being considered for those welds or portions of welds not accessible to AMAPS.

Qualified manual techniques as utilized for detection and discrimination during the spring 1983 refueling outage will be available to supplement other examination methods.

Key to this evaluation process is the considerations of man-rem economization. Certain systems appear efficient in that initial stay times are short, however repeated entries reduce this apparent economy. Systems which are capable of gathering, storing, and manipulating all available data are seen as having the advantage over those which need repeated "on pipe" evaluation.

Review of these systems is ongoing with full consideration as to their advantages and limitations. The results of the EPRI NDE Center qualifications as well as their in-process or upcoming field performance are also under scrutiny. Final decision on the equipment is being reserved until all available data from the individual qualification and initial field applications can be reviewed.

1.4 Sizing

Vermont Yankee is investigating available techniques for sizing IGSCC flaws including ID and OD creeping wave methods and crack tip diffraction. These techniques are being investigated as applicable to the advanced ultrasonic equipment under consideration as well as their more conventional applications included in the EPRI flaw-sizing seminar. Flaw-sizing techniques at Vermont Yankee will be qualified prior to application.

1.5 Overlay Inspection

Existing weld overlays in our inspection program, as well as any necessary new overlays, will be inspected to verify the integrity of both the weld metal and its bond to the pipe base material, in a manner consistent with ASME Code, Section V, Paragraph T550.

2.0 CRITERIA FOR FLAW EVALUATION

2.1 Flaws detected by non-destructive examination will be evaluated to the rules of ASME Code, Section XI, Article IWB-3600, supplemented by NRC SECY 83-267C, Paragraph C.2. Allowable flaw depth and length at end of fuel cycle will be limited to two-thirds (2/3) of the IWB-3640 allowable. Flawed joints which meet this criteria considering upper bound IGSCC and fatigue crack growth will be considered adequate for one operating cycle. (Approximately 12-13 months.)

2.2 Exceptions to Paragraph 2.1 are flaws where detected length exceeds 30% of the pipe diameter. These indications will be weld overlay repaired regardless of "UT called" depth unless the ultrasonic inspection technique is capable of very accurate sizing and has been so qualified. If depth measurement for a greater than 30% long flaw is utilized in a flaw evaluation, the specific UT technique and qualification will be submitted for staff review.

2.3 A Tearing Instability analysis in accordance with criteria specified in NUREG/CR-3464 and EPRI NP-2261 will also be performed. This elastic-plastic fracture mechanics analysis will demonstrate that the flawed system will not fail assuming large cracks and loads in excess of design loads. Lower bound material properties will be utilized in this analysis.

3.0 CRITERIA FOR FUTURE WELD OVERLAY REPAIR

3.1 Where flawed joints are repaired by weld overlay, the thickness of the overlay will be sufficient to provide full IWB-3640 margin during the next operating cycle. Flaws will be assumed to grow through the original pipe wall over the detected length. The advantageous effect of the compressive stress induced by the overlay process will not be considered in sizing the overlays.

3.2 Multiple short cracks will be treated as one crack with length equal to the sum of the circumferential lengths for both flaw evaluation and overlay design if applicable.

3.3 An outage report will be submitted to the NRC staff for review. This report will contain:

a. Ultrasonic Inspection Techniques and Qualifications,

b. Joints examined and results,

c. Flaw evaluations if required, including re-evaluation of unrepaired flaws, and

d. Weld overlay repair design and analyses techniques if required.

4.0 OPERATION FOR A SECOND CYCLE OF OPERATION WITH WELD OVERLAYS

4.1 Current Status

- Twenty-two weld overlays on 12-inch diameter pipe were applied at the 1983 refueling outage.

- These are structural overlays with a typical thickness of (0.5) (T_{MIN}). Overlays are generally 0.25 to 0.45 inches. Overlay data sheets are included in Enclosure II.

4.2 Design Criteria and Inspection

4.2.1 These overlays satisfy the criteria of ASME Code, Section III, Subsection NB and Section XI, Article IWB 3640. The design analysis included secondary stress and fatigue evaluation for a period of about five years. This includes 25 startup-shutdown cycles (100°F/hr) and 25 emergency cycles (456°F/hr). In the current operating period, only 4 startup cycles and no emergencies have occurred. Thus, cyclic loading on the recirculation system is minimal and if the current excellent plant operation continues, structural integrity of the overlays is assured for well in excess of five years.

4.2.2 At the time of installation, the overlays were inspected to verify the integrity of both the weld metal and its bond to the pipe base material, in a manner consistent with ASME Code, Section V, Paragraph T550. No indications were found.

4.3 IGSCC Crack Growth Into A Weld Overlay

4.3.1 Weld Metal

Vermont Yankee specified Type 308L weld metal with carbon content less than or equal to 0.03% and delta ferrite controlled to a level of between 8 and 15 FN. Readings of as-deposited weld metal were taken of the first layer where practical, and the final layer for each overlay. The initial layer results were all in excess of 8 FN. The final layer results were between 12 and 15 FN.

Weld metal with these properties provides outstanding resistance to IGSCC. This has been demonstrated by both test and theory.

4.3.2 Survey of Types 308 and 308L IGSCC Test Results

Pertinent results to illustrate the effects of carbon content and ferrite on weld metal resistance to IGSCC are presented in the following subsections.

Constant Extension Rate Tests (CERTs)

Test results from CERTs (References 1 and 2) for low carbon Types 308 and 308L are shown in Table 1. The CERT is similar to a tensile test, performed at slow strain rates (constant extension rate) in an aggressive environment (550°F, 8 ppm oxygen water) to force fracture. The fracture is then examined for IGSCC characteristics. No IGSCC was shown for the Types 308 and 308L tests in Table 1, even for cases where the weld metal was given a severe furnace sensitizing treatment.

Constant Load Tests

Constant load tensile test results (Reference 3) at 550°F in 0.2 to 100 ppm oxygen content water are shown in Figure 1. Types 308 and 308L were tested, both as-deposited and given furnace sensitizing treatments. Loads are as high as 125% of the yield strength at 550°F. No failures resulted for Type 308L specimens, regardless of ferrite content; no failures resulted for Type 308 specimens with % ferrite greater than or equal to 8%.

Other constant load tests were also performed (Reference 3) for 308L in chloride environments. Type 308L weld overlays on Type 304 stainless steel were tested at 125% of the 75°F yield strength in an aqueous environment of 100 ppm Cl^- at 200°F. No cracking or attack was found after test times of 178 and 138 hr., even for a specimen given the sensitizing treatment of 10 hr. at 1150°F.

Ferrite Effect - Sensitization Immunity

In References 1 and 2, the beneficial effects of ferrite content in Types 308 and 308L are discussed with regard to IGSCC susceptibility and sensitization immunity. Whereas, chromium carbide precipitation occurs intergranularly during aging of austenitic Type 308 stainless steel, no such precipitation occurs along austenite-austenite grain boundaries in duplex Type 308 containing suitable amounts and distributions of ferrite. Instead, the precipitation occurs exclusively along austenite-ferrite phase boundaries.

Since chromium diffusivity is approximately 1000 times greater in ferrite than in austenite at 1100°F, the chromium for this precipitation is supplied principally from the chromium-rich ferrite phase. A small zone of chromium depletion in the austenite is subsequently replenished by chromium diffusing from the interior of the austenite. After this "healing", the material is immune to intergranular corrosion in ASTM A262 Practice E and IGSCC in air-saturated water at 550°F.

Models have been developed (References 1 and 2) based on the above mechanism to describe IGSCC as a function of carbon content and the amount of ferrite-austenite (α-γ) boundary area. The critical distribution of boundary area for rapid healing is that amount which is sufficient to tie up all of the available carbon as chromium carbide exclusively along ferrite-austenite boundaries. Both the amount and distribution of ferrite-austenite boundary area can be expressed as a function of the metallographic parameter, $N_L^{\alpha-\gamma}$. This is a measure of the number of intercepts a random test line makes with α-γ boundaries per unit length of test line.

Figure 2 shows the model predictions of $N_L^{\alpha-\gamma}$, as functions of %C, to maintain a critical amount of α-γ boundary area (line S_V) and a critical distribution of α-γ boundary area (curve γ). The value of $N_L^{\alpha-\gamma}$ for rapid healing is the higher of the two curves. ASTM A262 Practice E results shown in Figure 2 verify the model predictions. At 0.03%C, the maximum of Type 308L, $N_L^{\alpha-\gamma} = 200\ cm^{-1}$ is required for rapid healing and immu nity to intergranular corrosion. At 0.015%C, or less, essen tially no ferrite is required.

Figure 3 plots data from Reference 1 to relate $N_L^{\alpha-\gamma}$ to volume % ferrite. For as-deposited Type 308L, as in an overlay repair, about 3% ferrite is adequate to achieve $N_L^{\alpha-\gamma} = 200\ cm^{-1}$ and intergranular corrosion immunity. Even for the solution treated material, 8% ferrite achieves the 200 value. Thus, the whole range of heating possibilities is covered by the Type 308L weld overlay repair requirements of 8% ferrite minimum, and the overlays should be immune to IGSCC.

Crack Arrest

Figure 4 (Reference 4) shows an IGSCC in Type 304 essentially arresting at the base metal/weld interface "annealed" zone. This annealed zone is caused by temperatures at this location during welding that are in the solution heat treatment range. Thus, this interface acts as a further protection against the propagation of IGSCC into weld overlay repairs.

4.3.3 Other Information

A large number of General Electric Co. pipe tests have been performed to qualify nuclear grade Type 316 (less than or equal to 0.02%C) for piping replacement (Reference 5). These materials were welded by Type 308L filler metal, which was successfully qualified along with the base metal for resistance to IGSCC.

NUREG-0531 (Reference 6) indicates that Type 308L with a ferrite content of at least 8% after welding appears to be a good corrosion resistant cladding material on BWR piping inside surfaces for resistance to IGSCC. NUREG-0313, Revision 1 (Reference 7) gives guidance that Type 308L with at least 5% ferrite be used to minimize crack susceptibility.

As a final point, no field leakage has ever been observed in any BWR welds growing through the weld metal. This includes the higher carbon content Type 308. This demonstrates the weld metal ability to arrest cracks, even though the weld residual stresses are highest at this location in a butt weld.

5.0 CONCLUSIONS

1. A large amount of test data shows that Type 308L weld metal is not susceptible to IGSCC. Ferrite contents of 8% or greater provide additional margin against IGSCC.

2. Theoretical predictions support the test data and show that Type 308L with at least 8% ferrite is virtually immune to IGSCC.

3. IGSCC cracks should not propagate into the 308L weld overlays applied at Vermont Yankee.

4. Since the overlays at each weld joint provide structural adequacy, and the overlays are essentially immune to further crack growth, operation for one additional operating cycle will not reduce Safety Margins below those intended by the ASME Code, Section III.

6.0 ENHANCED DRYWELL LEAK DETECTION

In Vermont Yankee Letter FVY 83-44, dated May 26, 1983 to NRC, a committment to the criteria now contained in SECY 83-267C, Attachment D, was made.

7.0 FUTURE PLANS

7.1 It is our present intent to replace recirculation and RHR System stainless steel piping with 316 nuclear grade seamless pipe and fittings at the 1985 refueling outage.

7.2 The 1984 outage will be utilized by the recirculation system pipe replacement contractor to survey the drywell and develop detailed plans for the intended 1985 pipe replacement. In this way, sufficient time will be available to plan an efficient replacement effort with minimum radiation exposure to personnel.

8.0 REFERENCES

1. N. R. Hughes and A. J. Giannuzzi, "Evaluation of Near-Term BWR Piping Remedies, Volume 2", EPRI NP-1222 Volume 2, November 1979.

2. N. R. Hughes and A. J. Giannuzzi, "Evaluation of Near-Term BWR Piping Remedies, Volume 1", EPRI NP-1222 Volume 1, November 1979.

3. W. L. Clarke and W. L. Walker, "Accelerated SCC Test Data Tabulation for 304 CF8, CF3, 308L and Wrought Austeno-Ferritic Alloys", General Electric Co., Unclassified, August 15, 1975.

4. R. M. Horn, "The Growth and Stability of Stress Corrosion Cracks in Large Diameter BWR Piping", Second Semiannual Report, November 1979-April 1980, NEDC-24750-2, EPRI Contract T118-1, June 1980.

5. J. F. Copeland and E. D. Sayre, "The Application of Low Carbon Type 316 Stainless Steel for BWR Recirculation Piping Systems", MPC-15, ASME Winter Annual Meeting, Chicago, Illinois, November 1980.

6. NUREG-0531, "Investigation and Evaluation of Stress-Corrosion Cracking in Piping of Light Water Reactor Plants", February 1979.

7. NUREG-0313, Revision 1, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping", July 1980.

Table 1

Constant Extension Rate Test (CERT) Results

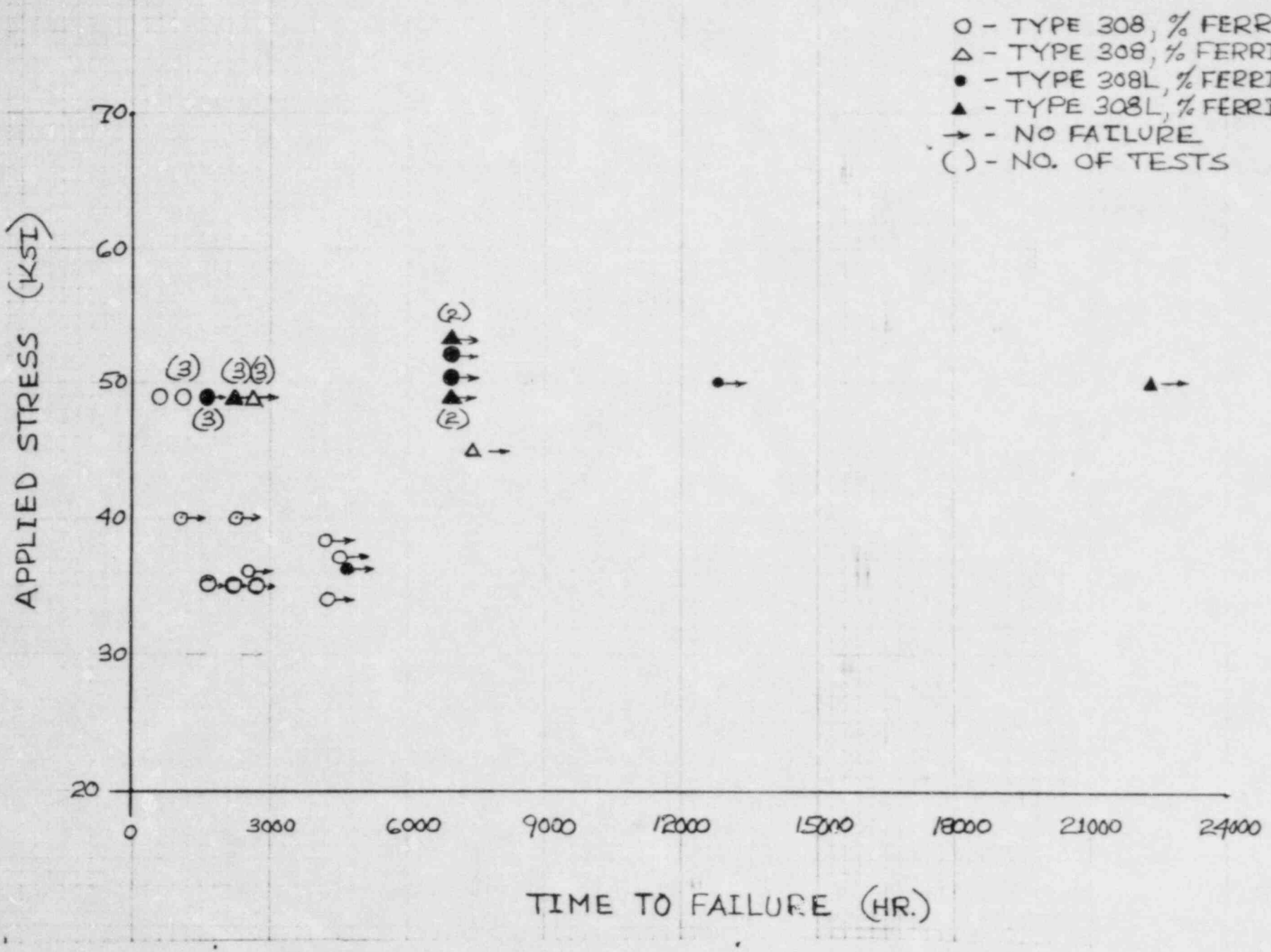
For Types 308L and 308 Weld Metal (Reference 1)

Heat No./Sample	Type	Heat Treatment	%C	Nominal Strain Rate(min^{-1})	IGSCC	Notes
M7616/26-B	308L	As-Deposited	.03	4.5×10^{-5}	No	1
M7616/27-B	308L	Solution Heat Treated	.03	4.5×10^{-5}	No	2
L-B7	308	1350°C/1 Hr.	.04	1.0×10^{-3}	No	3
L-B7	308	1350°C/1 Hr.	.04	2.0×10^{-4}	No	3
L-B7	308	1350°C/1 Hr.	.04	2.0×10^{-5}	No	3
L-B7	308	1350°C/1 Hr. + 475°C/10 Hr.	.04	1.5×10^{-4}	No	2
L-B7	308	1350°C/1 Hr. + 475°C/100 Hr.	.04	1.3×10^{-4}	No	2
L-B7	308	1350°C/1 Hr. + 475°C/1000 Hr.	.04	1.3×10^{-4}	No	2
L-B7	308	1350°C/1 Hr + 600°C/1 Hr.	.04	1.0×10^{-5}	No	2
L-B7	308	1350°C/1 Hr. + 600°C/2 Hr.	.04	1.3×10^{-5}	No	2
L-B7	308	1350°C/1 Hr. + 600°C/10 Hr.	.04	1.3×10^{-5}	No	2
L-B7	308	1350°C/1 Hr. + 600°C/20 Hr.	.04	1.3×10^{-5}	No	2
L-B7	308	1350°C/1 Hr. + 600°C/20 Hr.	.04	1.6×10^{-5}	No	2
L-B7	308	1350°C/1 Hr. + 600°C/100 Hr.	.04	1.4×10^{-4}	No	2
L-B7	308	1350°C/1 Hr. + 700°C/1 Hr.	.04	1.3×10^{-4}	No	2

Notes: 1 - Corrosion resistant clad overlay; procedure specification requires a ferrite content of at least 8 FN.

2 - No ferrite content given.

3 - 20% volume ferrite for this treatment.



** Figure 1 - Constant Load Tensile Tests at 550°F in 0.2 to 100 PPM Oxygen Water For Types 308 and 308L In As-Deposited, Or 1150°F/24 Hr., or 1150°F/40 Hr. Conditions (Reference 3)

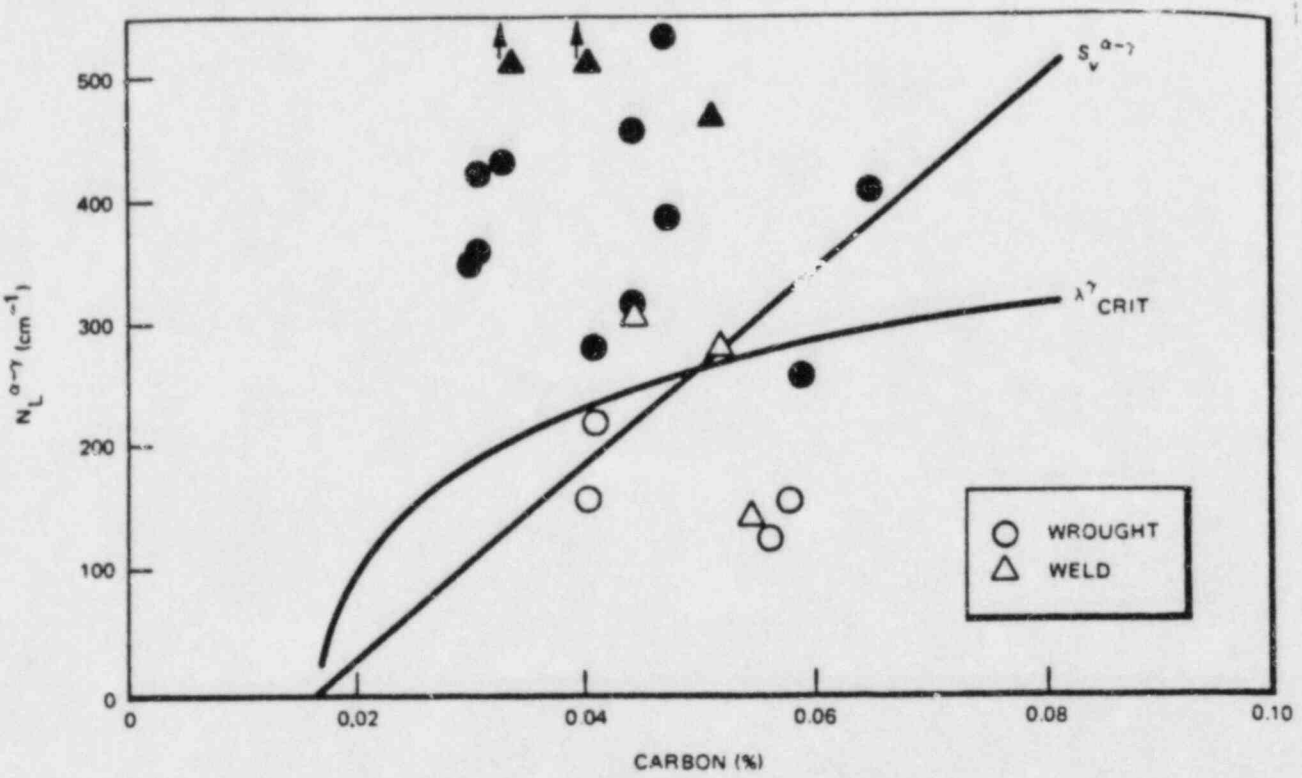


Figure 2 - The Influence of $N_L^{\alpha-\gamma}$ on the Intergranular Corrosion Behavior of Aged Samples of Wrought and Weld-Deposited Type-308 Stainless Steel. Open Symbols Indicate IGSCC per ASTM A262 Practice E Testing; Closed Symbols Indicate No IGSCC (Reference 1)

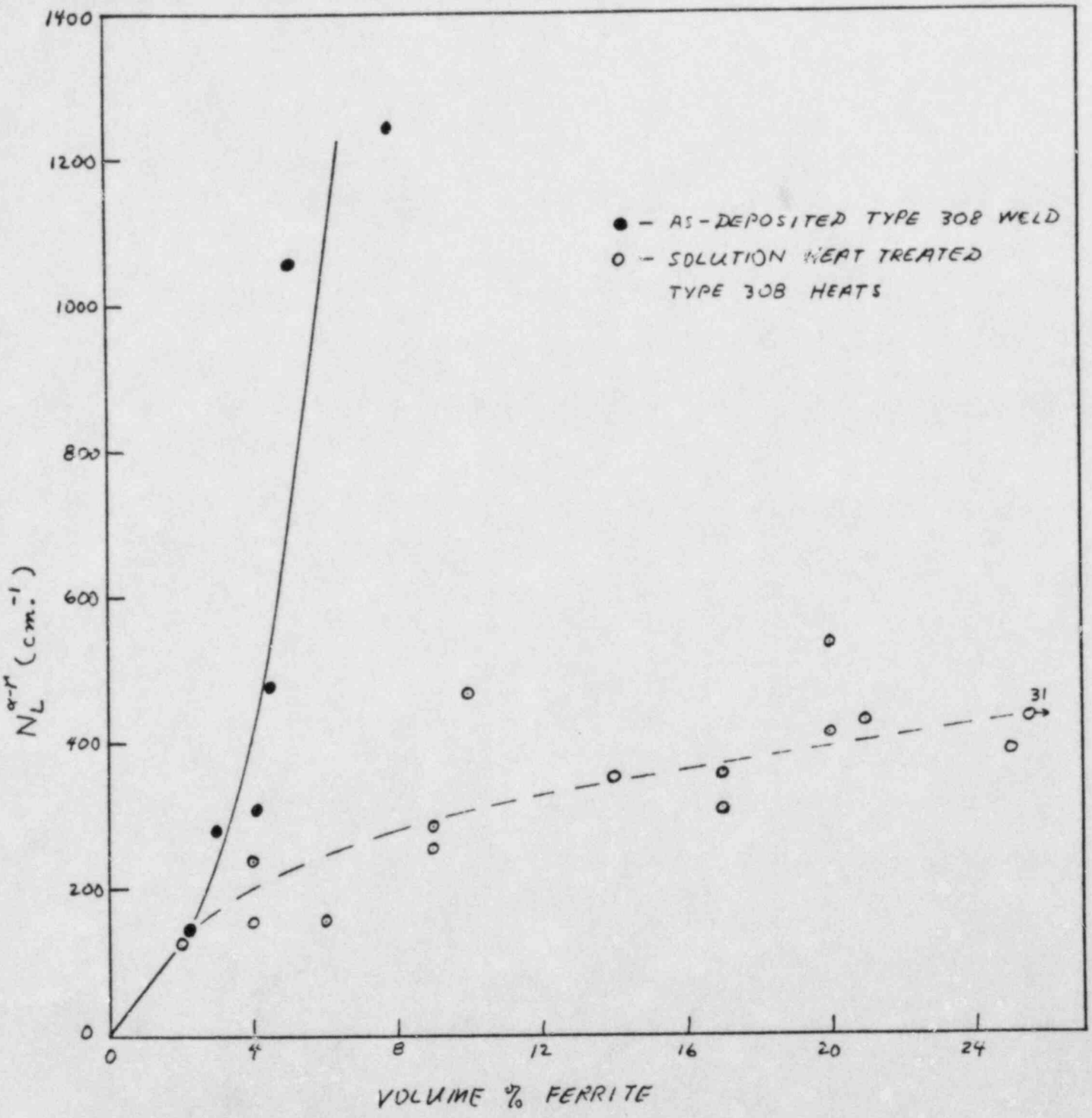


Figure 3 - Number of Intercepts of a Random Test Line With Austenite-Ferrite Boundaries Per Unit Length of Test Line, N_L, Versus Volume % Ferrite For Type 308 Weld Metal

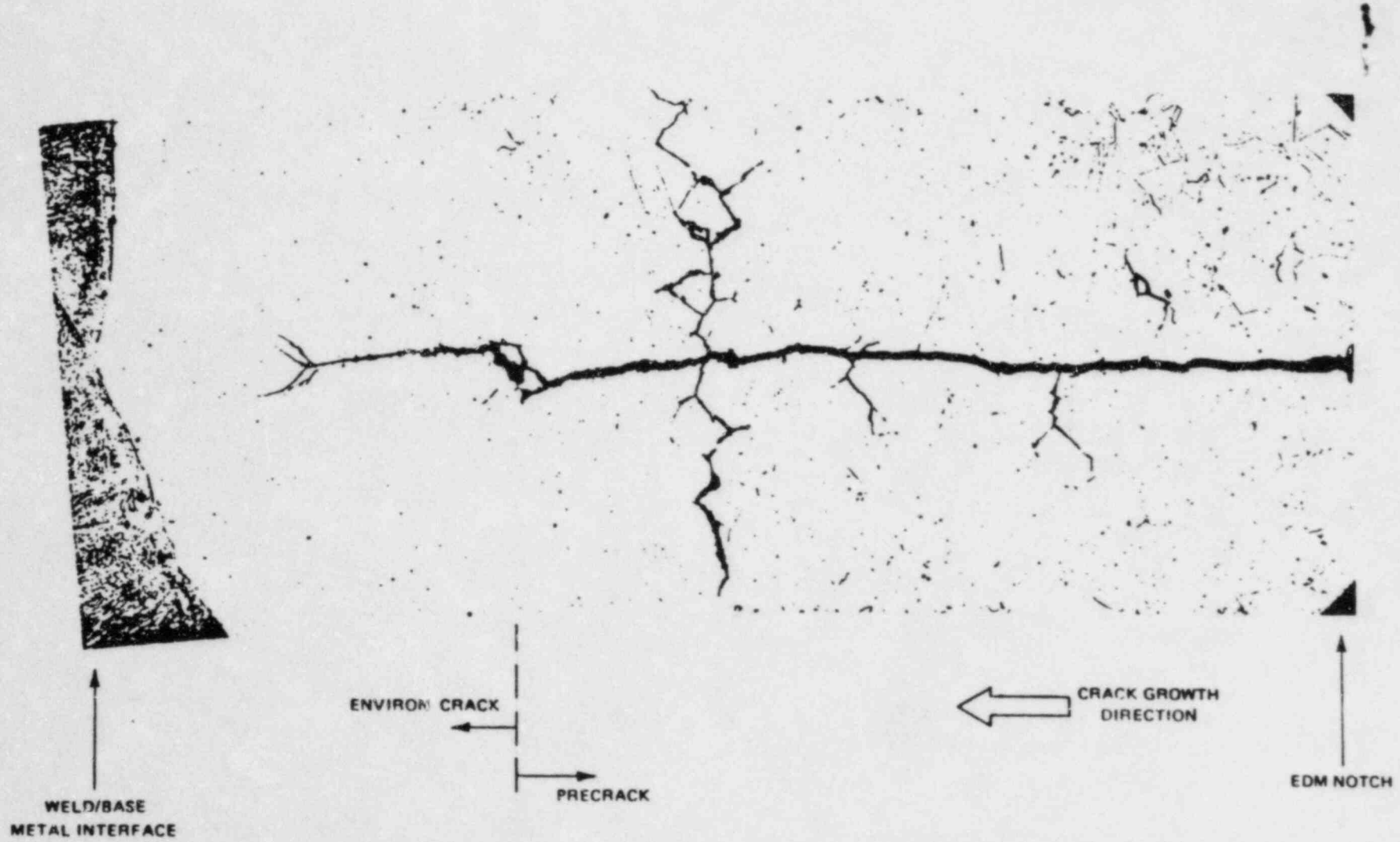


Figure 4 - IGSCC In Type 304 Shown Essentially Arresting At Base Metal/Weld Interface "Annealed" Zone, 1T WOL Specimen Cycled at ΔK = 25 ksi $\sqrt{in}$ in High Pressure Water With 8 PPM Oxygen at 550°F; Type 308 Weld Metal, ≥ .05%C, 5-7% Ferrite (Reference 4).

Enclosure II

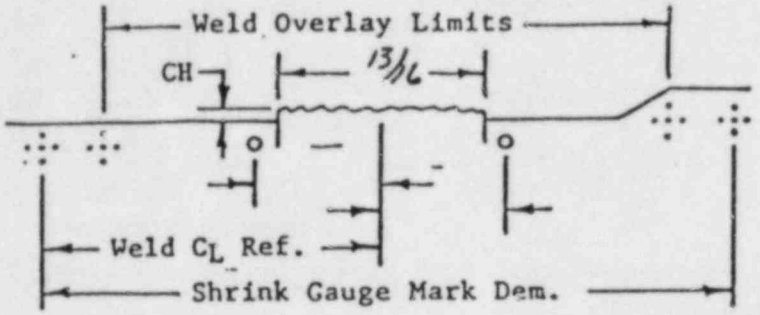
Weld Overlay Repair Data Sheets

Enclosure 1

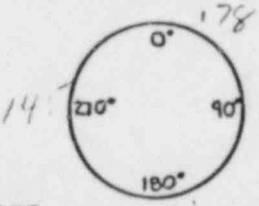
Elbow

Weld Overlay Data Sheet

Weld # 54 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	5.290	5.112	.178
90°	5.385	5.261	.124
180°	5.260	5.099	.161
270°	5.345	5.200	.145

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.710		.918		.208	
.664		.929		.265	
.696		.947		.251	
.675		.939		.264	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	2.680	1/16	3.587
90°	2.685	0	3.540
180°	2.700	1/16	3.666
270°	2.685	1/16	3.646

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-5,8,10,11	ER-308L	20629	YES
2nd Layer	GP-5,8,11,12	↓	↓	↓
3rd Layer	GP-8,10	↓	↓	↓
4th Layer				
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC R. VanTol Date 5/19/83 Remarks INITIAL U.T. R. VanTol 5/19/83

Post Weld Surface Profile Acceptance

MQC Mark Clifford Date 5/23/83 Remarks FINAL UT: WRH for M. PARLA 5/26/83

Final Layer Ferrite 12.5% MT&E# TE-531

MQC Mark Clifford Date 5/23/83 Remarks

Final Surface LP Acceptable

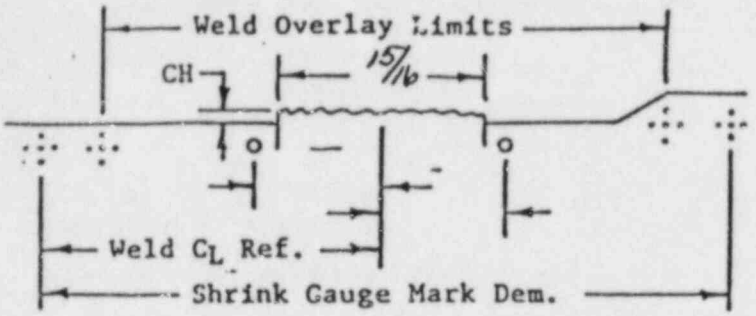
MQC Brigitte Greene Date 5/26/83 Remarks

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	AP	MM					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

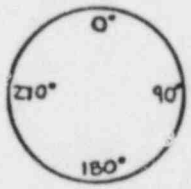
Weld Overlay Data Sheet

Sweep

Weld # 53 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.417	6.320	.097
90°	6.290	5.674	
180°	6.453	6.345	.108
270°	5.827	5.763	.064

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.662		1.079		.417	
.678		1.048		.370	
.698		1.089		.391	
.645		1.065		.370	

Weld C_L to Reference Dim.		CH	Weld Overlay Final Length
0°	3.605	1/8	4.703
90°	3.594	3/32	4.720
180°	3.655	3/32	4.507
270°	3.622	1/16	4.456

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,6,9,14,15	ER-308L	20663	YES
2nd Layer	GP-3,6,9,14			
3rd Layer	GP-6,9,14,15			
4th Layer	GP-3,6,9,14,15			
5th Layer	GP-4,5,7,12,13			

Pre-Weld Surface Visual Examination Acceptance

MQC A. Teixeira Date 5/10/83 Remarks INITIAL UT: [signature] 5/10/83

Post Weld Surface Profile Acceptance

MQC A. Teixeira Date 5/24/83 Remarks FINAL UT: W/H for M. PARLA 5/25/83

Final Layer Ferrite 12.5% MT&E# TE 531

MQC W/H for M. PARLA Date 5/23/83 Remarks

Final Surface LP Acceptable

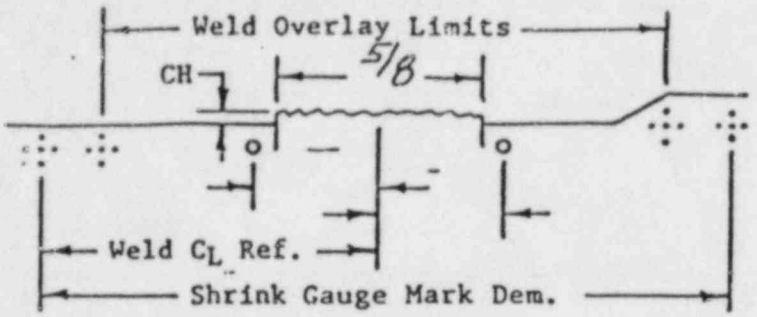
MQC B. Lacatte A. Teixeira Date 5/24/83 Remarks

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	AP	M					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

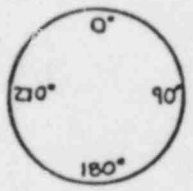
Nozzle

Weld Overlay Data Sheet

Weld # 52 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.942	6.714	.228
90°	6.766	6.574	.192
180°	6.813	6.623	.190
270°	6.840	6.623	.217

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.687		.889		.202	
.683		.940		.257	
.605		.933		.328	
.677		.906		.229	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.806	1/16	4.652
90°	3.724	1/32	4.649
180°	3.750	1/16	4.743
270°	3.700	1/16	4.493

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-4,6,9	ER-308L	20642	YES
2nd Layer	GP-4,6,8,10	↓	↓	↓
3rd Layer	GP-1,3,4,5,6,8,	↓	↓	↓
4th Layer				
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC W.R. Hunshman Date 5/7/83 Remarks INITIAL UT: W.R. Hunshman 5/7/83

Post Weld Surface Profile Acceptance

MQC A. Peiceus Date 5/11/83 Remarks FINAL UT: Mark Clifford 5/28/83

Final Layer Ferrite 12.5% MT&E# TE-531

MQC WRH for M.PARLA Date 5/12/83 Remarks

Final Surface LP Acceptable

MQC [illegible] Date 5-27-83 Remarks

REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD
0	5/3/83	AP	[illegible]				

Enclosure 1
WELD OVERLAY DATA SHEET

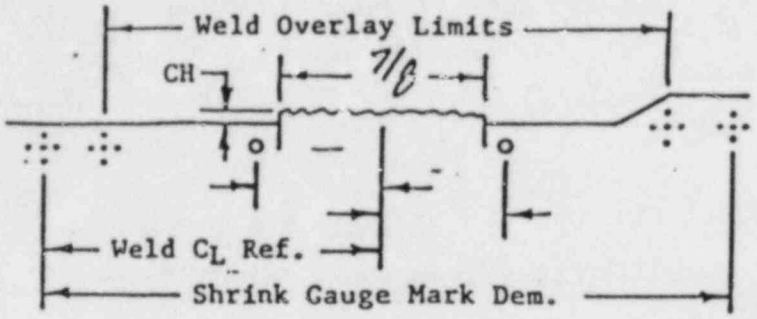
MERCURY COMPANY OF NORWOOD, INC.

SPN-70149-700 SH 1 OF 1

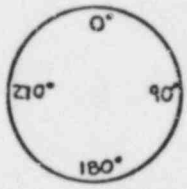
Elbow

Weld Overlay Data Sheet

Weld # 51 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA				UT THICKNESS DATA					
				Initial		Post Weld		△	
Location	Initial	Post Weld	△	Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
0°	7.388	7.203	.185	.606		.940		.334	
90°	7.273	7.065	.208	.597		.958		.361	
180°	7.280	7.102	.215	.579		.890		.311	
270°	7.270	7.060	.210	.567		.889		.322	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.715	1/16	4.552
90°	3.653	1/32	4.540
180°	3.690	3/32	4.539
270°	3.690	0	4.538

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-5,8,10,11,16 R	ER-308L	20629	YES
2nd Layer	GP-5,10,11,12,15	↓	↓	↓
3rd Layer	GP-7,8,10,11,12	↓	↓	↓
4th Layer				
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC R. Van Pelt Date 5/19/83 Remarks INITIAL U.T. T. Van Pelt 5/19/83

Post Weld Surface Profile Acceptance

MQC A. Teixeira Date 5/23/83 Remarks FINAL U.T.: WAIT for M. PARLA 5/26/83

Final Layer Ferrite 12.5 % MT&E # TE-531

MQC Mark Clifford Date 5/23/83 Remarks

Final Surface LP Acceptable

MQC B. Bicotte & A. Teixeira Date 5/26/83 Remarks

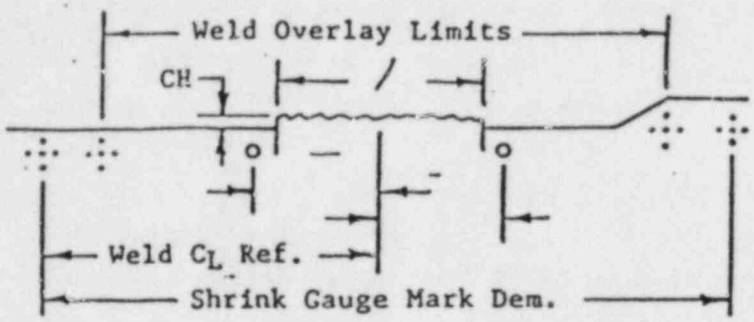
FOR INFO ONLY

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	AP	M					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

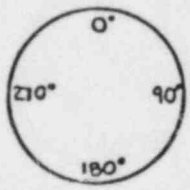
Weld Overlay Data Sheet

Sweep

Weld # 50 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.357	6.248	.109
90°	6.011	5.967	.044
180°	6.452	6.323	.129
270°	5.860	N/A	N/A

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.631		1.056		.425	
.667		1.033		.366	
.654		1.031		.377	
.665		1.090		.425	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.618	3/16	4.612
90°	3.619	1/16	4.624
180°	3.674	1/16	4.660
270°	3.624	3/16	4.406

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-1,3,4,6,9,11,15	ER-308L	20663	YES
2nd Layer	GP-3,4,9,13,14,15			NO
3rd Layer	GP-3,6,16			NO
4th Layer	GP-1,3,4,8,9,13,14,15,16			NO
5th Layer	GP-4,5,9,11,12,14,16,17			NO

Pre-Weld Surface Visual Examination Acceptance

MQC A Teixeira Date 5/10/83 Remarks INITIAL UT CM 5/10/83

Post Weld Surface Profile Acceptance

MQC Nuclear Spoons Date 5/25/83 Remarks FINAL U.T. WFF for M. PARLA 5/26/83

Final Layer Ferrite 12.5% MT&E# TE-531

MQC R MacFallen Date 5/26/83 Remarks

Final Surface LP Acceptable

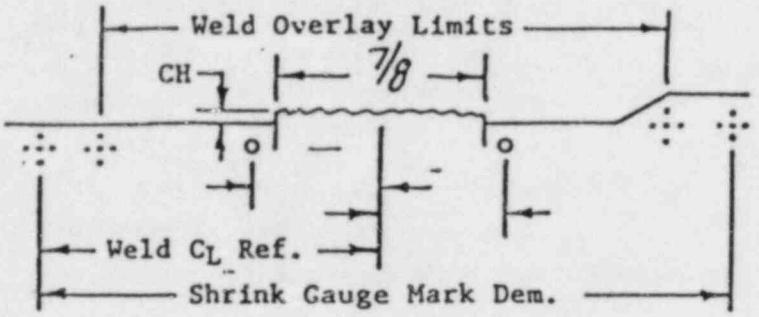
MQC UTGun Date 5-27-83 Remarks

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	AP	M					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

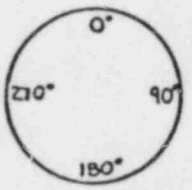
Sweep

Weld Overlay Data Sheet

Weld # 45 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.462	6.318	.144
90°	5.895	5.854	.041
180°	6.467	6.345	.122
270°	6.012	5.885	.127

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.642		1.076		.434	
.647		1.067		.420	
.666		1.167		.501	
.701		1.110		.409	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.664	3/32	4.416
90°	3.649	1/8	4.410
180°	3.662	3/32	4.385
270°	3.642	3/32	4.405

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,11,16,17	ER-308L	20642	YES
2nd Layer	GP-4,5,9,14,17		20651	
3rd Layer	GP-3,4,5			
4th Layer	GP-10,12,16,17			
5th Layer	GP-6,9,14,15		20663	

Pre-Weld Surface Visual Examination Acceptance

MQC [signature] Date 5/6/83 Remarks INITIAL U.T. [signature] 5/7/83

Post Weld Surface Profile Acceptance

MQC [signature] Date 5/23/83 Remarks FINAL U.T. WAIT for M. PARLA 5/25/83

Final Layer Ferrite 12.5% MT&E# TE-531

MQC [signature] Date 5/14/83 Remarks

Final Surface LP Acceptable

MQC [signature] Date 5/26/83 Remarks

FOR INFO ONLY

REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD
0	5/3/83	AB	MC				

Enclosure 1
WELD OVERLAY DATA SHEET

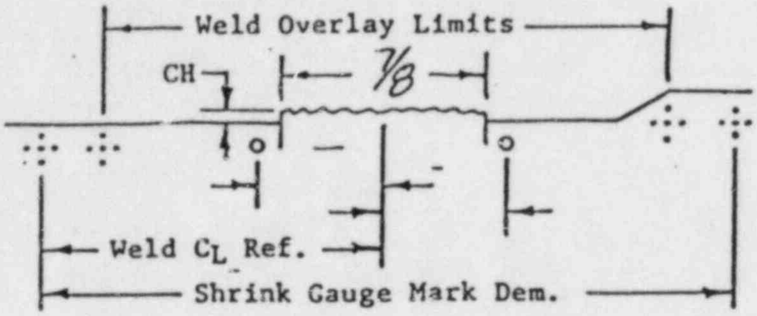
MERCURY COMPANY OF NORWOOD, INC.

SPN-70149-700 SH 1 OF 1

Swaff

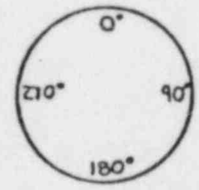
Weld Overlay Data Sheet

Weld # 42 Welded Overlay WPS W-8/8-OL



O - UT Thickness Gate Area

Top Or Side Nearest Reactor Plan View



SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.520	6.351	.169
90°	6.104	5.975	.129
180°	6.476	6.333	.143
270°	6.038	5.906	.132

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.647		.981		.334	
.619		.934		.315	
.638		.969		.331	
.644		.966		.322	

	Weld CL to Reference Dim.	CH	Weld Overlay Final Length
0°	3.696	3/32	4.164
90°	3.623	1/16	4.202
180°	3.674	1/16	4.421
270°	3.634	3/32	4.204

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-7,10,14,16	ER-308L	20642	YES
2nd Layer	GP-3,15	↓	↓	↓
3rd Layer	GP-3,9,14,15			
4th Layer	GP-3,5,9,14,15		20651	
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC Charles Spoone Date 5/6/83 Remarks INITIAL U.T.: [signature] 5/7/83

Post Weld Surface Profile Acceptance

MQC [signature] Date 5/23/83 Remarks FINAL U.T.: [signature] for M.PARLA 5/25/83

Final Layer Ferrite 15% MT&E# TE-531

MQC [signature] Date 5/14/83 Remarks

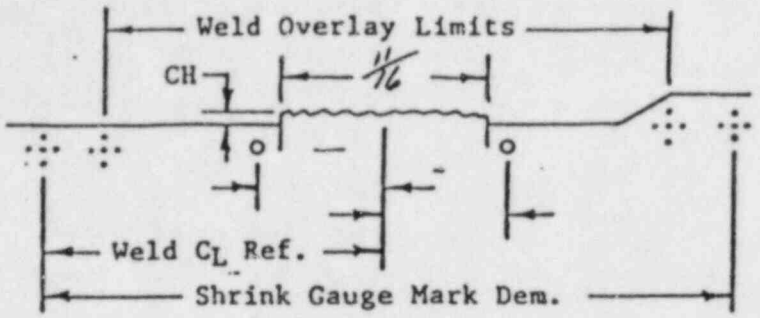
Final Surface LP Acceptable

MQC [signature] Date 5/26/83 Remarks

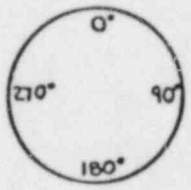
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	
0	5/3/83	[initials]	[initials]					Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
								SPN-70149-700 SH 1 OF 1

Weld Overlay Data Sheet

Nozzle Weld # 40 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.791	6.592	.199
90°	6.878	6.619	.259
180°	6.836	6.619	.217
270°	6.707	6.506	.201

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.643		.997		.354	
.679		1.038		.359	
.681		1.056		.375	
.683		1.045		.362	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.364	3/32	4.500 AT .250
90°	3.355	1/8	4.500 AT .250
180°	3.655	1/16	4.500 AT .250
270°	3.660	3/32	4.500 AT .250

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,4,2,6,7	ER-308L	20642	YES
2nd Layer	GP-4,6,7,11,11,11			
3rd Layer	GP-4,6,11,12,11			
4th Layer	GP-11,12,13			
5th Layer	GP-8,13			

Pre-Weld Surface Visual Examination Acceptance

MQC W.L. Henderson Date 5/7/83 Remarks INITIAL UT: W.L. Henderson 5/7/83

Post Weld Surface Profile Acceptance

MQC R. VanTol Date 5/12/83 Remarks FINAL UT: R. VanTol 5/12/83

Final Layer Ferrite 12.57 MT&E# TE-531

MQC WH for M.PARLA Date 5/12/83 Remarks

Final Surface LP Acceptable

MQC Ronald Williams Date 5/12/83 Remarks

QA ONLY

REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD
0	5/3/83	AP	M				

Enclosure 1
WELD OVERLAY DATA SHEET

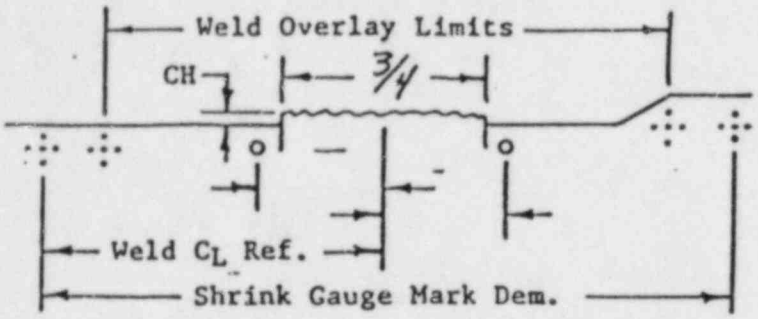
MERCURY COMPANY OF NORWOOD, INC.

SPN-70149-700 SH 1 OF 1

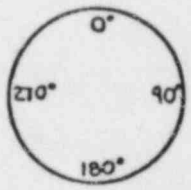
Reducer

Weld Overlay Data Sheet

Weld # 36 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.455	6.365	.090
90°	6.427	6.365	.062
180°	6.415	6.308	.107
270°	6.450	6.343	.107

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.680		1.068		.388	
.683		1.044		.361	
.652		1.047		.395	
.655		1.041		.386	

Weld C_L to Reference Dim.		CH	Weld Overlay Final Length
0°	3.627	3/32	4.116
90°	3.635	1/8	4.116
180°	3.727	3/32	4.122
270°	3.656	1/16	4.168

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,13,15	ER-308L	20642	YES
2nd Layer	GP-3,15	↓	↓	↓
3rd Layer	GP-3,14,15,17	↓	↓	↓
4th Layer	GP-3,5	↓	↓	↓
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC Charles Spoone Date 5/6/83 Remarks INITIAL U.T.: [signature] 5/7/83

Post Weld Surface Profile Acceptance

MQC Mark Clifford Date 5/13/83 Remarks FINAL U.T.: WRH for M.PARLA 5/25/83

Final Layer Ferrite 12.5% MT&E# TE-581

MQC Mark Clifford Date 5/13/83 Remarks

Final Surface LP Acceptable

MQC D.A. Mello Date 5/26/83 Remarks

REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD
0	5/3/83	AP	[signature]				

Enclosure 1
WELD OVERLAY DATA SHEET

MERCURY COMPANY OF NORWOOD, INC.

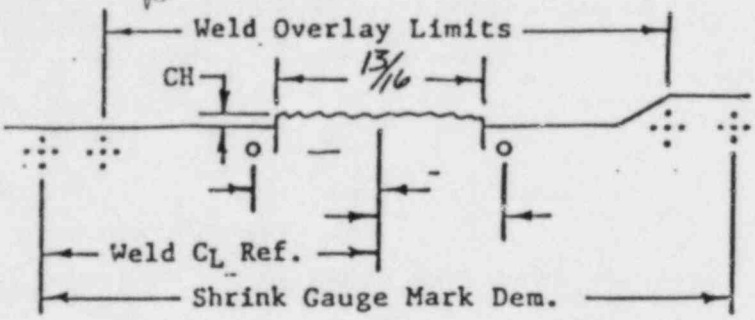
SPN-70149-700 SH 1 OF 1

Elbow

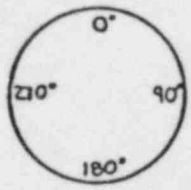
Weld Overlay Data Sheet

Weld # 35 Welded Overlay WPS W-8/8-OL

Elbow



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	7.306	6.880	.426
90°	7.126	6.821	.305
180°	7.198	6.980	.218
270°	7.184	6.958	.226

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.630		.908		.278	
.627		.860		.233	
.626		.883		.257	
.624		.870		.246	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.786	1/32	5.232
90°	3.660	1/32	4.899
180°	3.605	1/16	4.987
270°	3.581	1/32	5.220

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,4,9,15	ER-308L	20629	YES
2nd Layer	GP-3,2,4,9,15,14,	↓	↓	NO
3rd Layer	GP-9,14	↓	↓	↓
4th Layer	GP-3,6,15,9,14	↓	↓	↓
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC _____ Date 5/16/83 Remarks INITIAL UT: D. Smith 5/16/83

Post Weld Surface Profile Acceptance

MQC M Vieira Date 5/25/83 Remarks FINAL UT: WAH for M. PARLA 5/26/83

Final Layer Ferrite 12.5 % MT&E# TE-531

MQC M Vieira Date 5/25/83 Remarks _____

Final Surface LP Acceptable

MQC D. R. Mello Date 5/26/83 Remarks _____

REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD
0	5/3/83	AP	MK				

Enclosure 1
WELD OVERLAY DATA SHEET

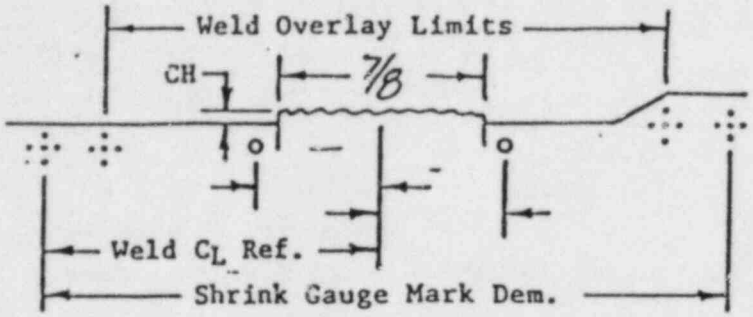
MERCURY COMPANY OF NORWOOD, INC.

SPN-70149-700 SH 1 OF 1

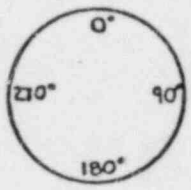
Nozzle

Weld Overlay Data Sheet

Weld # 34 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.780	6.675	.105
90°	6.792	6.696	.096
180°	6.635	6.540	.095
270°	6.795	6.665	.130

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.675		.928		.253	
.655		.922		.267	
.667		.923		.256	
.674		.953		.279	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.321	1/32	4.492
90°	3.330	1/32	4.364
180°	3.338	1/32	4.266
270°	3.346	1/32	4.153

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,4,5,6,11	ER-308L	20642	YES
2nd Layer	GP-11, 13	↓	↓	↓
3rd Layer	GP-5,9,13,14,15	↓	↓	↓
4th Layer				
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC W.A. Henderson Date 5/7/83 Remarks INITIAL UT: W.A. Henderson 5/7/83

Post Weld Surface Profile Acceptance

MQC T. VanTol Date 5/10/83 Remarks FINAL U.T.: LAH for M. PARLA 5/26/83

Final Layer Ferrite 12.5% MT&E# TE-531

MQC [signature] Date 5/11/83 Remarks

Final Surface LP Acceptable

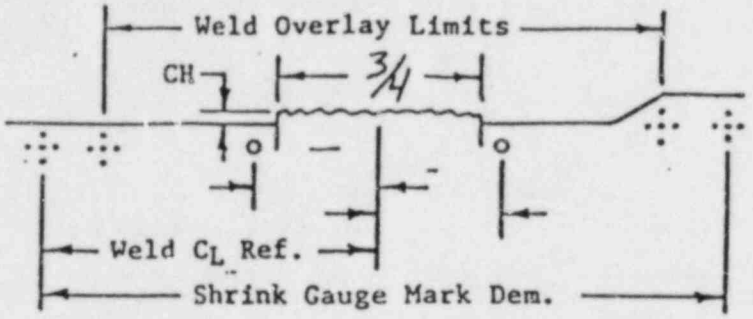
MQC D.R. Mello Date 5/26/83 Remarks

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	[signature]	[signature]					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

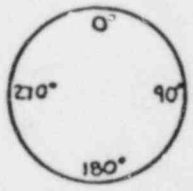
Sleeve

Weld Overlay Data Sheet

Weld # 33 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.480	6.357	.123
90°	5.838	5.750	088
180°	6.477	6.370	.107
270°	5.871	5.751	.120

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.634		1.020		.386	
.635		1.028		.393	
.648		1.040		.392	
.637		1.010		.373	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.704	1/8	4.000
90°	3.639	3/32	4.098
180°	3.689	3/32	4.270
270°	3.637	1/16	4.110

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-4,6,8,12,13	ER-308L	20651	YES
2nd Layer	GP-4,6,8,12		20642	
3rd Layer	GP-6,12,13,16			
4th Layer	GP-8, 13			
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC Charles Spoon Date 5/6/83 Remarks INITIAL UT: [signature] 5/7/83.

Post Weld Surface Profile Acceptance

MQC W.R. Hunshman Date 5/22/83 Remarks FINAL UT: W.R. Hunshman 5/25/83

Final Layer Ferrite 15% MT&E# TE-531

MQC W.R. Hunshman Date 5/14/83 Remarks

Final Surface LP Acceptable

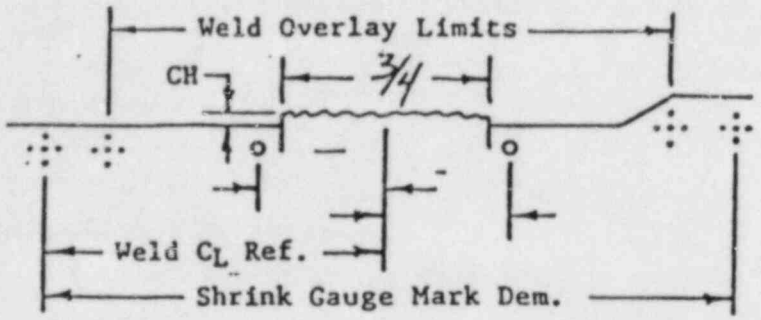
MQC Ronald Williams Date 5/24/83 Remarks

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	[signature]	[signature]					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

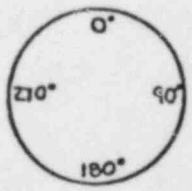
Elbow

Weld Overlay Data Sheet

Weld # 32 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA				UT THICKNESS DATA					
				Initial		Post Weld		△	
Location	Initial	Post Weld	△	Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
0°	5.033	4.884	.149	.613		.744		.131	
90°	5.287	5.140	.147	.635		.760		.125	
180°	5.227	5.105	.122	.601		.758		.157	
270°	5.326	5.198	.128	.619		.765		.146	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	2.652	1/32	3.195
90°	2.598	1/32	3.090
180°	2.566	0	3.290
270°	2.668	1/32	3.120

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,6,9,13,14,16	ER-308L	20629	Y
2nd Layer	GP-3,4,8,10,15	↓	↓	↓
3rd Layer	GP-10	↓	↓	↓
4th Layer				
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC B. Smith Date 5/22/83 Remarks INITIAL UT: B. Smith 5/22/83

Post Weld Surface Profile Acceptance

MQC [illegible] Date 5/26/83 Remarks FINAL UT: Charles Spoon 5-25-83

Final Layer Ferrite 12.5% MT&E# TE 531

MQC Charles Spoon Date 5-25-83 Remarks

Final Surface Is Acceptable

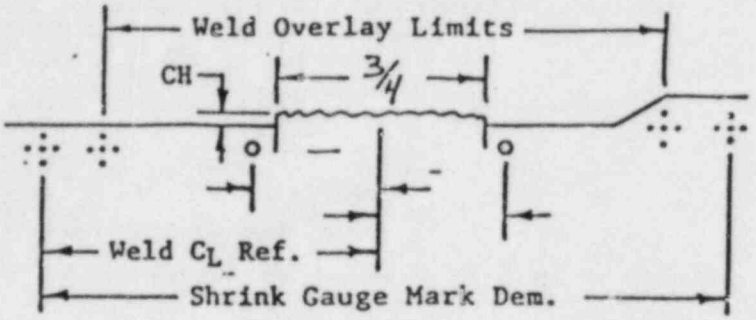
MQC [illegible] Date 5-27-83 Remarks

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	AD	MY					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

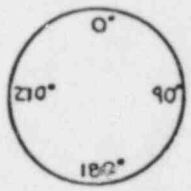
Weld Overlay Data Sheet

Nozzle

Weld # 31 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.800	6.680	.120
90°	6.802	6.670	.132
180°	6.770	6.596	.174
270°	6.967	6.818	.149

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.687		.954		.267	
.636		.944		.308	
.687		1.016		.329	
.756		.974		.218	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.317	1/16	4.128
90°	3.559	1/16	4.111
180°	3.392	1/16	4.090
270°	3.839	3/32	4.081

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,7,14	ER-308L	20642	YES
2nd Layer	GP-3,5,7,8,9	↓	↓	↓
3rd Layer	GP-3,5,7,8,9	↓	↓	↓
4th Layer				
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC W.R. Henshaw Date 5/7/83 Remarks INITIAL UT: W.R. Henshaw 5/7/83

Post Weld Surface Profile Acceptance

MQC B. Smith Date 5/11/83 Remarks FINAL UT: WP Trombley IV 5-27-83

Final Layer Ferrite 12.5 % MT&E# TE-531

MQC B. Smith Date 5/11/83 Remarks

Final Surface PT Acceptable

MQC Chuck Spoone Date 5-27-83 Remarks

REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD
0	5/3/83	AD	MF				

Enclosure 1
WELD OVERLAY DATA SHEET

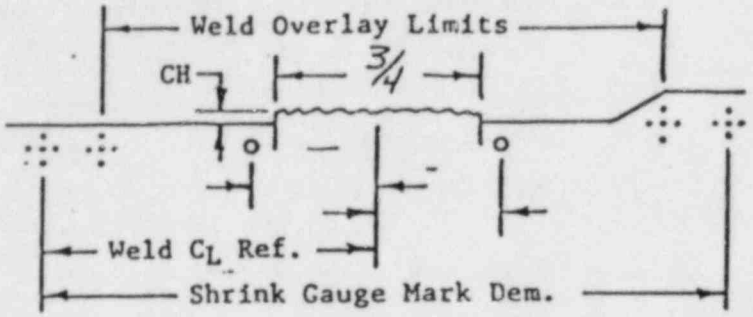
MERCURY COMPANY OF NORWOOD, INC.

SPN-70149-700 SH 1 OF 1

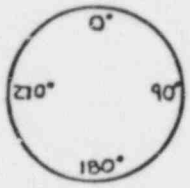
Group

Weld Overlay Data Sheet

Weld # 30 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.503	6.394	.109
90°	5.788	5.701	.087
180°	6.447	6.320	.127
270°	5.868	5.753	.115

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.665		1.065		.400	
.636		1.064		.428	
.597		1.041		.444	
.642		1.041		.399	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.635	1/8	4.125
90°	3.632	3/32	4.125
180°	3.667	3/32	4.023
270°	3.645	3/32	4.036

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,6,8,13,14	ER-308L	20651	YES
2nd Layer	GP-3,11,12,16		20663	
3rd Layer	GP-3,5,11,15			
4th Layer	GP-7,9,14			
5th Layer	GP-3,5,9,14,15			

Pre-Weld Surface Visual Examination Acceptance

MQC Charles Spoone Date 5/6/83 Remarks INITIAL UT: [signature] 5/7/83

Post Weld Surface Profile Acceptance

MQC Charles Spoone Date 5/16/83 Remarks FINAL UT: WR#6 for M. PARLA 5/25/83

Final Layer Ferrite 12.5% MT&E# TE-531

MQC Charles Spoone Date 5/16/83 Remarks

Final Surface LP Acceptable

MQC Conrad W Wilson Date 5/26/83 Remarks

ORIGINAL

REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD
0	5/3/83	[signature]	[signature]				

Enclosure 1
WELD OVERLAY DATA SHEET

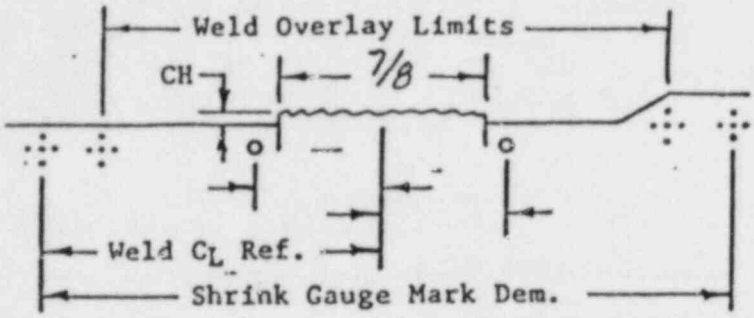
MERCURY COMPANY OF NORWOOD, INC.

SPN-70149-700 SH 1 OF 1

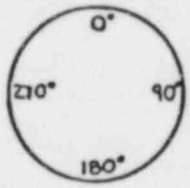
Elbow

Weld Overlay Data Sheet

Weld # 29 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	5.073	4.840	.233
90°	5.270	5.126	.144
180°	5.382	5.236	.146
270°	5.405	5.249	.156

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.615		.830		.215	
.618		.832		.214	
.619		.860		.261	
.669		.905		.236	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	2.511	1/16	3.298
90°	2.672	1/32	3.271
180°	2.747	0	3.409
270°	2.685	0	3.327

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-R,10,11,12	ER-308L	20629	No
2nd Layer	GP-4,5,11,R,13,14	↓	↓	↓
3rd Layer	GP-5R,10,11,14,17	↓	↓	↓
4th Layer				
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC B. Lunette Date 5/22/83 Remarks INITIAL UT: B. Lunette 5/22/83

Post Weld Surface Profile Acceptance

MQC [signature] Date 5/25/83 Remarks FINAL UT: WAH for M. T. RLA 5/25/85

Final Layer Ferrite 12.5 % MT&E# TE-531

MQC [signature] Date 5/25/83 Remarks

Final Surface LP Acceptable

MQC Conrad Wurdeman Date 5/24/83 Remarks

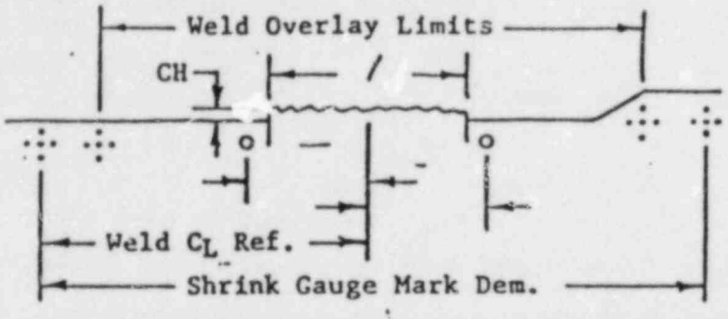
ORIGINAL

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	AP	MH					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

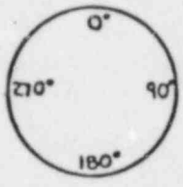
Nozzle

Weld Overlay Data Sheet

Weld # 25 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.871	6.704	.167
90°	6.873	6.714	.159
180°	6.872	6.674	.198
270°	6.922	6.772	.150

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.675		.940		.265	
.679		.949		.270	
.627		.943		.316	
.662		.941		.279	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.394	3/32	4.015
90°	3.381	3/32	4.029
180°	3.331	3/32	4.044
270°	3.333	3/32	4.049

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-7,8,9,10	ER-308L	20642	YES
2nd Layer	GP-3,5,8	↓	↓	↓
3rd Layer	GP-3,4,5,8,9,10	↓	↓	↓
4th Layer				
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC Charles Spoon Date 5/7/83 Remarks INITIAL UT: Charles Spoon 5/7/83

Post Weld Surface Profile Acceptance

MQC [signature] Date 5/10/83 Remarks FINAL UT: [signature] for M.PARLA 5/25/83

Final Layer Ferrite 12.5% MT&E# TC-531

MQC [signature] Date 5/11/83 Remarks

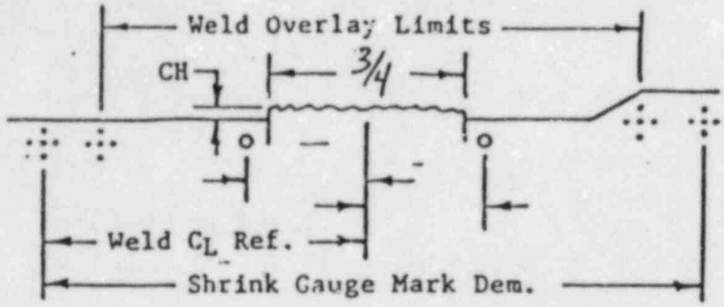
Final Surface LP Acceptable

MQC [signature] Date 5/26/83 Remarks

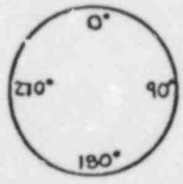
								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	[signature]	[signature]					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

Weld Overlay Data Sheet

Weld # 24 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	5.344	5.237	.107
90°	5.387	5.269	.118
180°	5.415	5.328	.087
270°	5.295	5.208	.087

UT THICKNESS DATA					
Initial		Post Weld		△	
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.659		.919		.260	
.675		.902		.227	
.662		.909		.247	
.687		.911		.224	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	2.620	1/16	2.731
90°	2.676	1/32	2.573
180°	2.694	1/16	2.696
270°	2.602	0	2.580

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-8,10,12	ER-308L	20629	YES
2nd Layer	GP-2,4,10,12	↓	↓	↓
3rd Layer	GP-5,8,10	↓	↓	↓
4th Layer				
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC A Teixeira Date 5/14/83 Remarks INITIAL UT: W.K. Hunsinger 5/14/83

Post Weld Surface Profile Acceptance

MQC A Teixeira Date 5/19/83 Remarks FINAL UT: A Teixeira 5/22/83

Final Layer Ferrite 12.5% MT&E# TE-531

MQC A Teixeira Date 5/19/83 Remarks

Final Surface LP Acceptable

MQC WRH for P. PELLERIN Date 5/26/83 Remarks

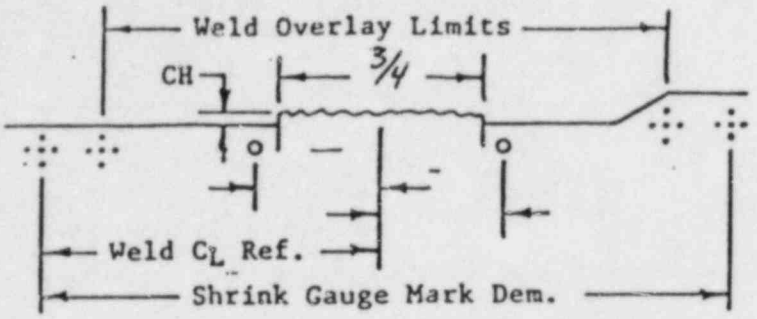
FOR INFO ONLY

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	AO	M					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

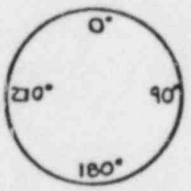
Draft

Weld Overlay Data Sheet

Weld # 23 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.492	6.372	.120
90°	5.800	5.723	.077
180°	6.121	5.973	.148
270°	6.246	5.953	.293

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.677		1.004		.327	
.655		.969		.314	
.656		.976		.320	
.670		1.064		.394	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.702	1/8	3.923
90°	3.594	3/32	3.818
180°	3.589	1/16	3.986
270°	3.629	1/16	3.938

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,4,6,15,16	ER-308L	20663	YES
2nd Layer	GP-3,6,15,16			
3rd Layer	GP-7,16			
4th Layer	GP-6,7,16			
5th Layer	GP-3,6,7,15			

Pre-Weld Surface Visual Examination Acceptance

MQC A Teixeira Date 5/10/83 Remarks INITIAL UT: [signature] 5/10/83

Post Weld Surface Profile Acceptance

MQC LRH for M.PARLA Date 5/18/83 Remarks FINAL UT: [signature] 5/28/83

Final Layer Ferrite 12.5 % MT&E# TE-531

MQC [signature] Date 5/18/83 Remarks

Final Surface LP Acceptable

MQC [signature] Date 5-27-83 Remarks

REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD
0	5/3/83	[signature]	[signature]				

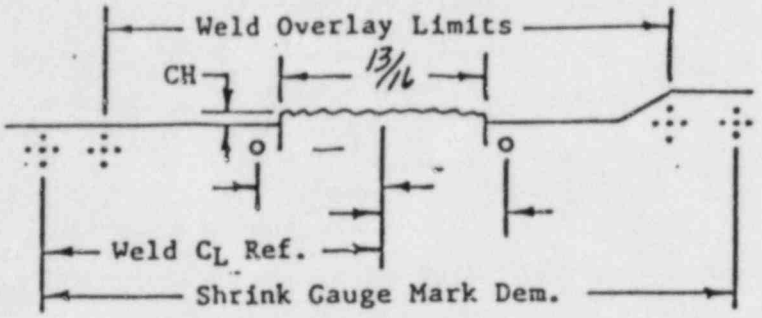
Enclosure 1
WELD OVERLAY DATA SHEET

MERCURY COMPANY OF NORWOOD, INC.

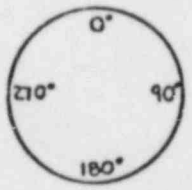
SPN-70149-700 SH 1 OF 1

Weld Overlay Data Sheet

Weld # 20 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	6.511	6.360	.151
90°	6.399	6.144	.255
180°	6.455	6.253	.202
270°	6.067	5.909	.158

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.668		1.143		.475	
.673		1.104		.431	
.661		1.130		.469	
.702		1.074		.372	

Location	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.640	1/8	4.425
90°	3.640	1/8	4.291
180°	3.634	1/16	4.270
270°	3.644	1/16	4.232

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-3,4,5,13,17	ER-308L	20663	YES
2nd Layer	GP-3,11,13,15			
3rd Layer	GP-13,16,17			
4th Layer	GP-5,11,12,17			
6th LAYER	GP-4,5,11,13	ER308L	20663	YES

Pre-Weld Surface Vis

MQC [signature] Date 5/10/83 Remarks INITIAL UT: [signature] 5/10/83

Post Weld Surface Profile Acceptance

MQC Mark Clifford Date 5/23/83 Remarks FINAL UT: [signature] for M. PARLA 5/25/83

Final Layer Ferrite 12.5% MT&E# TE-531

MQC [signature] Date 5/18/83 Remarks

Final Surface LP Acceptable

MQC T.J. [signature] Date 5/26/83 Remarks

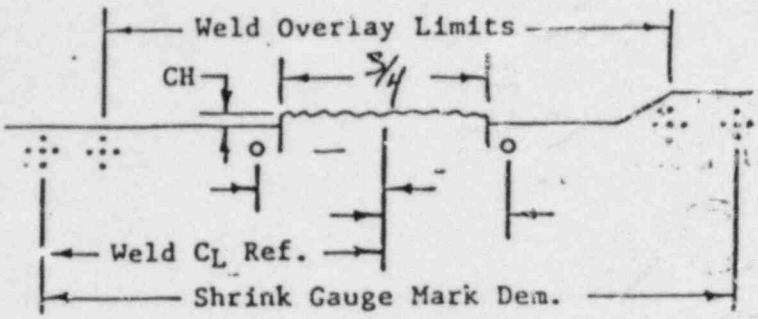
FOR INFO ONLY

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	AD	[signature]					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1

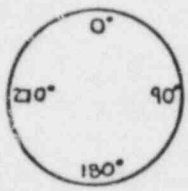
Elbow

Weld Overlay Data Sheet

Weld # 18 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



O - UT Thickness Gate Area

SHRINK GAUGE DATA			
Location	Initial	Post Weld	△
0°	5.168	5.018	.150
90°	5.204	5.084	.120
180°	5.414	5.320	.094
270°	5.281	5.124	.157

UT THICKNESS DATA				△	
Initial		Post Weld			
Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
.607		.860		.253	
.656		.899		.243	
.623		.881		.258	
.644		.931		.287	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	2.558	3/32	3.041
90°	2.635	3/32	3.000
180°	2.843	1/16	2.993
270°	2.685	1/8	2.961

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-8, 10, 12	ER-308L	20629	YES
2nd Layer	GP-25, 8, 12	↓	↓	↓
3rd Layer	GP-8, 10	↓	↓	↓
4th Layer				
5th Layer				

Pre-Weld Surface Visual Examination Acceptance

MQC A. Teixeira Date 5/13/83 Remarks INITIAL UT: A. Teixeira 5/15/83

Post Weld Surface Profile Acceptance

MQC W.R.H. for M. PARLA Date 5/13/83 Remarks FINAL UT: A. Teixeira 5/26/83

Final Layer Ferrite 12.5% MT&E# TE-531

MQC A. Teixeira Date 5/23/83 Remarks

Final Surface LP Acceptable

MQC [illegible] Date 5-27-83 Remarks

REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD
0	5/3/83	[illegible]	[illegible]				

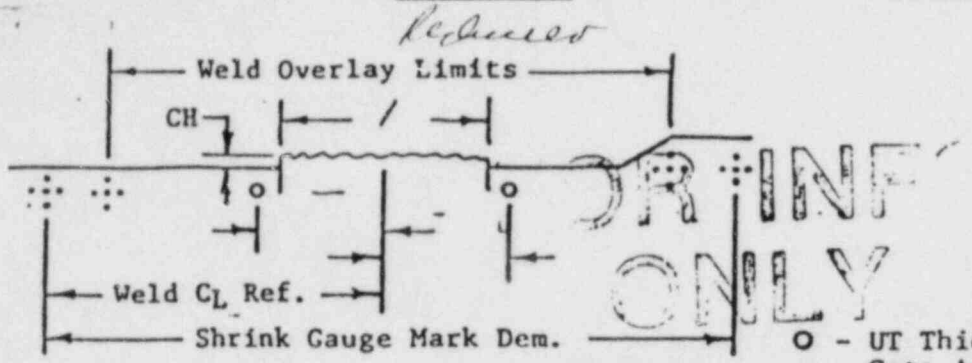
Enclosure 1
WELD OVERLAY DATA SHEET

MERCURY COMPANY OF NORWOOD, INC.

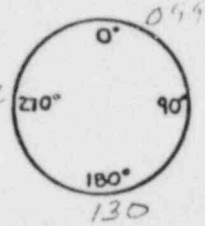
SPN-70149-700 SH 1 OF 1

Weld Overlay Data Sheet

Weld # 16 Welded Overlay WPS W-8/8-OL



Top Or Side Nearest Reactor Plan View



SHRINK GAUGE DATA				UT THICKNESS DATA				△	
				Initial		Post Weld			
Location	Initial	Post Weld	△	Pipe	Fitting	Pipe	Fitting	Pipe Side	Fitg. Side
0°	6.281	6.182	.099	.636		1.016		.380	.310
90°	6.279	6.103	.176	.648		.983		.335	
180°	6.592	6.462	.130	.663		.989		.326	
270°	6.312	6.188	.124	.583		1.005		.422	

	Weld C_L to Reference Dim.	CH	Weld Overlay Final Length
0°	3.554	1/16	5.153
90°	3.596	3/32	5.198
180°	3.683	1/16	5.045
270°	3.635	1/16	5.146

	Welder's ID	Material	Heat No.	Waterflow (Y/N)
1st Layer	GP-5,11,12,13,16,17	ER-308L	20663	YES
2nd Layer	GP-5,11,12,13,17			
3rd Layer	GP-5,11,12,13,14,17			
4th Layer	GP-5,11,13,14,16			
5th Layer	GP-3,5,8,11,12,14,17			NO

Pre-Weld Surface Visual Examination Acceptance

MQC [illegible] Date 5/10/83 Remarks INITIAL UT: [illegible] 5/10/83

Post Weld Surface Profile Acceptance

MQC [illegible] Date 5/27/83 Remarks FINAL UT: [illegible] 5-27-83

Final Layer Ferrite 12.5% MT&E# TE-531

MQC [illegible] Date 5/27/83 Remarks

Final Surface LP Acceptable

MQC [illegible] Date 5/27/83 Remarks

								Enclosure 1 WELD OVERLAY DATA SHEET
								MERCURY COMPANY OF NORWOOD, INC.
0	5/3/83	[illegible]	[illegible]					
REV	DATE	CHKD	APPVD	REV	DATE	CHKD	APPVD	SPN-70149-700 SH 1 OF 1