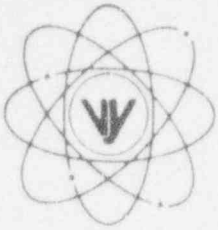


VERMONT YANKEE NUCLEAR POWER CORPORATION



Ferry Road, Brattleboro, VT 05301-7002

REPLY TO
ENGINEERING OFFICE
580 MAIN STREET
BOLTON, MA 01740
(508) 779-6711

June 10, 1994
BVY 94 - 62

United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

- References:
- a. License No. DPR-28 (Docket No. 50-271)
 - b. Letter, USNRC to [All Licensees], NVY 92-041, dated 3/6/92
 - c. Letter, VYNPC to USNRC, BVY 92-76, dated 7/3/92
 - d. Letter, USNRC to VYNPC, NVY 93-107, dated 7/21/93
 - e. Letter, VYNPC to USNRC, BVY 93-107, dated 9/24/93
 - f. Telecon, USNRC to VYNPC, dated 11/5/93
 - g. Letter, VYNPC to USNRC, BVY 93-146, dated 12/21/93
 - h. Letter, USNRC to VYNPC, NVY 94-47, dated 4/18/94
 - i. Letter, VYNPC to USNRC, BVY 94-56, dated 5/18/94

Subject: Generic Letter 92-01, Revision 1, "Reactor Vessel Structural Integrity"

The purpose of this letter is to provide supplemental information with regard to the subject issue, in accordance with our previous correspondence [Reference (i)].

Reference (b), USNRC Generic Letter 92-01, was sent to all operating reactors requesting information pertaining to the structural integrity of the reactor pressure vessel, specifically its capability of withstanding neutron embrittlement without violating the regulatory requirements of 10CFR50 Appendices G and H.

Vermont Yankee responded to Reference (b) with Reference (c). In Reference (d) NRC requested that Vermont Yankee detail how we complied with the necessary criteria, as well as requesting that materials data be provided. Reference (e) provided the requested information.

In Reference (f) NRC indicated that additional information was required for the Staff to complete their review of the Vermont Yankee submittal. These items are discussed below:

1. Submit upper shelf energy values for beltline plates 1-15, 1-16 and 1-17. If actual plate data do not exist submit test data from a sample of plates, using the mean minus two standard deviations value as a generic value for Vermont Yankee. In lieu of that submit an Equivalent Margins Analysis in accordance with ASME Code Case N-512.
2. Submit upper shelf energy values for all weld wire used in the core beltline region. If actual weld data do not exist submit test data from a sample of welds, using the mean minus two standard deviations value as a generic value for Vermont Yankee. In lieu of that submit an Equivalent Margin Analysis in accordance with ASME Code Case N-512.

Reference (g) transmitted the equivalent margin analysis for the Vermont Yankee reactor pressure vessel; it was applicable to Plates 1-14, 1-15 and 1-16 and all welds.

9406210354 940610
PDR ADDCK 05000271
P PDR

AC28

United States Nuclear Regulatory Commission
June 10, 1994
Page 2

Reference (h) provided two tables reporting the data for the Vermont Yankee reactor vessel that the NRC intended to enter into its database. NRC requested that Vermont Yankee verify the data and notify NRC of any inconsistencies within 30 days. Reference (i) notified NRC that some inconsistencies were identified, and that further information would be provided upon completion of our evaluation effort. This letter reports the inconsistencies we observed. For convenience we have also provided a marked-up set of tables in NRC format.

Following are the inconsistencies we observed:

1. In the "Summary Table for Pressure-Temperature Limits" the method of determining IRT_{NDT} for Plates 1-15, 1-16 and 1-17 should be MTEB 5-2, as reported in Reference (e).
2. In the "Summary Table for Pressure-Temperature Limits" the chemistry factors should be whole numbers since that is how they are presented in USNRC Regulatory Guide 1.99.
3. In the "Summary File for Upper Shelf Energy" the 1/4T USE at EOL/EFPY for Plate 1-14 should be 77 ft-lbf using the adjusted USE drop documented in Reference (g).
4. In the "Summary File for Upper Shelf Energy" the 1/4T USE at EOL/EFPY for Plates 1-15, 1-16 and 1-17 and Welds should be by the Equivalent Margin Analysis (EMA) as requested by the USNRC in Reference (f) and as submitted by VYNPC in Reference (g).
5. In the "Summary File for Upper Shelf Energy" the "Method of Determin. Unirrad. USE" for Plates 1-15, 1-16 and 1-17 and Welds should be blank.
6. In the "Summary File for Upper Shelf Energy" the "Unirrad. USE" for Plates 1-15, 1-16 and 1-17 and Welds should be EMA.

In the course of discussing these observed discrepancies with NRC staff we were requested to document the basis for the copper content used for the weld material. We stated that the upper bound assumption of 0.10 w/o copper was based on a previous USNRC accepted value for a similar reactor vessel fabricated by the same vendor at the same time frame; most of the weld wire heats were the same for both vessels. The NRC stated that they were rescinding that approval and requested that we obtain generic data to support our assumption, using the mean plus one standard deviation value from the generic data.

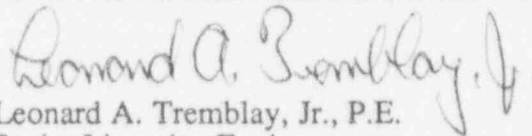
We obtained twenty-two (22) material certifications from the same vendor who produced the welding electrodes used to fabricate the Vermont Yankee reactor pressure vessel. These electrodes were produced contemporaneously with the Vermont Yankee electrodes, but they had copper content data. There are 22 data points with a mean value of 0.03 w/o copper and a standard deviation of 0.01 w/o, with a maximum value of 0.04 w/o copper. Since the 8018 weld electrode has no added copper, this sample is considered representative of generic 8018 material. Thus, the originally stated upper bound of 0.10 w/o copper is shown to be conservative. Using a generic value of 0.04 w/o copper, based on NRC requirements, with an upper bound of 1.00 w/o nickel for the welds requires the Chemistry Factor to be 54 in the "Summary File for Pressure-Temperature Limits".

United States Nuclear Regulatory Commission
June 10, 1994
Page 3

We trust that the information provided herein satisfactorily responds to your request and serves to close this issue as it pertains to Vermont Yankee. However, should additional information be required, please contact this office.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION



Leonard A. Tremblay, Jr., P.E.
Senior Licensing Engineer

Enclosed: Attachments 1 and 2

cc: USNRC Region I Administrator
USNRC Resident Inspector - VYNPS
USNRC Project Manager - VYNPS

Attachment 1 to BVY 94 - 62

Copies of Alloy Rod Company Material Certificates
for Typical Heats of 8018 Weld Rods (1969 - 1971)

R

CHEMETRON CORPORATION
ARC PRODUCTS DIV. - RESEARCH DEPARTMENT
CHEMICAL ANALYSIS JOB CARD

Date 10-9-71 Engineer [Signature] 10-18-71

Specimen	Lab. No.	R-7247	R-	R-	R-				
	Chem. Pad	✓							
	Weldment	10-14-71 S.S.							
	Core Wire								
	Other								
Electrodes	Size	3/16"							
	Type	8018NM							
	Heat No.	064565							
	Lot No.	J105A27A							
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓	.049	✓					
	Mn	✓	1.13	✓					
	Si	✓	.45	✓					
	P		.021	✓					C.34I
	S	✓	.018	✓					
	Cr								
	Ni	✓	.85	✓					
	Mo	✓	.51	✓					
	Fe								
	Al								
	Ti								
	Co								
V									
Cu		.03	✓						

WMS-201 REV 3

Form RD238-6-70

SALES

CHEMETRON CORPORATION
ARC PRODUCTS DIV. - RESEARCH DEPT.
RESEARCH DEPARTMENT ROUTING CARD TEST #362

Control No. _____ Date: Started 10-9-71 Completed _____

Assignee & Phase Completion Date: _____ TEST LAB ✓

Extrusion Lab. XRAY 10/10 RWB Chem. Lab. _____

Welding Lab. ✓ 10-14-71 S.S. Mach. Shop 10-20-71

Project: TEST AS PER SPEC WMS-201 REV 3

WELDER SET UP TO AWS A 5.5-6.9

HEAT TREATMENT 6 1/4 HRS @ 1125°F

Details: 3/16" ARM ARC 8018NM H1-064565 LOT J105A27A

TREATING TEMP +10°F DUE 10-29-71

LAT. FIP 5 IMPACTS 1-TENSILE (505)

70 SHEAR SR AI 362DX SR AF 362DZ Ø

NO WITNESS REQUIRED
Form RD118-6-70

Project Engineer: [Signature]

1 of 28

CHEMETRON CORPORATION
ARC PRODUCTS DIV. - RESEARCH DEPARTMENT
CHEMICAL ANALYSIS JOB CARD

Date 1-13-71 Engineer JFS 1-26-71

Specimen	Lab. No.	R-	R-	R-				
	Chem. Pad	<input checked="" type="checkbox"/>						
Weldment	<u>1/2" x 1/4" RFL</u>							
Core Wire								
Other								
Electrodes	Size	<u>5/32"</u>						
	Type	<u>8018NM</u>						
	Heat No.	<u>09L853</u>						
	Lot No.	<u>ALL1A27A</u>						
Analysis	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	<input checked="" type="checkbox"/>	<u>.052</u>	<input checked="" type="checkbox"/>				
	Mn	<input checked="" type="checkbox"/>	<u>1.23</u>	<input checked="" type="checkbox"/>				
	Si	<input checked="" type="checkbox"/>	<u>.46</u>	<input checked="" type="checkbox"/>				
	P		<u>.018</u>					
	S		<u>.023</u>					
	Cr							
	Ni	<input checked="" type="checkbox"/>	<u>.86</u>	<input checked="" type="checkbox"/>				
	Mo	<input checked="" type="checkbox"/>	<u>.51</u>	<input checked="" type="checkbox"/>				
	Fe							
	Al							
	Ti							
	Co							
V								
Cu		<u>.03</u>	<input checked="" type="checkbox"/>					

ASME SA 316

FORM RD 238-6-70

Control No. _____
Assignee & Phase Completion Date _____
Customer Lab XRAY 1-26-71
Welding Lab 1/2" x 1/4" ASME SA 316
TESTS PER SPEC ASME SA 316
TREATMENT 2018NM H-09L853 Lot ALL1A27A
DATE 2-5-71
58 2-1-71
1-TECHNICAL (405)

ALLOY RODS & COMPANY
DIVISION OF CHEMETRON CORPORATION
RESEARCH DEPARTMENT
ROUTING CARD TEST # 964
SALES

Date Started 1-14-71 Completed _____
Chem. Lab Testlab
March Shop 2-6-71

X-Ray Inspection Record

Test No. AI964CY47

Electrode Type 5/32" 8018NM Lot ALL1A27A Heat 09L853
Thickness of Plate 3/4" MIL Spec 371 B
Weld Position FLAT Source GE-300
Film to Plate Dist. 0 Time Exposure 2100
Dist. from Target 36 in. Tube Voltage KVP 220
Film Density 2.0 (aim) m. a. 10
Type Screen Lead Penetrometer 75-01
Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____
Date 1-26-71 Radiographer S. Field
AC-CU RD48-4-69

CHEMICAL ANALYSIS JOB CARD

Date 1-4-71 Engineer 9/2 1-15-71

Lab. No.	R2-6543	R.	R.	R.
Chem. Pad	✓			
Weldment	1-6-71 S.G.			
Core Wire				
Other				
Size	4/16			
Type	8018NM			
Heat No.	422B7201			
Lot No.	1030A27A			

	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
C	✓	.155	✓					
Mn	✓	1.22	✓					
Si	✓	.51	✓					
P	✓	.013	✓					
S	✓	.018	✓					
Cr								
Ni	✓	.90	✓					
Mo	✓	.51	✓					
Fe								
Al								
Ti								
Co								
V								
Cu		.04	✓					

Form RD238-6-70

Control No. _____
 Signature & Phase Completion Date: _____
 Extension Lab. XRAY 1-12-71 Chem. Lab. _____
 Welding Lab. 1-6-71 S.G. Mach. Shop 1-21-71
 Project: TEST AS PER SPEC ASME SEC III NUCLEOP
 (WRIGERS USE SITOP PER AWS P5.5-69)
 HEAT TREATMENT 624 HRS @ 1125°F
 1/4" HIGH ARC 8018NM HI-422B7201 LOT-1030A27A
 Temp _____
 DUE 1-25-71 SR-1-19-71
 5-IMPACTS 1-TENSILE (505)
 AI937FX SR AI937FZZ

ALLOY RODS COMPANY SALES
 RESEARCH DEPARTMENT ROUTING CARD TEST #937
 Date: Started 1-5-71 Completed _____

X-Ray Inspection Record

Test No. AI 937FX4Z

Electrode Type 1/4" 8018NM Lot 1030A27A Heat 422B7201
 Thickness of Plate 3/4" MIL Spec 271 B
 Weld Position FLAT Source GE-300
 Film to Plate Dist. 0 Time Exposure 2:00
 Dist. from Target 36 in. Tube Voltage KVP 250
 Film Density 2.0 (aim) m. a. 9.5
 Type Screen Lead Penetrometer .75-B1
 Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 1-12-71 Radiographer S. Hall AC-CO

RD48-4-69

CHEMETRON CORPORATION
ARC PRODUCTS DIV. - RESEARCH DEPARTMENT
CHEMICAL ANALYSIS JOB CARD

Date 12-22-70 Engineer PL 1-7-71

Specimen	Lab. No.	RQ-6527	R.	R.	R.		
	Chem. Pad	✓					
	Weldment	12/23/70 D. LAM					
	Core Wire						
	Other						
Electrodes	Size	5/32"					
	Type	8018NM					
	Heat No.	091853					
	Lot No.	1017A27A					
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓	0.36	✓			
	Mn	✓	1.07	✓			
	Si	✓	.44	✓			
	P		.014	✓			
	S		.007	✓			
	Cr						C.B.I.
	Ni	✓	.08	✓			
	Mo	✓	.55	✓			
	Fe						
	Al						
	Ti						
	Co						
	V						
Cu							

ASME DWG

Form RD238-6-70

ALLOY RODS COMPANY
RESEARCH DEPARTMENT ROUTING CARD
SALES #925

Control No. _____ Date: Started 12-22-70 Completed _____

Assignee & Phase Completion Date: _____

Extrusion Lab 12/1/71 Chem. Lab. Test Lab

Welding Lab 12/23/70 Mach. Shop 1-14-71

Project: Test As Per Spec ASME SA 316 (S.S.-Q) (NUCLEAR SPEC) (CBI)

Heat Treatment 12 1/2 Hrs @ 1125°F

Detail: 5/8" Ann Ann 8018NM H-091853 lot 1017A27A

Temp DOT 7-15-70 OR 1-11-71

5. Impact TENSILE (505)

AI 925CZ SR AI 925CZ

X-Ray Inspection Record

Test No. AI 925CZ9X

Electrode Type 5/32" 8018NM Lot 1017A27A Heat 091853

Thickness of Plate 3/4" MIL Spec 271 B

Weld Position FLAT Source GE-300

Film to Plate Dist. 0 Time Exposure 2:00

Dist. from Target 36 in. Tube Voltage KVP 250

Film Density 2.0 (aim) m. a. 10

Type Screen Lead Penetrometer .75 - B-1

Focal Spot Size 5 mm Type Film 1700AT-M

Remarks: _____

Date 12/30/70 Radiographer S. Kael A.C. Co.

RD48-4-69

CHEMETRON CORPORATION
 ARC PRODUCTS DIV. - RESEARCH DEPARTMENT
CHEMICAL ANALYSIS JOB CARD

Date 10-21-70 Engineer [Signature] 10 27-11

Specimen	Lab. No.	R.	R.	R.					
	Chem. Pad	RG 6410	✓						
Weldment									
Core Wire									
Other									
Electrodes	Size	<u>3/32</u>							
	Type	<u>8018NM</u>							
	Heat No.	<u>C3146C</u>							
	Lot No.	<u>1020A27A</u>							
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓	.063	✓					
	Mn	✓	.96	✓					
	Si	✓	.32	✓					
	P		.019	✓					
	S		.017	✓					
	Cr								
	Ni	✓	.89	✓					
	Mo	✓	.53	✓					
	Fe								
	Al								
	Ti								
	Cu		.02	✓					

ASME SEC. III

FORM RD23B-6-70

control No. _____
 Assignee & Phase Completion Date: _____
 Extension Lab X-Ray 11-10-70 Chem. Lab. _____
 Welding Lab. 11/9/70 DR. Mach. Shop 11/18/70
 Project: Test A3 Pin Spec ASME SA316
Test Lab
 Alloy Rods Company SALES
 Research Department Routing Card TEST #875
 Date Started 10-25-70 Completed _____
 Date 11-13-70 SR 11-16-70
 Project: Test A3 Pin Spec ASME SA316
Ammer 8018NM 1/16-3/16 1/16-3/16 1/16-3/16
Ammer 8018NM 1/16-3/16 1/16-3/16 1/16-3/16
Impact
875EX SR AI875EZ
Impact
875EX SR AI875EZ

X-Ray Inspection Record

Test No. AI875EZ4X

Electrode Type 3/32 8018NM Lot 1020A27A Heat C3116C
 Thickness of Plate 3/16" MIL Spec 271 B
 Weld Position FLAT Source GE-300
 Film to Plate Dist. 0 Time Exposure 2:00
 Dist. from Target 36 in. Tube Voltage KVP 250
 Film Density 2.0 (aim) m. a. 10
 Type Screen Lead Penetrometer .75 - B1
 Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 11-9-70 Radiographer S. Hall

AC-CU RD48-4-69

5

ALLOY RODS CO. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 7-21-70 Engineer [Signature] 9-3-70

Specimen	Lab. No.	<u>R6267</u>	R.	R.	R.		
	Chem. Pad	<input checked="" type="checkbox"/>					
	Weldment						
	Core Wire						
	Other						
Electrodes	Size	<u>1/8"</u>					
	Type	<u>8018NM</u>					
	Heat No.	<u>432A2671</u>					
	Lot No.	<u>H019A27A</u>					
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	<input checked="" type="checkbox"/>	<u>.057</u>	<input checked="" type="checkbox"/>			
	Mn	<input checked="" type="checkbox"/>	<u>1.22</u>	<input checked="" type="checkbox"/>			
	Si	<input checked="" type="checkbox"/>	<u>.44</u>	<input checked="" type="checkbox"/>			
	P		<u>.019</u>	<input checked="" type="checkbox"/>			
	S		<u>.014</u>	<input checked="" type="checkbox"/>			
	Cr				<u>C.B.T</u>		
	Ni	<input checked="" type="checkbox"/>	<u>1.08</u>	<input checked="" type="checkbox"/>			
	Mo	<input checked="" type="checkbox"/>	<u>.51</u>	<input checked="" type="checkbox"/>			
	Fe						
	Al						
	Ti						
	Co						
	V						
Cu		<u>.04</u>	<input checked="" type="checkbox"/>				

ASME SA 316 QWMS201 REV 3 Form 80-23A-11-68

ALLOY RODS COMPANY
RESEARCH DEPARTMENT ROUTING CARD
#800
SALES #4
Date: Started 8-21-70 Completed 9-11-70

ee & Phase Completion Date: TESTING

Examination Lab. XRAY 9-11-70 Chem. Lab. TESTING

Welding Lab. [Signature] Mach. Shop 9-18-70

TEST AS PER SPEC ASME SA 316 (NUCLEAR CODE)

HEAT TREATMENT 625 HRS @ 11250F

ASME SA 316 QWMS201 Lot H019A27A

THR DUE 9-18-70 GR 9-14-70

5-IMPACTS TENSILE (350)

AI 800 BX SR AI 800 BZ Q'

X-Ray Inspection Record

Test No. AI 800 BX 02

Electrode Type 1/8" 8018NM Lot H019A27A Heat 432A2671

Thickness of Plate 3/4" MIL Spec 271 B

Weld Position FLAT Source GE-300

Film to Plate Dist. 0 Time Exposure 2:00

Dist. from Target 36 in. Tube Voltage KVP 250

Film Density 2.0 (aim) m. a. 85

Type Screen Lead Penetrometer .62-B1

Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 9-9-70 Radiographer S. Hall AC-CC

RD46-4-69

Date 8-14-70 Engineer *[Signature]* R-24-71

Specimen	Lab. No.	RD-247	R-	R-	R-				
	Chem. Pad	✓							
	Weldment								
	Core Wire								
	Other								
Electrodes	Size	5/32"							
	Type	8018NM							
	Heat No	662A746							
	Lot No	H013A27A							
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓	.060	✓					
	Mn	✓	.96	✓					
	Si	✓	1.38	✓					
	P		.021	✓					
	S		.017	✓					
	Cr								
	Ni	✓	.88	✓					C B&I
	Mo	✓	.52	✓					
	Fe								
	Al								
	Ti								
	Co								
V									
Cu			.03	✓					

Form RD-23A-11-68

ALLOY RODS COMPANY SALES
 RESEARCH-DEPARTMENT ROUTING CARD TEST # 792

rol No. _____ Date: Started 8-20-70 Completed _____

Ince & Phase Completion Date: _____ TEST Lab _____

Estimation Lab. *[Signature]* 9-11-70 Chem. Lab. _____

Welding Lab. *[Signature]* Mach. Shop 9-18-70

ext: TEST AS PER SPEC ASME A 316 (NUCLEAR)

HEAT TREATMENT 62 1/2 Hrs @ 1125°F

Lot: 5/2 Atom Dec 8018NM Hi-662A746 lot-H013A27A

116" Due 9-25-70 SR 9-14-70

5-IMPACTS TENSILE (505)

AI792CX SR AI792CZD

X-Ray Inspection Record

Test No. AI792CX4Z

Electrode Type 5/32" 8018NM Lot H013A27A Heat 662A746

Thickness of Plate 3/4" MIL Spec 271 B

Weld Position FLAT Source GE-300

Film to Plate Dist. 0 Time Exposure 2:00

Dist. from Target 36 in. Tube Voltage KVP 250

Film Density 2.0 (aim) m. a. 8.5

Type Screen Lead Penetrometer .62-B1

Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 9-9-70 Radiographer S. Kroll, R.C. Co

RD48-4-69

CHEMICAL ANALYSIS JOB CARD

Date 8-12-70 Engineer J.P. 7-5-70

Specimen	Lab. No.	<u>R2-228</u>	R.	R.	R.
	Chem. Pad	<u>✓</u>	<u>✓</u>		
	Weldment	<u>8-26-70</u>	<u>20 m.</u>		
	Core Wire				
Electrodes	Other				
	Size	<u>3/32"</u>			
	Type	<u>5018NM</u>			
	Heat No.	<u>421A6811</u>			
Lot No.	<u>H010A27A</u>				

	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
C	<u>✓</u>	<u>.057</u>	<u>✓</u>					
Mn	<u>✓</u>	<u>1.16</u>	<u>✓</u>					
Si	<u>✓</u>	<u>.50</u>	<u>✓</u>					
P		<u>.020</u>	<u>✓</u>					
S		<u>.016</u>	<u>✓</u>					
Cr								
Ni	<u>✓</u>	<u>.89</u>	<u>✓</u>					
Mo	<u>✓</u>	<u>.46</u>	<u>✓</u>					
Fe								
Al								
Ti								
Co								
V								
Cu		<u>.03</u>	<u>✓</u>					

Form RD-75A-11-68

ALLOY RODS COMPANY
RESEARCH DEPARTMENT ROUTING CARD

Control No. _____ Date: Started 8-13-70 Completed _____

Signature & Phase Completion Date: _____

Extraction Lab X-Ray 7-11-70 Chem. Lab. Tested

Welding Lab. 8/26/70 212 Mach. Shop 9-7-70

Opert: TEST AS PER SPEC ASMT PAR NSL.3 SEC III

NUCLEAR CODE

HEAT TREATMENT 620 hrs @ 11850F

5018NM HE-421A6811 Lot-H010A27A

REC 9-18-70 SR 9-14-70

5-EGGACTS TENSILE (505)

SR AI 771EX SR AI 771EZ

X-Ray Inspection Record

Test No. AI 771EX4Z

Electrode Type 3/32" 5018NM Lot H010A27A Heat 421A6811

Thickness of Plate 3/32" MIL Spec 271 B

Weld Position FLAT Source GE-300

Film to Plate Dist. 0 Time Exposure 2:00

Dist. from Target 36 in. Tube Voltage KVP 250

Film Density 2.0 (aim) m. a. 8.5

Type Screen Lead P-netrometer 62-B-1

Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 9/9/70 Radiographer S. K. A.C.C.

RD48-4-69

RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 7-8-70 Engineer [Signature]

Specimen	Lab. No.	<u>R2-0158</u>	<u>R</u>	<u>R</u>	<u>R</u>				
	Chem. Pad	<input checked="" type="checkbox"/>							
	Weldment								
	Core Wire								
	Other								
Electrodes	Size	<u>5/32"</u>							
	Type	<u>8018 NM</u>							
	Heat No.	<u>01L333</u>							
	Lot No.	<u>F025A 27A</u>							
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	<input checked="" type="checkbox"/>	<u>.055</u>	<input checked="" type="checkbox"/>					
	Mn	<input checked="" type="checkbox"/>	<u>1.07</u>	<input checked="" type="checkbox"/>					
	Si	<input checked="" type="checkbox"/>	<u>.47</u>	<input checked="" type="checkbox"/>					
	P		<u>.021</u>	<input checked="" type="checkbox"/>					
	S		<u>.018</u>	<input checked="" type="checkbox"/>					
	Cr								
	Ni	<input checked="" type="checkbox"/>	<u>.93</u>	<input checked="" type="checkbox"/>					
	Mo	<input checked="" type="checkbox"/>	<u>.54</u>	<input checked="" type="checkbox"/>					
	Fe								
	Al								
	Ti								
	Co								
	V								
	Cu		<u>.02</u>	<input checked="" type="checkbox"/>					

SPEC. ASME 316 & WMS 201 Form RD-23A-11-68

ALLOY RODS COMPANY		SALES
RESEARCH DEPARTMENT, ROUTING CARD		TEST # <u>716</u>
Control No.	Date: Started <u>7-8-70</u> Completed	
Assignee & Phase Completion Date:	<u>TEST LAB</u>	
Extrusion Lab.	Chem. Lab.	
Welding Lab. <u>7/9/70</u>	<u>K.M.</u>	Mach. Shop <u>7-21-70</u>
Project:	<u>TEST AS PER SPEC. ASME 316 & WMS 201</u>	
	<u>REV 1</u>	
	<u>HEAT TREATMENT 6 2 1/4 HR @ 1125°F.</u>	
Details:	<u>5/32" ATOM ARC 8018 NM HT-01L333 Lot-F025A02A</u>	
LAT. EXP.	<u>DUE 7-21-70</u>	<u>SR-7-17-70</u>
<u>20 SHEAR</u>	<u>5 IMPACT</u>	<u>TENSILE (305)</u>
TESTING TEMP <u>+100°F</u>	<u>SR AI 716 C X</u>	<u>SR AI 716 C Z</u>
<u>NO. WITNESS REQUIRED</u>		
FORM RL31 ANSCO	Project Engineer: <u>[Signature]</u>	

ALLOY RODS CO. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 6-26-70 Engineer [Signature] 7-7-70

Specimen	Lab. No.	<u>R9-6103</u>	R.	R.	R.				
	Chem. Pad	<input checked="" type="checkbox"/>							
	Weldment								
	Core Wire								
	Other								
Electrodes	Size	<u>7/32"</u>							
	Type	<u>8018 NM</u>							
	Heat No.	<u>421A6811</u>							
	Lot No.	<u>F023A27A</u>							
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	<input checked="" type="checkbox"/>	<u>.052</u>	<input checked="" type="checkbox"/>					
	Mn	<input checked="" type="checkbox"/>	<u>.74</u>	<input checked="" type="checkbox"/>					
	Si	<input checked="" type="checkbox"/>	<u>.41</u>	<input checked="" type="checkbox"/>					
	P		<u>.019</u>	<input checked="" type="checkbox"/>					
	S		<u>.014</u>	<input checked="" type="checkbox"/>					
	Cr								
	Ni	<input checked="" type="checkbox"/>	<u>.87</u>	<input checked="" type="checkbox"/>					
	Mo	<input checked="" type="checkbox"/>	<u>.52</u>	<input checked="" type="checkbox"/>					
	Fe								
	Al								
	Ti								
	Co								
	V								
	Cu		<u>.03</u>	<input checked="" type="checkbox"/>					

ASME SA 316 UN S 201 REU Form RD-23A-11-68

ALLOY RODS COMPANY S.A.P.S.
RESEARCH DEPARTMENT ROUTING CARD TEST #107

Control No. _____ Date: Started 6-26-70 Completed _____

Assignee & Phase Completion Date: Test Lab 7-22-70

Extortion Lab. Chem. Lab.

Welding Lab. 7-10-70 Mach. Shop 7-21-70

Project: TEST AS PER SPEC ASME PAR 1511.3 SECT III
NUCLEAR CODE

Details: HEAT TREATMENT 62 1/2 HRS @ 1125°F
7/32" A1018 NM HT-421A6811 Lot F023A27A

LAT. EXP. DUE 7-17-70 CR-7-17-70

70 SHEAR 5 IMPACTS TENSILE (505)

TESTING +10°F SR. A1707E X SR. A1707EZ

NO WITNESS REQUIRED

CHEMICAL ANALYSIS JOB CARD

Date 6-16-70 Engineer 215 7-10-70

Specimen	Lab. No.	R-	R-	R-			
	Chem. Pad	<u>R-6085</u>					
Weldment							
Core Wire							
Other							
Electrodes	Size	<u>3/16</u>					
	Type	<u>RO18NM</u>					
	Heat No.	<u>066165</u>					
	Lot No.	<u>FOIL A 27A</u>					
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓ .060					
	Mn	✓ .93					
	Si	✓ .32					
	P	.021					
	S	.016					
	Cr						
	Ni	✓ .85					
	Mo	✓ .48					
	Fe						
	Al						
	Ti						
	Co						
V							
Cu		1.03					

SPEC. ASME SA 316 WAS 301 REV 1

Control No. _____
 Assignee & Phase Completion Date: _____
 Extension Lab XRAY 7-6-70 Chem. Lab. _____
 Welding Lab. 6/15/70 R. M. Mach. Shop 7/14/70
 Project: TEST AS PER SPEC ASME PAR M51.3 SEC III
NUCLEAR CODE
HEAT TREATMENT 625 HRS @ 1125 OF
3/4" DIA DIA 8018NM HI-066165 FOR FOIL A27A
 Date Started 6-16-70 Completed _____
 Alloy Rods Company SALES
 RESEARCH DEPARTMENT ROUTING CARD 701
 Date 7-17-70 SR 7-10-70
IMPACTS TENSILE (5005)
701DX SR AI 70107V

X-Ray Inspection Record

Test No. AI 701DX42

Electrode Type 3/16" 8018NM Lot FOIL A 27A Heat 066165
 Thickness of Plate 3/4" MIL Spec 271 B
 Weld Position FLAT Source GE-300
 Film to Plate Dist. 0 Time Exposure 2:00
 Dist. from Target 36 in. Tube Voltage KVP 275
 Film Density 2.0 (aim) m. a. 7
 Type Screen Lead Penetrometer 75-B-1
 Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 7/2/70 Radiographer C. Hantz A.C. Co.

RD48-4-69

ALLOY RODS CO. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 4-6-70 Engineer [Signature] 421

Specimen	Lab. No.	R		R		R			
	Chem. Pad								
Weldment	<u>4/15/70 R.M.</u>								
Core Wire									
Other									
Electrodes	Size	<u>1/8"</u>							
	Type	<u>8018NM</u>							
	Heat No.	<u>06R885</u>							
Lot No.	<u>D001A22A</u>								
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓	.052	✓					
	Mn	✓	1.24	✓					
	Si	✓	.52	✓					
	P		.019	✓					
	S		.024	✓					
	Cr								
	Ni	✓	.93	✓					
	Mo	✓	.5A	✓					
	Fe								
	Al								
	Ti								
Co									
V									
Cu		.03	✓						

ASME PAR N511.3 SEC III

Form RD-23A-11-68

ALLOY RODS COMPANY
RESEARCH DEPARTMENT ROUTING CARD TEST #620
SALES

Control No. _____
Assignee & Phase Completion Date: _____
Date: Started 4-6-70 Completed _____

Welding Lab 4/15/70 R.M. Mach. Shop 5/17/70
Lab X-Ray 4/9/70 Chem. Lab. _____
TEST LAB

Project: TEST AS PER SPEC ASME PAR N511.3 SEC III
NUCLEAR CODE _____

HEAT TREATMENT 62 HRS @ 1125°F
1/2" ATOM REC 8018NM HR-06 R885 Lot D001A22A

DUF 4-28-70
5 IMPACTS
SR AI 620BXO
TENSILE (350)
SR AI 620BZP

X-Ray Inspection Record

Test No. AI 620BXZ7

Electrode Type 1/8" 8018NM Lot D001A22A Heat 06R885
Thickness of Plate 3/4" MIL Spec 271 B
Weld Position FLAT Source GE-300
Film to Plate Dist. 0 Time Exposure 2:00
Dist. from Target 36 in. Tube Voltage KVP 250
Film Density 2.0 (aim) m. a. 8.5
Type Screen Lead Penetrometer 75-B-1
Focal Spot Size 5 mm Type Film IT 071A4-M

Remarks: _____

Date 4-28-70 Radiographer S. Khalil A.C. Co.

RD48-4-69

DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 3-9-70 Engineer JH 3-25-7

Specimen	Lab. No.	R5 5876		R.	R.			
	Chem. Pad							
	Weldment	3/13/70 2-27						
	Core Wire							
	Other							
Electrodes	Size	3/16"						
	Type	8018NM						
	Heat No.	CTY538						
	Lot No.	B012A27A						
Analysis	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓	.060	✓				
	Mn	✓	1.13	✓				
	Si	✓	.51	✓				
	P		.020	✓				
	S		.016	✓				CB4 F
	Cr			✓				
	Ni	✓	.84	✓				
	Mo	✓	.55	✓				
	Fe							
	Al							
	Ti							
	Co							
V								
Cu			.03	✓				

ASME Sec III PAR. N511.3 Form RD 23A-11-68

Control No. _____
 Assignee & Phase Completion Date: _____
 Lab. X-Ray 3-31-70 Chem. Lab. Tested ✓
 Welding Lab. 3/16/70 Mach Shop 4-9-70
 Project: TEST AS PER SPEC. ASME SEC III PAR. N511.3
 NUCLEAR GRADE
 HPS THERMATEX 600 lbs @ 11250F
 Detail: 3/16" Area Arc 8018NM H-CTY538 Lot-B012A27A
 DOE 3-26-70 SR-4-3-70
 5-IMPACTS TENSILE
 5-ASIG8DXQ SR AI568DZV

ALLOY RODS COMPANY SALES
 RESEARCH DEPARTMENT ROUTING CARD TEST #568

X-Ray Inspection Record

Test No. AI568DY4Z

Electrode Type 3/16" 8018NM Lot B012A27A Heat CTY538
 Thickness of Plate 3/4 MIL Spec 271 B
 Weld Position FLAT Source GE-300
 Film to Plate Dist. 0 Time Exposure 2:00
 Dist. from Target 36 in. Tube Voltage KVP 250
 Film Density 2.0 (aim) m. a. 7.5
 Type Screen Lead Penetrometer 75-B-1
 Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____
 Date 3-30-70 Radiographer S. Knapp A.C. Co
 RD48-4-69

Date 3-9-70 Engineer [Signature]

Specimen	Lab. No.	<u>R9-5875</u>	R.	R.					
	Chem. Pad								
	Weldment	<u>3/11/70 K.M.</u>							
	Core Wire								
	Other								
Electrodes	Size	<u>3/32"</u>							
	Type	<u>8018NM</u>							
	Heat No.	<u>048976</u>							
	Lot No.	<u>0004A27A</u>							
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓	.249	✓					
	Mn	✓	1.18	✓					
	Si	✓	.50	✓					
	P		.018	✓					
	S		.017	✓					
	Cr								
	Ni	✓	.89	✓					C.B.F.
	Mo	✓	.58	✓					
	Fe								
	Al								
	Ti								
	Co								
V									
Cu		.02	✓						

ASME SEC III PAR. N511.3 Form RD-22A-11-68

ALLOY RODS COMPANY SALES.

RESEARCH DEPARTMENT ROUTING CARD TEST # 567

1. Phase Completion Date: Test Lab

2. Date: Started 3-9-70 Completed 4-9-70

Welding Lab. 3/13/70 K.M. Mach. Shop 4-9-70

TEST AS PER SPEC ASME SEC III PAR. N511.3

NUCLEAR CODE

Heat Treatment 675 Hrs @ 1125°F

Alloy 8018NM H-048976 Lot-0004A27A

Section SR AI567CZ

Impact AI567CZ

Doc 3-26-70 SR 4-5-70

TEASIE (505)

Engineer: [Signature]

X-Ray Inspection Record

Test No. AI567CZ

Electrode Type 3/32" 8018NM Lot 0004A27A Heat 048976

Thickness of Plate 3/4" MIL Spec 271 B

Weld Position FLAT Source GE-300

Film to Plate Dist. 0 Time Exposure 2:00

Dist. from Target 36 in. Tube Voltage KVP 250

Film Density 2.0 (aim) m. a. 9.5

Type Screen Lead Penetrometer 75-B-1

Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 3-30-70 Radiographer S. Knall A.C.Co.

RD48-4-69

Date 2-27-70 Engineer 9/1

Specimen	Lab. No.	R-	R-	R-					
	Chem. Pad	<u>R2-5859</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Weldment									
Core Wire									
Other									
Electrodes	Size	<u>1/4"</u>							
	Type	<u>8018 NM</u>							
	Heat No.	<u>402 A041</u>							
Lot No.	<u>B026A27A</u>								
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	<input checked="" type="checkbox"/>	<u>.068</u>	<input checked="" type="checkbox"/>					
	Mn	<input checked="" type="checkbox"/>	<u>1.01</u>	<input checked="" type="checkbox"/>					
	Si	<input checked="" type="checkbox"/>	<u>.41</u>	<input checked="" type="checkbox"/>					
	P		<u>.019</u>	<input checked="" type="checkbox"/>					
	S		<u>.016</u>	<input checked="" type="checkbox"/>			<u>C B d I</u>		
	Cr								
	Ni	<input checked="" type="checkbox"/>	<u>.86</u>	<input checked="" type="checkbox"/>					
	Mo	<input checked="" type="checkbox"/>	<u>.51</u>	<input checked="" type="checkbox"/>					
	Fe								
	Al								
	Ti								
	Co								
V									
Cu		<u>.02</u>	<input checked="" type="checkbox"/>						

ALLOY RODS COMPANY SALES
 RESEARCH DEPARTMENT ROUTING CARD # 559

Phase Completion Date: 3-3-70 Completed 3-24-70
 Date Started 3-3-70

Welding Lab. X-Ro1 Mach. Shop 3/24/70
3/9/70 J.M.

ESR AS PER SPEC ASME SEC III PAR N511.3
 NUCLEAR CODE

62 1/2 HRS @ 1125 OF
 8018 NM H-402A041 LOT B026A27A

DUE 3-24-70
 SR 3-25-70

SR A1559FXZ

ASME PAR N511.3 SEC III Form RD-20A-11-68

X-Ray Inspection Record

Test No. A1559FXZ

Electrode Type 1/4" 8018 NM Lot B026A27A Heat 402A041
 Thickness of Plate 1" MIL Spec 271 B
 Weld Position FLAT Source GE-300
 Film to Plate Dist. 0 Time Exposure 2:20
 Dist. from Target 36 in. Tube Voltage KVP 300
 Film Density 2.0 (aim) m. a. 8
 Type Screen Lead Penetrometer LoD - B1
 Focal Spot Size 5 mm Type Film KODAK - M

Remarks: _____

Date 3-16-70 Radiographer S. Mall AC-co

MAY-23-94 MON 10:45

OPER & MAINT SUPPORT

FAX NO. 6123477369

P. 20

HEAT TREATMENT 62 1/2 HRS @ 1125°F

Details: 7/8" ATOM ARC 8018NM HT-H02A0462 LOT B023A27A

DUE 3-20-70

TESTING TEMP. +100°F

5 IMPACTS TENSILE (505)

SR. AI 557 EX ✓ SR. AI 557 EZ ✓

Project Engineer: [Signature]

Control No. _____ Date: Started 2-27-70 Completed 3-19-70

Assignee & Phase Completion Date: _____

Extension Lab. XRAY 3-10-70 Chem. Lab. _____

Welding Lab. 3/4/70 K.M. Mach. Shop 3-18-70 [Signature]

Project: TEST AS PER SPEC ASME SEC III PAR N511.3

NUCLEAR CODE _____

ALLOY RODS COMPANY SALES
RESEARCH DEPARTMENT ROUTING CARD # TEST 557

Lab. No.	Chem. Pad	Weldment	Core Wire	Other	Size	Type	Heat No.	Lot No.	Eft'd	Det'd	Est'd	Del'd	Eft'd	Det'd	Est'd	Del'd
R35855					3/8"	8018NM	H02A0462	B023A27A								
										.057						
										1.02						
										.40						
										.021						
										.018						
										.90						
										.52						
										.02						

Analysis: C, Mn, Si, P, S, Cr, Ni, Mo, Fe, Al, Ti, Co, V, Cu

Form 80-23A-11-68

X-Ray Inspection Record

Test No. AI 557 EX d Z

Electrode Type 3/32" 8018NM Lot B023A27A Heat H02A0462

Thickness of Plate 1" MIL Spec 271 B

Weld Position FCAW Source GE-300

Film to Plate Dist. 0 Time Exposure 2.10

Dist. from Target 36 in. Tube Voltage KVP 300

Film Density 2.0 (aim) m. a. 8

Type Screen Lead Penetrometer 1.0 - B1

Focal Spot Size 5 mm Type Film KODAK-M4

Remarks:

Date 3-9-70 Radiographer S. Hall AC-CC

DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 2-20-70 Engineer [Signature]

Specimen	Lab. No.	R05851		R.	R.	R.	
	Chem. Pad						
	Weldment	7/27/70 K.M.					
	Core Wire						
Electrodes	Other						
	Size	1/8"					
	Type	8018NM					
	Heat No.	432Z4521					
Lot No.		B020A27A					
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓	.060	✓			
	Mn	✓	1.20	✓			
	Si	✓	.42	✓			
	P		.018	✓			
	S		.017	✓			
	Cr						
	Ni	✓	.98	✓			
	Mo	✓	.54	✓			
	Fe						
	Al						
	Ti						
Co							
V							
Cu		.01	✓				

CBDT

ASME PAR 1511.3 SEC III Form RD-23A-11

ALLOY RODS COMPANY

RESEARCH DEPARTMENT ROUTING CARD TEST #555

Control No. _____ Date: Started 2-24-70 Completed _____

Assignee & Phase Completion Date: _____ Test Lab _____

Lab XRAY 3-10-70 Chem Lab _____

Welding Lab 3/2/70 K.M. Mach. Shop 3-18-70 K.M.

Project: TEST AS PER SPEC ASME PAR 1511.3 SEC III

NUCLEAR CODE _____

Heat Treatment 60 hrs @ 1125 OF

Details: 1/8" Alloy Rods 8018NM Hr-432Z4521 Lot-B020A27A

Temp 5 IMPACTS DOE 3-20-70 GR 3-11-70

AI 555 BX SR AI 555 B20

AI 555 BX SR AI 555 B20

AI 555 BX SR AI 555 B20

AI 555 BX SR AI 555 B20

Project Engineer: [Signature]

X-Ray Inspection Record

Test No. AI 555 BX 4Z

Electrode Type 1/8" 8018NM Lot B020A27A Heat 432Z4521

Thickness of Plate <u>3/4"</u>	MIL Spec <u>271 B</u>
Weld Position <u>FLAT</u>	Source <u>GE-300</u>
Film to Plate Dist. <u>0</u>	Time Exposure <u>2'00</u>
Dist. from Target <u>36 in.</u>	Tube Voltage KVP <u>2.50</u>
Film Density <u>2.0 (aim)</u>	m. a. <u>9.5</u>
Type Screen <u>Lead</u>	Penetrometer <u>75-8-1</u>
Focal Spot Size <u>5 mm</u>	Type Film <u>KODAK-M</u>

Remarks: _____

Date 3-9-70 Radiographer S. Krull A.C.C.

DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 2-5-70 Engineer gld

Specimen	Lab. No.	RD 5801	R.	R.	R.				
	Chem. Pad	✓							
	Weldment								
	Core Wire								
	Other								
Electrodes	Size	<u>5/32"</u>							
	Type	<u>8015NM</u>							
	Heat No.	<u>43220471</u>							
	Lot No.	<u>B003A27A</u>							
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓	.097	✓					
	Mn	✓	.92	✓					
	Si	✓	.33	✓					
	P		.017	✓					
	S		.019	✓			C	B	I
	Cr								
	Ni	✓	.91	✓					
	Mo	✓	.52	✓					
	Fa								
	Al								
	Ti								
	Co								
V									
Cu		.03	✓						

Spec. ASME SA 233 SECT II Form RD-23A-11-68

Control No. _____
 Assignee & Phase Completion Date: _____
 Lab. X-Ray 2-19-70 Chem. Lab. _____
 Welding Lab. 2/9/70 Math. Shop 2-26-70
 Project: TEST AS PER SPEC ASME PAR NS1.3
SECT II NUCLEAR COOL.
 Details: 1/2" Annular 8015NM H1-43220471 Lot-B003A27A
62 1/2" dia @ 11250F
 5 Taps INSIDE
 AI 527CX ✓ SR AI 527CZ
 Due 2-20-70 SR 2-25-70
 Project Engineer: gld

ALLOY RODS COMPANY SALES
RESEARCH DEPARTMENT ROUTING CARD TEST # 527

X-Ray Inspection Record

Test No. AI 527CX00Z

Electrode Type 5/32" 8015NM Lot B003A27A Heat 43220471
 Thickness of Plate 3/4" MIL Spec 271 B
 Weld Position FLOT Source GE-700
 Film to Plate Dist. 0 Time Exposure 2:00
 Dist. from Target 36 in. Tube Voltage KVP 250
 Film Density 2.0 (aim) m. a. 10
 Type Screen Lead Penetrometer .75-8-1
 Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 2-16-70 Radiographer S. Kuo A.O.C.

ALLOY RODS CO. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION

CHEMICAL ANALYSIS JOB CARD

Date 1-30-70 Engineer [Signature]

2-9-71

Specimen	Lab. No.	R.	R.	R.				
	Chem Pad	<u>RD-5786</u>						
Weldment								
Core Wire								
Other								
Electrodes	Size	<u>1/4"</u>						
	Type	<u>8018NM</u>						
	Heat No.	<u>H0129711</u>						
	Lot No.	<u>A022A27A</u>						
Analysis	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	<u>✓ .05</u>	<u>✓</u>					
	Mn	<u>✓ .15</u>	<u>✓</u>					
	Si	<u>✓ .39</u>	<u>✓</u>					
	P	<u>.021</u>	<u>✓</u>					
	S	<u>.017</u>	<u>✓</u>					
	Cr							
	Ni	<u>✓ .83</u>	<u>✓</u>					<u>CDI</u>
	Mo	<u>✓ .48</u>	<u>✓</u>					
	Fe							
	Al							
	Ti							
	Co							
	V							
Cu		<u>.02</u>	<u>✓</u>					

ASME PAR 1511.3 SEC III

Form RD-22A-11-68

ALLOY RODS COMPANY
RESEARCH DEPARTMENT ROUTING CARD TEST # 519

Control No. _____
Assignee & Phase Completion Date: _____
Date Started 1-30-70 Completed _____

Welding Lab 2/11/70 R.M. Mach Shop 2-26-70
Lab. XRAY 2-19-70 Chem. Lab. _____

Project: IN. As Rec. per NITE PARK 511.3 SEC III
NUCLEAR CODE

Details: W. Brown 695 lbs @ 11250F
Hi. Anal. Rec. 8018NM Hi-H0129711 Log A022A27A

INSURE (505)
AI 519 FZ
SR-2-23-70

X-Ray Inspection Record

Test No. AI 519 EX 022

Electrode Type 1/4" 8018NM Lot _____ Heat _____

Thickness of Plate 1 MIL Spec 271 B
Weld Position FLAT Source GG-300
Film to Plate Dist. 0 Time Exposure 2:15
Dist. from Target 36 in. Tube Voltage KVP 300
Film Density 2.0 (aim) m. a. 8
Type Screen Lead Penetrometer .87-8-1
Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 2/16/70 Radiographer S. Hall A.C.G.

RD48-4-69

ALLOY RODS CO. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 1-30-70 Engineer [Signature] 2-1-70

Specimen	Lab. No.	<u>R9-5787</u>	R.	R.	R.		
	Chem Pad	<input checked="" type="checkbox"/>					
	Weldment						
	Core Wire						
Electrodes	Size	<u>3/8"</u>					
	Type	<u>8018NM</u>					
	Heat No.	<u>CTY538</u>					
	Lot No.	<u>A027A27A</u>					
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	<input checked="" type="checkbox"/>	<u>.066</u>	<input checked="" type="checkbox"/>			
	Mn	<input checked="" type="checkbox"/>	<u>1.06</u>	<input checked="" type="checkbox"/>			
	Si	<input checked="" type="checkbox"/>	<u>.46</u>	<input checked="" type="checkbox"/>			
	P		<u>.020</u>	<input checked="" type="checkbox"/>			
	S		<u>.018</u>	<input checked="" type="checkbox"/>			
	Cr						
	Ni	<input checked="" type="checkbox"/>	<u>.83</u>	<input checked="" type="checkbox"/>			<u>CBIF</u>
	Mo	<input checked="" type="checkbox"/>	<u>.49</u>	<input checked="" type="checkbox"/>			
	Fe						
	Al						
	Ti						
	Co						
V							
Cu		<u>.03</u>	<input checked="" type="checkbox"/>				

ASME PAR. N511.3 SEC III Form RD-23A-11-68

ALLOY RODS COMPANY SALES
RESEARCH DEPARTMENT ROUTING CARD TEST # 518

Control No. _____ Date: Started 1-30-70 Completed _____

Assignee & Phase Completion Date: _____

Welding Lab. 2-9-70 Mach. Shop 2-25-70

Project: Test As Per Spec ASME PAR N511.3 SEC III

Details: 1-Target SR 2-20-70 SR 2-23-70

174151X SR AT 518 EZ

Project Engineer: [Signature]

X-Ray Inspection Record

Test No. AJ518 EXD EZ

Electrode Type 3/8" 8018NM Lot A027A27A Heat CTY538

Thickness of Plate 1" MIL Spec 271 B

Weld Position FLAT Source GE-300

Film to Plate Dist. 0 Time Exposure 2:15

Dist. from Target 36 in. Tube Voltage KVP 300

Film Density 2.0 (aim) m. a. 8

Type Screen Lead Penetrometer .87-B-1

Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 2/16/70 Radiographer S. Krall A.C.C.

ALLOY RODS CO. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 1-22-70 Engineer JH

Specimen	Lab. No.	<u>R35765</u>	R-	R-	R-
	Chem. Pad	<input checked="" type="checkbox"/>			
	Weldment				
	Core Wire				
Electrodes	Other				
	Size	<u>3/16"</u>			
	Type	<u>8018 NMM</u>			
	Heat No.	<u>05R938</u>			
Analysis	Lot No.	<u>A020A27A</u>			
		Est'd	Det'd	Est'd	Det'd
	C	<input checked="" type="checkbox"/>	<u>.077</u>	<input checked="" type="checkbox"/>	
	Mn	<input checked="" type="checkbox"/>	<u>.94</u>	<input checked="" type="checkbox"/>	
	Si	<input checked="" type="checkbox"/>	<u>.40</u>	<input checked="" type="checkbox"/>	
	P		<u>.018</u>	<input checked="" type="checkbox"/>	
	S		<u>.017</u>	<input checked="" type="checkbox"/>	
	Cr				
	Ni	<input checked="" type="checkbox"/>	<u>.91</u>	<input checked="" type="checkbox"/>	
	Mo	<input checked="" type="checkbox"/>	<u>.57</u>	<input checked="" type="checkbox"/>	
Fe	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
Al					
Ti					
Co					
V					
Cu		<u>.02</u>	<input checked="" type="checkbox"/>		

ASME SECTION PAR N511.3 Form RD-22A-11-68

ALLOY RODS COMPANY
RESEARCH DEPARTMENT ROUTING CARD TEST # 511

Control No. _____
Assignee & Phase Completion Date: _____
Date Started 1-29-70 Completed _____

Examination Lab X-Ray 2-19-70 Chem. Lab. _____
Welding Lab. 2-9-70 Mach. Shop 2-25-70

Project: Test As Per Spec ASME PAR N511.3 SEC III

Details: Heat Treatment: 625hrs @ 1125°F
ASME SECTION PAR N511.3 SEC III

Doc 2-20-70 SR-2-23-70
5 IMPACTS TEASIE (585)
AT511DX SR AT511DZ

X-Ray Inspection Record

Test No. AT511DX1Z

Electrode Type 3/16" 8018NMM Lot A020A27A Heat 05R938

Thickness of Plate 3/16" MIL Spec 271 B

Weld Position FLAT Source GE-300

Film to Plate Dist. 0 Time Exposure 2:00

Dist. from Target 36 in. Tube Voltage KVP 250

Film Density 2.0 (aim) m. a. 10

Type Screen Lead Penetrometer .75 -B-1

Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____
Date 2-16-70 Radiographer S. Krall A.C.Co.

ALLOY RODS Co. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 12-16-70 Engineer _____

Specimen	Lab. No.	R- 5677	R-	R-	R-				
	Chem. Pad	<i>[Handwritten Signature]</i>							
	Weldment								
	Core Wire								
	Other								
Electrodes	Size	7							
	Type	11	11						
	Heat No.	03P72							
	Lot No.	L712A32							
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C		.063	✓					
	Mn		.23	✓					.31
	Si		.48	✓					
	P		.020	✓					
	S		.016	✓					
	Cr								
	Ni		.92	✓					C B I
	Mo		.51	✓					
	Fe								
	Al								
Ti									
Co									
V									
Cu			.03	✓					

ALLOY RODS COMPANY
DIVISION OF CHEMETRON CORPORATION
RESEARCH DEPARTMENT ROUTING CARD TEST # 458

Control No. _____ Date Started 12-17-70 Completed _____

Assignee & Phase Completion Date: _____
Examination Lab. YAN 1-2-70 Test Lab. _____
Welding Lab. GA 1-3-70 Chem. Lab. _____
Project: II Mach. Shop 1-8-70

Details: 5 IMPULS. TEST
5 IMPULS. TEST
5 IMPULS. TEST

X-Ray Inspection Record

Test No. AF458 DX47

Electrode Type 3/16" SOLID VCL Lot L712A32 Heat 03P72

Thickness of Plate 3/16" MIL Spec 271 B
Weld Position FIL Source GTE 302
Film to Plate Dist. 0 Time Exposure 2.00
Dist. from Target 36 in. Tube Voltage KVP 250
Film Density 2.0 (aim) m. a. 7
Type Screen Lead Penetrometer 75 - B1
Focal Spot Size 5 mm Type Film 1400A4-M

Remarks: _____

Date 12-29-70 Radiographer S. [Signature]

ALLOY RODS CO. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date: _____ Engineer: _____

Specimen	Lab. No.	R: 5671	R:	R:	R:				
	Chem. Pad	✓							
	Weldment	✓ 11/6/70 [Signature]							
	Core Wire								
	Other								
Electrodes	Size	1/8"							
	Type	SC18-NM							
	Heat No.	H-170611							
	Lot No.	L2-2220							
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C		.063						
	Mn		1.23						1.23
	Si		.45						
	P		.018						
	S		.021						C, B, F
	Cr								
	Ni		.96						
	Mo		.52						
	Fe								
	Al								
	Ti								
	Co								
	V								
	Cu		.03						

ASME Print 1511.3 Section II Form RD-22A-11-68

ALLOY RODS COMPANY
DIVISION OF CHEMETRON CORPORATION
RESEARCH DEPARTMENT ROUTING CARD

Control No. _____ Date Started _____ Completed _____

Assignee & Phase Completion Date:

_____ Lab. X-567 Chem. Lab. _____

Welding Lab. 11/6/70 [Signature] Mach. Shop 1-12-70

Project: TEST A: [Signature]

HEAT TREATING @ 1125°F

Details: 1/8" Dia. [Signature]

SR. 1-9-70

SR. AF4576 X SR. AF4576 Z ✓

ALLOY RODS CO. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 11/21/69 Engineer [Signature]

Specimen	Lab. No.	R.	R.	R.	R.		
	Chem. Pad						
Weldment							
Core Wire							
Other							
Electrodes	Size	<u>3/32</u>					
	Type	<u>8018 VM</u>					
	Heat No.	<u>40175</u>					
	Lot No.	<u>K914-2871</u>					
Analysis		Est'd	Det'd	Est'd	Det'd	Est'd	Det'd
	C	✓	.69	✓			
	Mn	✓	.94	✓			
	Si	✓	.38				
	P		.016				
	S		.014				
	Cr						
	Ni	✓	.94	✓			
	Mo	✓	.48				
	Fe						
	Al						
Ti							
Co							
V							
Cu		.03	✓				

ASME PFC-4-511.3 SEC III NUCLEAR

Form RD-23A-11 of 20

X-Ray Inspection Record

Test No. AI 436C X92

Electrode Type 5/32 8018 VM Lot K914-2871 Heat 40175211

Thickness of Plate 3/4" MIL Spec 271 B
 Weld Position TIG Source GLE-300
 Film to Plate Dist. 0 Time Exposure 2:00
 Dist. from Target 36 in. Tube Voltage KVP 250
 Film Density 2.0 (aim) m. a. 9
 Type Screen Lead Penetrometer .75-51
 Focal Spot Size 5 mm Type Film KODAK-M

Remarks: _____

Date 11-24-69 Radiographer S. Hall - R.C. #1

RD-8-4-69

26

Project Engineer: _____

Control No. _____

Assignee & Phase Completion Date _____

Date Started _____

Completed _____

ALLOY RODS COMPANY
DIVISION OF CHEMETRON CORPORATION
RESEARCH DEPARTMENT ROUTING CARD 11/21/69

Examination Lab. X-Ray 11/24/69 64 Test Lab. _____
 Welding Lab. 11/21/69 2-3 Chem. Lab. _____
 Project: ASME PFC N. 511.3 SEC III Mach. Shop 12-9-69

SR 12-4-69

AI 436C X92
AI 436C Z0

ALLOY RODS CO. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 11-12-69 Engineer R. S. ...

Specimen	Lab No.	R.	R.	R.
Chem. Pad	<u>505A11</u>			
Weldment				
Core Wire				
Other				
Size	<u>3/32</u>			
Type	<u>505A11</u>			
Heat No.	<u>H1270751</u>			
Lot No.	<u>R910A27A</u>			
Electrodes				
	Est'd	Det'd	Est'd	Det'd
C	.063			
Mn	1.01			
Si	.46			
P	1019			
S	015			
Cr				
Ni	.90			
Mo	.52			
Fe				
Al				
Ti				
Co				
V				
Cu	.02			
Analysis				<u>CBPT</u>

Form RD 11A-2-65

ALLOY RODS COMPANY
DIVISION OF CHEMETRON CORPORATION
RESEARCH DEPARTMENT ROUTING CARD TEST # 425

Control No. _____ Date Started 11-12-69 Completed _____

Assignee & Phase Completion Date: _____

Extrusion Lab. X-ray 11/20/69 Chem. Lab. Testok

Welding Lab. 11/20/69 X.M. Mach. Shop 12-9-69

Project: Test A on 1/2" diam. 505A11 rod H-113 S10 III

Details: Heat Treatment 12 1/2 hr @ 1125 °F

From Alloy 505A11 H-11270751 Lot-R910A27A

Due 12-5-69 sr. 12-4-69

A. S. ...

A. H. 25 EX SR. A. H. 25 IZ

Project Engineer: [Signature]

X-Ray Inspection Record

Test No. A1H25EX1Z

Electrode Type 3/32" 505A11 Lot R910A27A Heat H1270751

Thickness of Plate 1" MIL Spec 271 B

Weld Position ERT Source GE-300

Film to Plate Dist. 0 Time Exposure 2:30

Dist. from Target 36 in. Tube Voltage KVP 300

Film Density 2.0 (aim) m. a. B

Type Screen Lead Penetrometer Lo - B1

Focal Spot Size 5 mm Type Film Kodak - 14

Remarks: _____

Date 11-24-69 Radiographer S. H. ...

ALLOY RODS CO. - RESEARCH DEPT.
DIVISION OF CHEMETRON CORPORATION
CHEMICAL ANALYSIS JOB CARD

Date 11-11-69 Engineer

Lab No.	R.	552	R.		R.	
Chem. Pad						
Weldment						
Core Wire						
Other						
Size						
Type						
Heat No.		08R4818				
Lot No.		K904A27A				
C	Est'd	Def'd	Est'd	Def'd	Est'd	Def'd
Mn	✓	.068	✓			
Si	✓	.113	✓			
P	✓	.044	✓			
S	✓	.016	✓			
Cr	✓	.017	✓			
Ni	✓	.84	✓			
Mo	✓	.49	✓			
Fe						
Al						
Ti						
Co						
V						
Cu		.03				

Form RD-22A-11-69

ALLOY RODS COMPANY
DIVISION OF CHEMETRON CORPORATION
RESEARCH DEPARTMENT ROUTING CARD

Control No. _____ Date Started 11-11-69 Completed _____

Assignee & Phase Completion Date: _____

Extrusion Lab. XRAY 11/24/69 TEST LAB

Welding Lab. 11/18/69 X M CHEM. LAB.

Mach. Shop 12-9-69

Project: TEST AS PER ASME SECT III NB 11.3
C.P.I.T.

Details: HEAT TREATMENT 62 1/2 HRS. @ 1125 °F
1/4" PHOSPHOR BRONZE H1-08R4818 Lot-K904A27A

Due 12-4-69

TEST LAB

SR AI421FX SR AI421FZ

Project Engineer: [Signature]

X-Ray Inspection Record

Test No. AI421FZ

Electrode Type 4 8011NM Lot K904A27A Heat 08R4818

Thickness of Plate 1"

Weld Position FLAT

Film to Plate Dist. 0

Dist. from Target 36 in.

Film Density 2.0 (aim)

Type Screen Lead

Focal Spot Size 5 mm

Remarks: _____

MIL Spec 271 B

Source GE-200

Time Exposure 2:40

Tube Voltage KVP 300

m. a. 8

Penetrometer 1.0 - B-1

Type Film KARAT-14

Date 11/24/69

Radio number 5 11-10 1 1 1

Attachment 2 to BVY 94 - 62

Corrected "Summary File for Pressure-Temperature Limits" and
Corrected "Summary File for Upper Shelf Energy"
for Vermont Yankee Reactor Pressure Vessel

Summary File for Pressure-Temperature Limits

Plant Name	Baseline Ident.	Heat No. Ident.	ID Heat. Fluence at EOL/EPY	IRT _{min}	Method of Determin. IRT _{min}	Chemistry Factor	Method of Determin. CF	X _{Cu}	X _M
Vermont Yankee EOL: 3/21/2012	Location unknown 1-14	C3017-2	2.3E17	40°F	Plant specific	74	Table	0.11	0.63
	Location unknown 1-15	C3116-2	2.3E17	30°F	MTEB 5-2	102	Table	0.14	0.66
	Location unknown 1-16	C2653-3	2.3E17	30°F	MTEB 5-2	91	Table	0.13	0.59
	Location unknown 1-17	C2640-1	2.3E17	30°F	MTEB 5-2	83	Table	0.12	0.61
	Welds	SAW	2.3E17	-70°F	Generic	54	Table	0.04	1.00

Reference for Vermont Yankee

Fluence data is from July 3, 1992, letter from J. P. Pelletier (VYNPC) to USNRC Document Control Desk, subject: Vermont Yankee Response to Generic Letter 92-01 Regarding Reactor Vessel Structural Integrity

Chemical composition and IRT data are from licensee's response to RAI (GL 92-01) dated September 24, 1993

Summary File for Upper Shelf Energy

Plant Name	Beltline Ident.	Heat No.	Material Type	1/4T USE at EOL/EPY	1/4T Neutron Fluence at EOL/EPY	Unirrad. USE	Method of Determin. Unirrad. USE
Vermont Yankee	Location unknown 1-14	C3017-2	A 5338-1	77	1.7E17	89	65%
EOL: 3/21/2012	Location unknown 1-15	C3116-2	A 5338-1	EMA	1.7E17	EMA	
	Location unknown 1-16	C2653-3	A 5338-1	EMA	1.7E17	EMA	
	Location unknown 1-17	C2640-1	A 5338-1	EMA*	1.7E17	EMA*	
	Welds	Unknown	EB018-G, SMAW	EMA	1.7E17	EMA	

Reference for Vermont Yankee

Plate heat numbers and USE data are from September 24, 1993 letter to NRC (Response to GL 92-01 RAI); the weld USE of 107 ft-lb (Atta. 3) is considered by the staff to be better than 125 ft-lb (Atta. 4).

Fluence datum is from July 3, 1992, letter from J. P. Pelletier (VYNPC) to USNRC Document Control Desk, subject: Vermont Yankee Response to Generic Letter 92-01 Regarding Reactor Vessel Structural Integrity

EMA data from December 21, 1993 letter from L. A. Tremblay (VYNPC) to USNRC Document Control Desk, Subject: Additional Information Regarding Generic Letter 92-01; Reactor Pressure Vessel Structural Integrity.