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Q200409290002

Scientific Notebook No. 638: Alloy 22  
Repassivation Tests - Continuation of S/Ns  
366, 485, 520, 528, 531, 541, and 571  
(02/05/2004 through 08/10/2004)

# LABORATORY NOTEBOOK

CNWRA/SwRI

CONTROLLED COPY NO. 638

NOTEBOOK NO. \_\_\_\_\_  
ISSUED TO DARRELL DUNN *[Signature]* *DD*  
ON \_\_\_\_\_ 20 \_\_\_\_\_  
DEPARTMENT \_\_\_\_\_  
RETURNED \_\_\_\_\_ 20 \_\_\_\_\_  
BRIAN K. Derby - *[Signature]* - BKO  
XIHUA HE - *[Signature]* - X.H

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TITLE \_\_\_\_\_

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Continued Testing From NB # 366, # 485, # 520, # 528, # 531  
A no # 541 A no # 571

Copied from Previous Notebooks

**Initial Scientific notebook entry for repassivation potential measurements**

**Title:** Alloy 22 Repassivation Tests

**Tests Performed by:** Darrell S. Dunn, Letai Yang, Div 20; Brian Derby, Div. 18

**Objectives:** Determine the effect of thermal aging time and temperature on the localized corrosion susceptibility of Alloy 22.

**Equipment:** Laboratory oven for exposure of test specimens at 600 to 900 °C, Thermocouple and thermocouple meter. Keithley 614/617. Solartron 1287 Potentiostat and CorrView Software or equivalent, Electrochemical test cell.

**Materials:** Alloy C-22, heat 2277-8-3175. Other materials and heats to be added and identified prior to testing.

**Specimen specifications:** Specimens will be equivalent to 20.01402.571.006 unless otherwise specified.

**Measurement Parameters:** Temperature and time of exposure, Potential and Current of specimen during test.

**Required level of accuracy:** Temperature  $\pm 2$  °C, Time of exposure  $\pm 1$  minute, Potentials  $\pm 1$  mV, Current  $\pm 0.01$  microamp.

**Uncertainty and Sources of Error:** Current measurement error can occur for localized corrosion processes because the actively corroding area is not the same as the surface area of the test specimen.

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Witnessed & Understood by me, \_\_\_\_\_

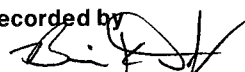
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FROM NB 157 P 208 And NB# 571

Initial Scientific notebook entry for corrosion resistant material potentiostatic and potentiodynamic polarization tests.

Title: Potentiostatic tests, cyclic polarization tests, crevice repassivation tests, passive current density tests, critical pitting temperature tests critical repassivation temperature tests.

Tests Performed by: Darrell S. Dunn

Objectives: Measure passive current densities, crevice repassivation potentials, critical pitting temperature and critical repassivation temperature for corrosion resistant candidate materials.

Equipment: EG&G Versastat Serial Number 20104. EG&G model 352 corrosion software. NEC 586 computer. Keithley Electrometer model 614 SN 555368 or equivalent. ASTM G-5 polarization cell, Large 2 L glass cells with Teflon tops, Electrochemical Impedance Spectroscopy system including Solartron 1260 FRA and Solartron 1287 Potentiostat. ESC 440 multichannel potentiostats with National instruments Labview data acquisition software or Strawberry Tree data acquisition software.

Materials: Alloy C-22, Alloy 825, Alloy 625 and Type 316 L stainless steel

Specimen specifications: Cylindrical CPP specimens 1.915" x 0.250" and Crevice repassivation specimens with Teflon crevice washers attached to surface.

Measurement Parameters: Current and Potential as described in TOP-008. Temperature of solution ± 2°C

Required level of accuracy: Potentials ± 5mV. Current less than 0.1 microamp.

Uncertainty and Sources of Error: Current density calculated as current divided by sample area. Actual current density of corroding areas is not determined. Resolution limit of data acquisition systems may limit accuracy of passive current density measurements.

Copies from previous NB # 157 / # 571

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Thermally Age Procedure for C-22 Specimens

Specimen: C-22 Heat 2277-8-3175 - Crevice Specimens

Total Number of Specimens = 10

Oven: Linoberg SN# 909172 Model # 51333

Oven Set Point = 875°C

Oven Temperature = 895°C

Measurement Taken with Omega Microprocessor Thermometer Model # HH22 SN# J-94140

Cal 11/5/03 Due 5/5/04

Thermocouple SN# 332 Cal 1/22/04 Due 7/22/04

5 min Total Time then Water Quenches

All Specimens will be polished to 600 Grit Finish PRIOR to Testing

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Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.2114g Model: Sartorius Genius SN: 12809099 Final Weight: 41.21616 CAL: 11/14/03 Due: 5/14/04

Solution: 0.5 M NaCl + 0.05 M NaHCO3  
58.44 g NaCl lot # 035421  
8.405 g NaHCO3 lot # 028966  
+ DI water To 2000ml

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 8.098 Model: Orion EA 940 SN: 2330 Final pH: 9.204 Cal: 7/15/03 Due: 7/15/04 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: 183305 Cal: 12/22/03 Due: 6/22/04

Counter Electrode: Platinum Flag Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas Ecorr: -412 mV Model: Keithley 614 SN: 467374 Ept: -374 mV Cal: 11/6/03 Due: 11/6/04 Potentiostat: EG&G Model 273 SN: 10120

Number of Crevice Corrosion Sites: 0 /24 (24 max.)

No Sign of Crevice Corrosion from location of crevice washer - m/o dull tint surface staining

\* Note: will Repolish for further testing

Data C22R200

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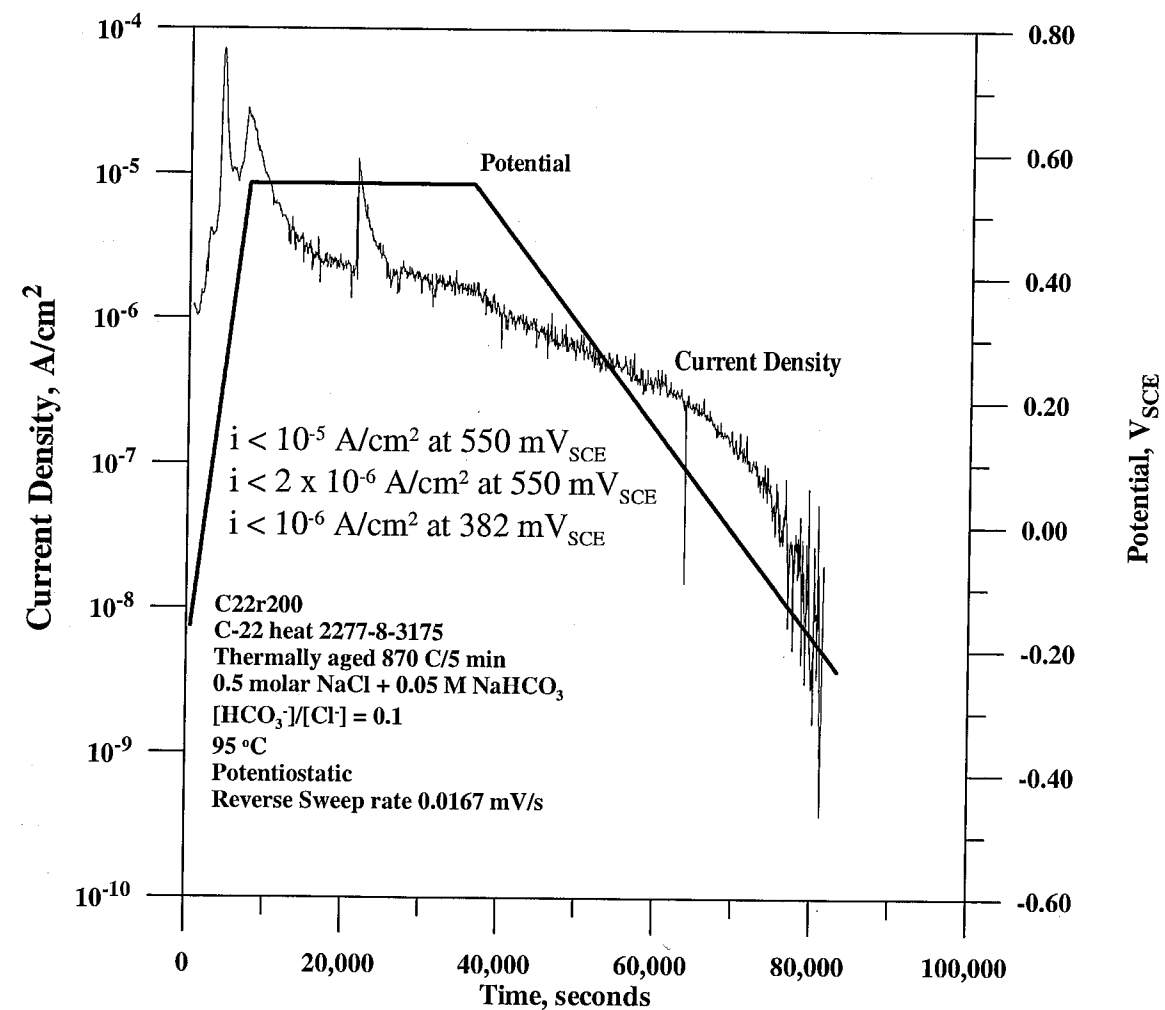
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Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.23627g Model: Sartorius Genius SN: 12809099

Final Weight: 41.25230g CAL:11/14/03 Due: 5/14/04

Solution: 0.5 m NaCl + 0.02 m NaHCO<sub>3</sub>  
58.44g NaCl Lot # 035421  
3.358g NaHCO<sub>3</sub> Lot # 028966  
+ DI water to 2000mls

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 7.985 Model: Orion EA 940 SN: 2330

Final pH: 9.584 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: C96-377 Cal: 1/15/04 Due: 7/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 9250063

Gas: 99.999% Nitrogen Gas

Ecorr: -410 mV Model: Keithley 614 SN: 467374  
Ept: +18 mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 10120

Number of Crevice Corrosion Sites: 4/24 (24 max.)

Crevice Corrosion on 4 Locations of crevice washer. Surface staining dull tint on All surfaces then darker tint staining around corrosion locations

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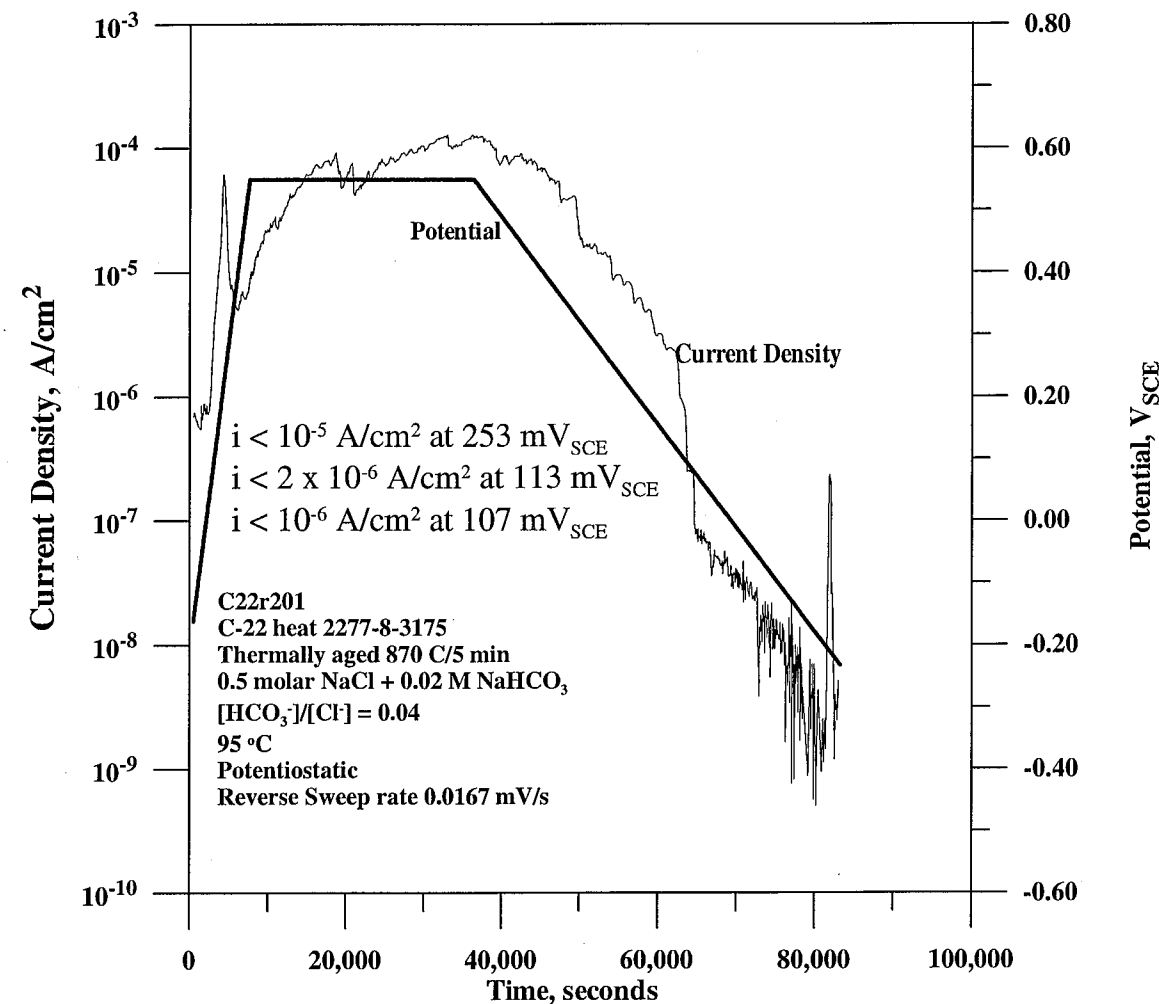
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Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.09643g Model: Sartorius Genius SN: 12809099 Final Weight: 41.09713g CAL: 11/14/03 Due: 5/14/04

Solution: 0.5 M NaCl + 0.1 M NaHCO3  
58.4g NaCl lot #035421  
16.807g NaHCO3 lot # 028966  
+ DI water to 2000ml

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 8.031 Model: Orion EA 940 SN: 2330 Final pH: 9.762 Cal: 7/15/03 Due: 7/15/04 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: 183305 Cal: 12/22/03 Due: 6/22/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: -462 mV Model: Keithley 614 SN: 467374 Ept: -149 mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 10120

Number of Crevice Corrosion Sites: 0/24 (24 max.)

No crevice corrosion from any location of crevice washer - dull tint staining on all surfaces of specimen

\* note: will repolish for further testing

Data C22 R202

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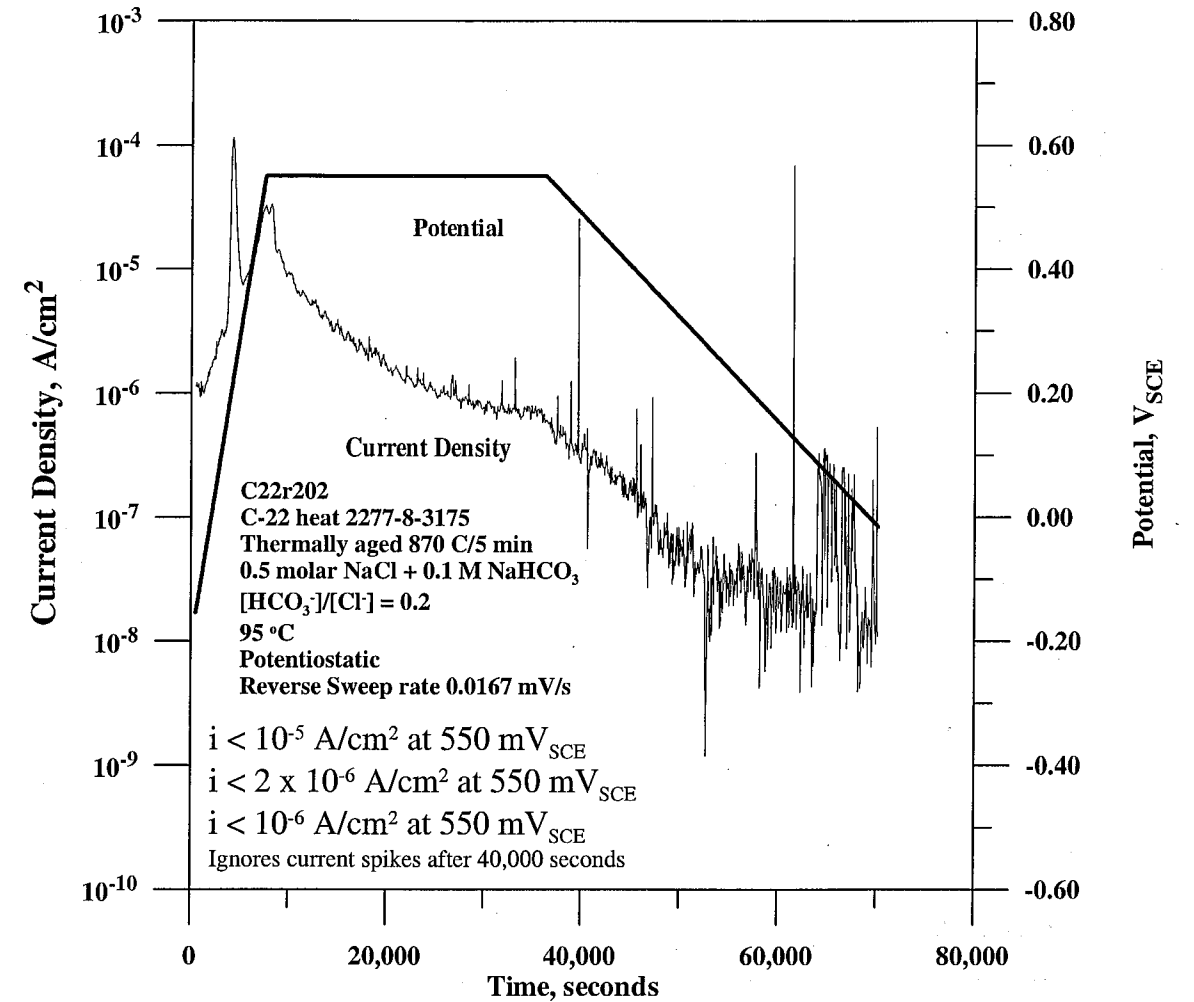
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From Page No. \_\_\_\_\_

**Repassivation Potential Test**

**Objective:** same as pg #1 and #2

**Alloy/Specimen:** C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

**Specimen Preparation:** Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

**Torque Screwdriver:** Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

**Initial Weight:** 41.1427g Model: Sartorius Genius SN: 12809099  
**Final Weight:** 41.13957g CAL: 11/14/03 Due: 5/14/04

**Solution:** 0.5 m NaCl + 0.15 m NaHCO<sub>3</sub>  
58.48g NaCl Lot # 035421  
25.203g NaHCO<sub>3</sub> Lot # 028966  
+ DI water to 2000mls

**Reagents measured with:** Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

**Initial pH:** 8.022 Model: Orion EA 940 SN: 2330  
**Final pH:** 9.545 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

**Test Temperature:** 95°C Measured with Hg Thermometer SN: C96-377  
Cal: 1/15/04 Due: 7/15/04

**Counter Electrode:** Platinum Flag

**Reference Electrode:** Fisher 13-620-52 SN: 9250063

**Gas:** 99.999% Nitrogen Gas

**Ecorr:** -531m Model: Keithley 614 SN: 467374  
**Ept:** +14m Cal: 11/6/03 Due: 11/6/04

**Potentiostat:** EG&G Model 273 SN: 10120

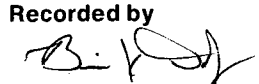
**Number of Crevice Corrosion Sites:** 0/24 (24 max.)

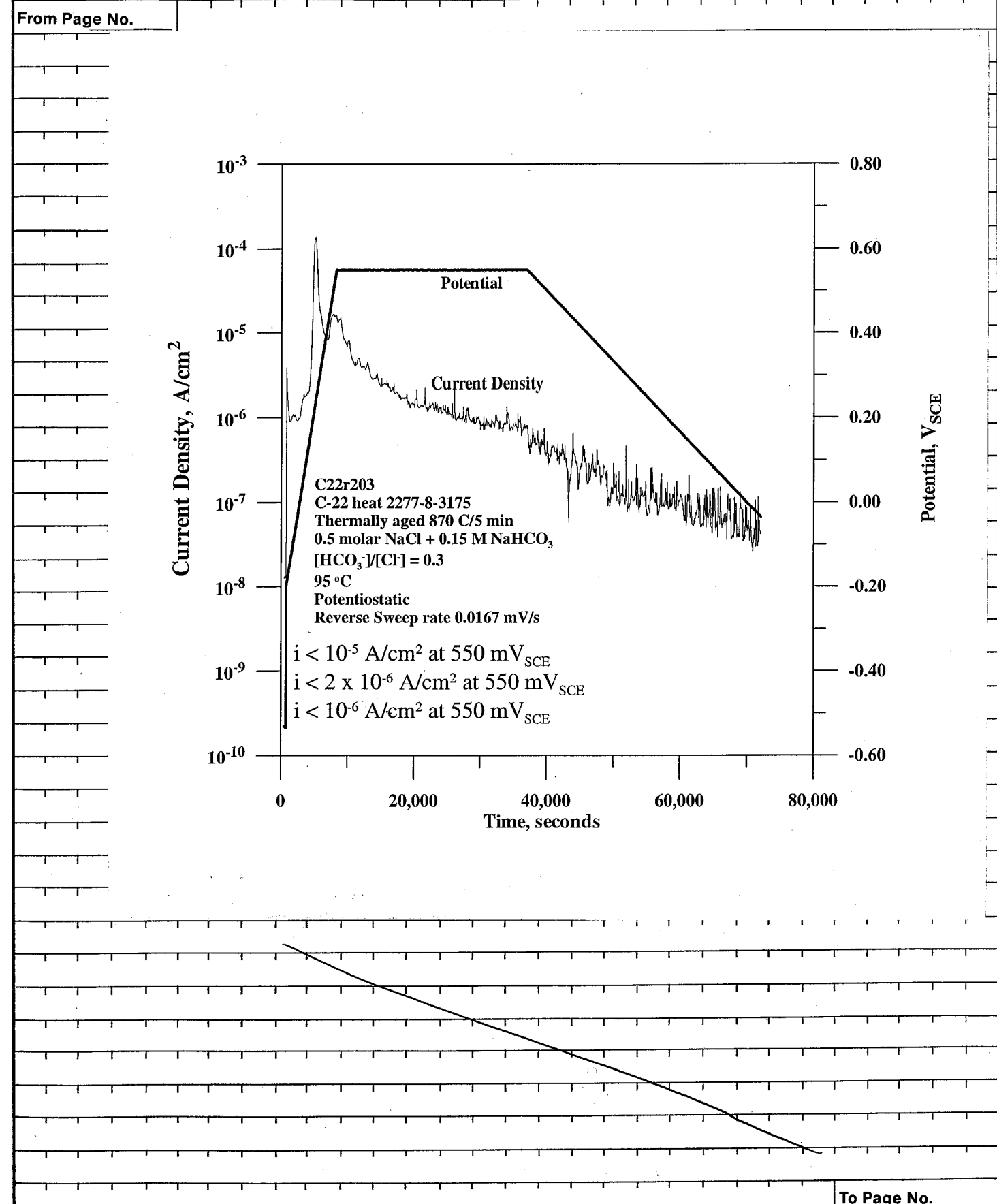
No Crevice Corrosion from Any location of crevice washer - Dull tint staining on All Surfaces of specimen

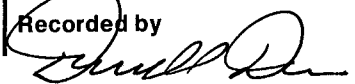
\* Notes will be noted for further testing

data C22 R203

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Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.15454g Model: Sartorius Genius SN: 12809099 Final Weight: 41.16525g CAL:11/14/03 Due: 5/14/04

Solution: 0.5 m NaCl + 0.02 m Na2CO3 58.49g NaCl lot # 035421 4.243g Na2CO3 lot # 028087 + DI water to 2000ml

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 11.064 Model: Orion EA 940 SN:2330

Final pH: 10.642 Cal: 7/15/03 Due: 7/15/04 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: 183305 Cal: 12/22/03 Due: 6/22/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: -404mv Model: Keithley 614 SN: 467374 Ept: -206mv Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 10120

Number of Crevice Corrosion Sites: 0/24 (24 max.)

Crevice corrosion on 1/4 feet of crevice washer. No staining on all surfaces of specimen.

Data C22E204

\* Will Repolish Specimen for Further Testing

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Date \_\_\_\_\_

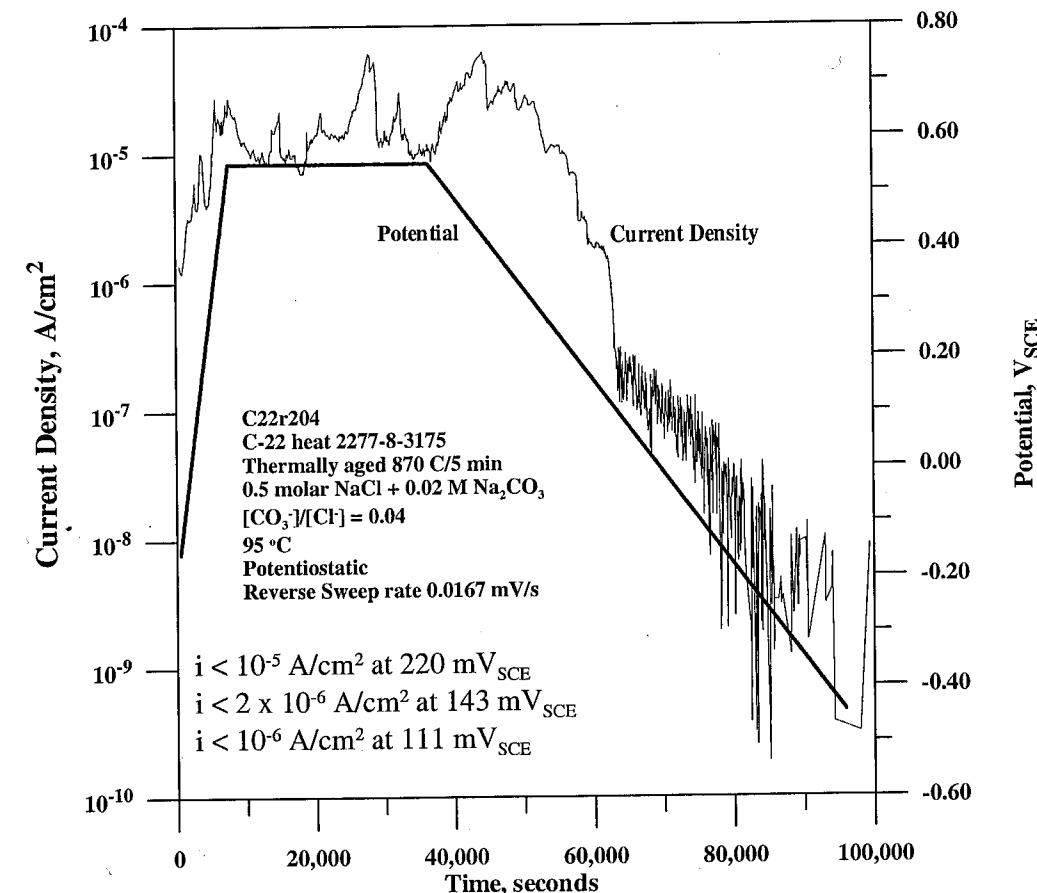
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Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 9/4/03 Due: 3/4/04

Initial Weight: 40.9177g Model: Sartorius Genius SN: 12809099 Final Weight: 40.95003g CAL:11/14/03 Due: 5/14/04

Solution: 0.5 m NaCl + 0.05 m Na<sub>2</sub>CO<sub>3</sub>  
58.47g NaCl lot# 035421  
10.602g Na<sub>2</sub>CO<sub>3</sub> lot# 028087

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 11.276 Model: Orion EA 940 SN:2330 Final pH: 11.016 Cal: 7/15/03 Due: 7/15/04 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: C96-377 Cal: 1/15/04 Due: 7/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 9250063

Gas: 99.999% Nitrogen Gas

Ecorr: -491 mV Model: Keithley 614 SN: 467374 Ept: -22 mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 10120

Number of Crevice Corrosion Sites: 0/24 (24 max.)

No crevice corrosion 1/24 feet of crevice washer  
Mild surface staining

Data C22R205

\* will polish specimen for further testing

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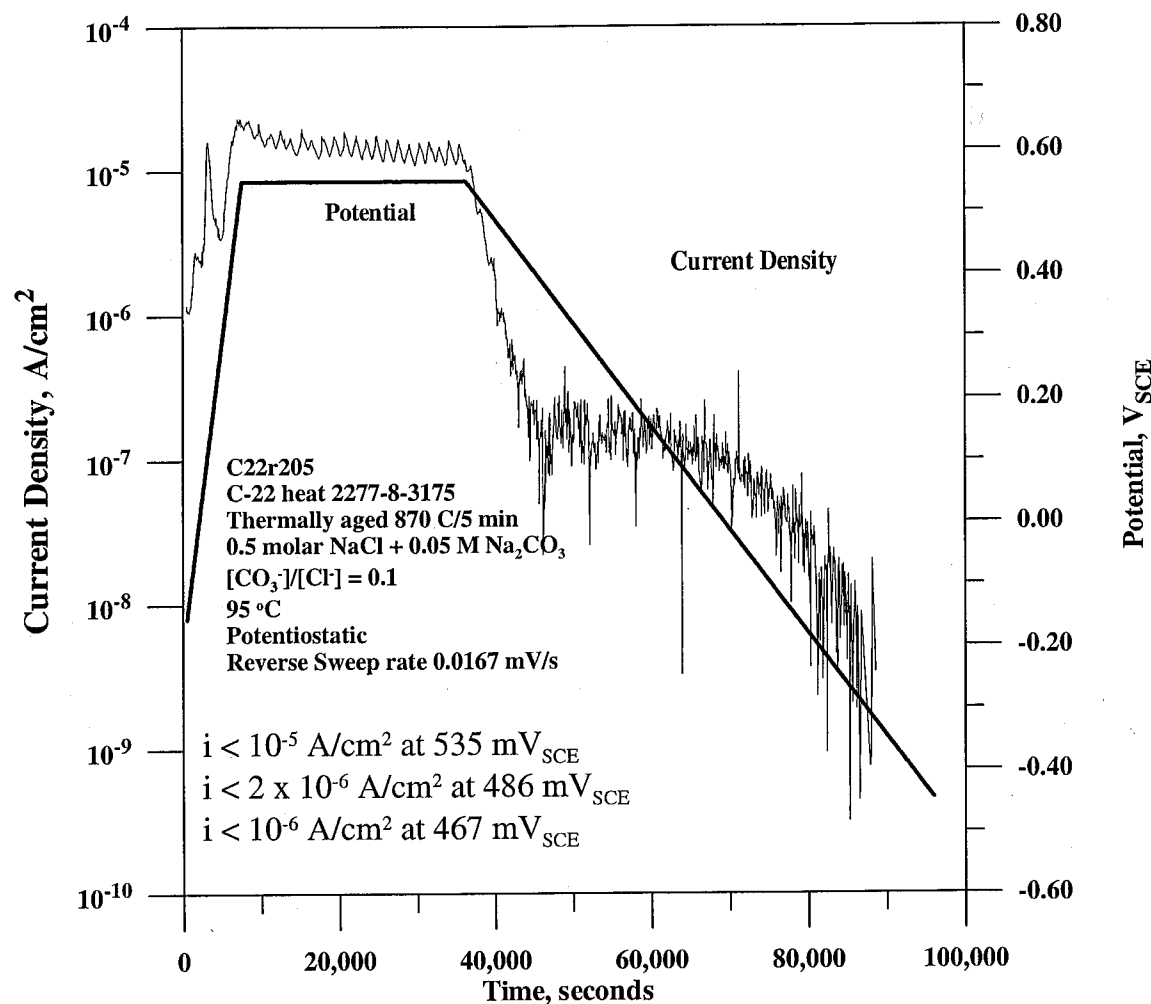
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**Repassivation Potential Test**

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.0688g Model: Sartorius Genius SN: 12809099  
Final Weight: 41.07701g CAL:11/14/03 Due: 5/14/04

Solution: 0.5 m NaCl + 0.1 m Na<sub>2</sub>CO<sub>3</sub>  
58.48g NaCl lot # 025421  
21.193g Na<sub>2</sub>CO<sub>3</sub> lot # 028087  
+ DI water to 2000 ml

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 11.346 Model: Orion EA 940 SN:2330  
Final pH: 11.132 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: 193305  
Cal: 12/22/03 Due: 6/22/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 6251439

Gas: 99.999% Nitrogen Gas

Ecorr: -374mv Model: Keithley 614 SN: 467374  
Ept: -163mv Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 41108

Number of Crevice Corrosion Sites: 0/24 (24 max.)

No sign of crevice corrosion. Gold tint staining on all surfaces of specimen

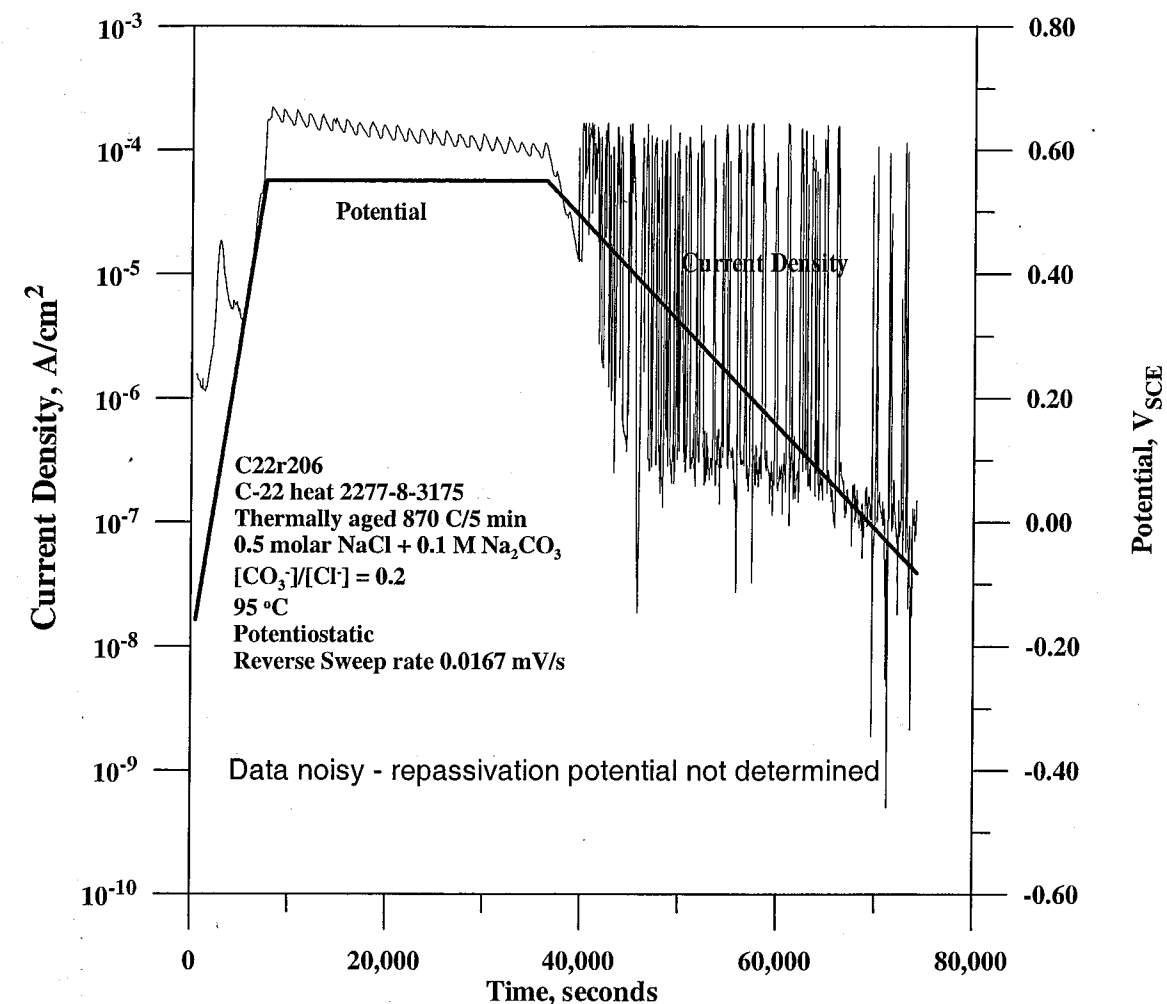
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\* Note: will re-polish for further testing

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To Page No. \_\_\_\_\_

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To Page No. \_\_\_\_\_

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Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.03861 Model: Sartorius Genius SN: 12809099 Final Weight: 41.03826 CAL:11/14/03 Due: 5/14/04

Solution: 0.5 m NaCl + 0.15 m Na2CO3  
58.48g NaCl lot # 035421  
31.831g Na2CO3 lot # 028087  
+ DI water to 2000mls

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 11.428 Model: Orion EA 940 SN:2330 Cal: 7/15/03 Due: 7/15/04 Final pH: 11.251 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: C96-377 Cal: 1/15/04 Due: 7/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 925 0063

Gas: 99.999% Nitrogen Gas

Ecorr: -414mV Model: Keithley 614 SN: 467374 Ept: -19mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 10120

Number of Crevice Corrosion Sites: 0/24 (24 max.)

No Sign of crevice corrosion - Gold tint staining on All surface of Specimen

Data C22E207

\* Note well Repolish for further Testing

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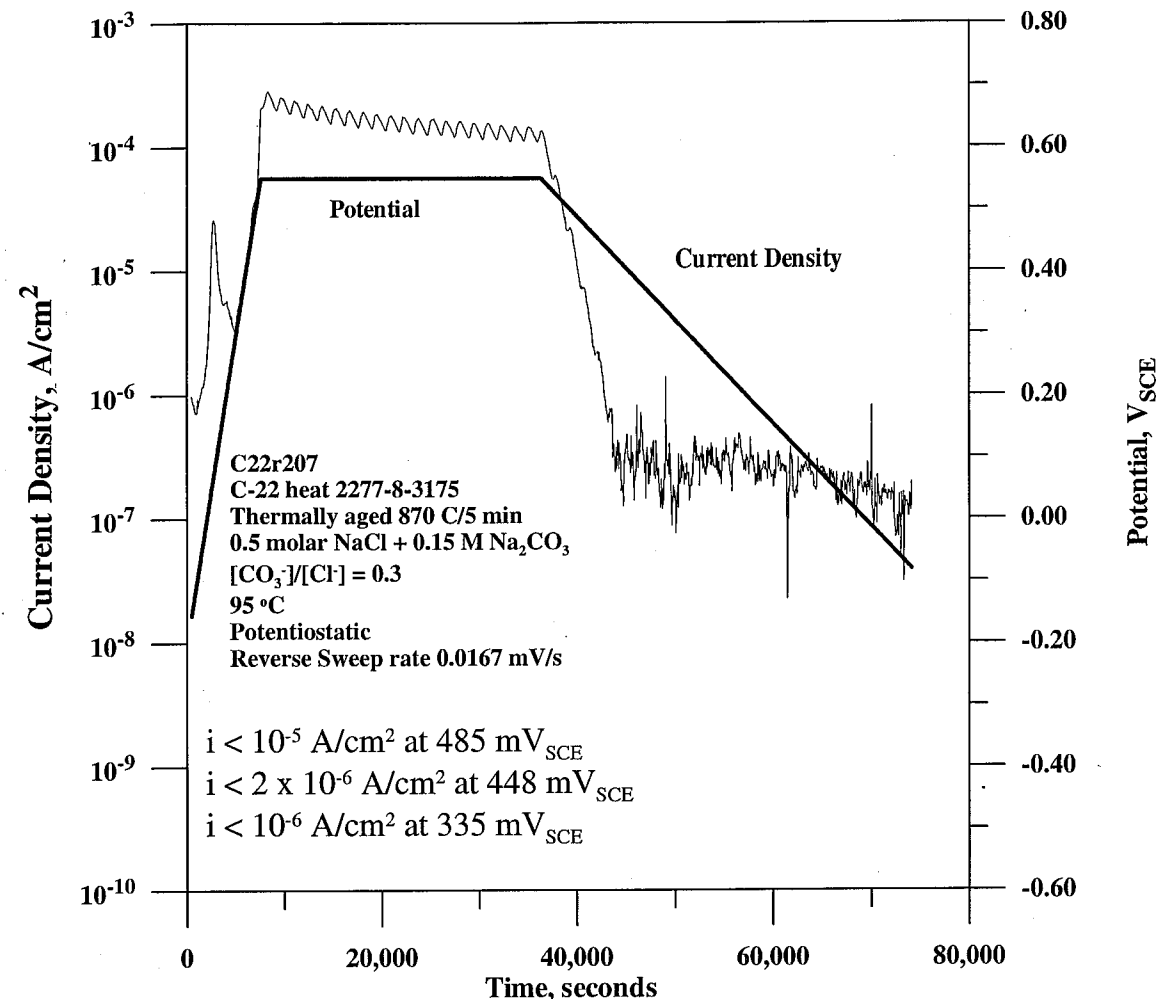
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Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.0706g Model: Sartorius Genius SN: 12809099  
Final Weight: 41.0901g CAL: 11/14/03 Due: 5/14/04

Solution: 0.5 m NaCl + 0.3 m NaF  
58.45g NaCl Lot # 035421  
25.193g NaF Lot # 991559  
+ DI water to 2000mls

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 9.891 Model: Orion EA 940 SN: 2330  
Final pH: 9.064 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: 183305  
Cal: 12/22/03 Due: 6/22/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-22 SN: 0251429

Gas: 99.999% Nitrogen Gas

Ecorr: -376 mV Model: Keithley 614 SN: 467374  
Ept: +19 mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 41108

Number of Crevice Corrosion Sites: 0 /24 (24 max.)

No crevice corrosion. Mild surface staining  
Transpassive Dissolution Around Both Crevice Washers

Data C22R208

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

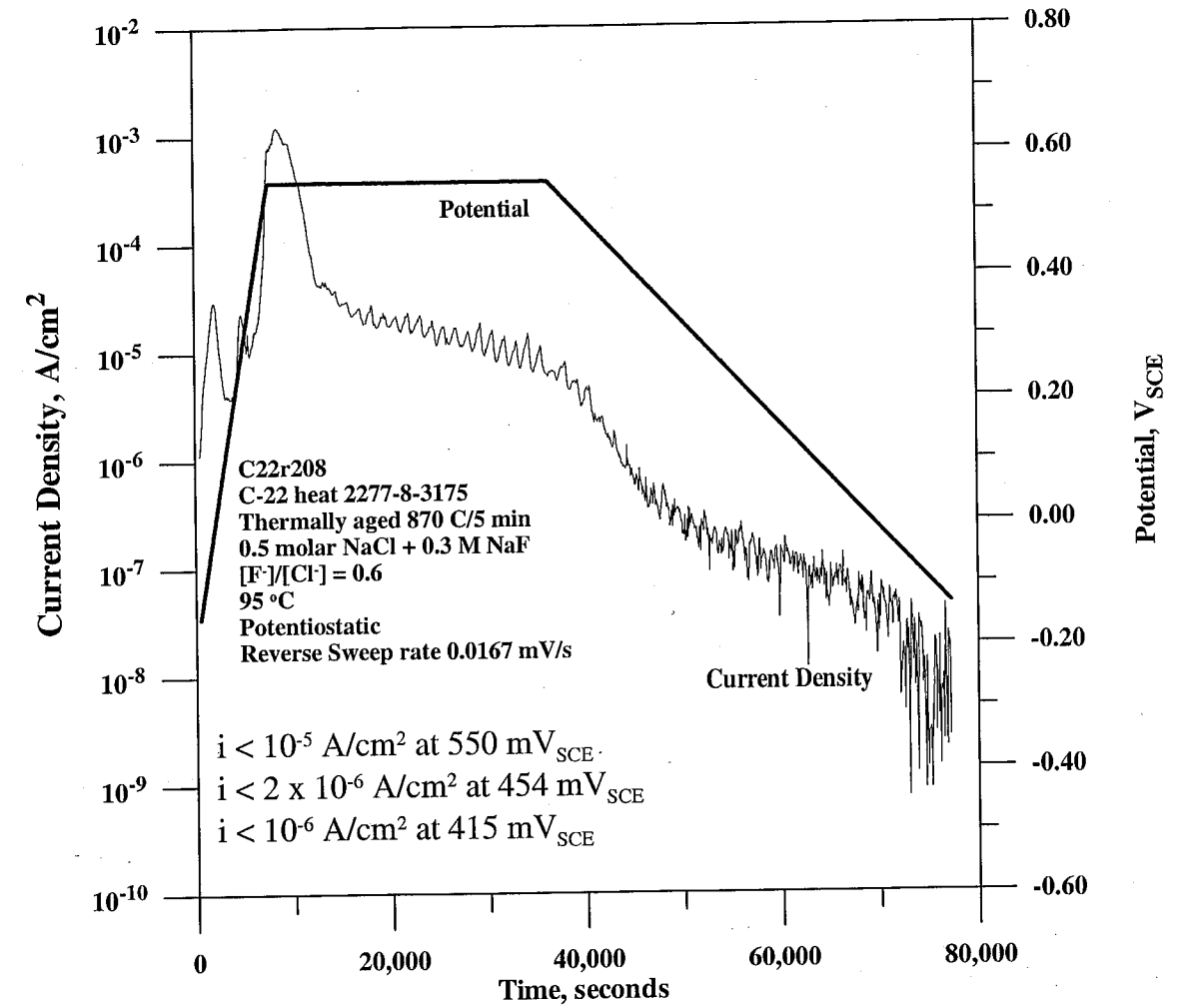
Date

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To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

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2/11/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.08966 Model: Sartorius Genius SN: 12809099

Final Weight: 41.08337 CAL:11/14/03 Due: 5/14/04

Solution: 0.5 m NaCl + 0.25 m NaF  
58.48g NaCl Lot # 035421  
20.980g NaF Lot # 991559  
+ DI water to 2000ml

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 9.797 Model: Orion EA 940 SN:2330

Final pH: 9.170 Cal: 7/15/03 Due: 7/15/04

pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: C96-377 Cal: 1/15/04 Due: 7/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 9250063

Gas: 99.999% Nitrogen Gas

Ecorr: -315mV Model: Keithley 614 SN: 467374

Ept: -98mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 10120

Number of Crevice Corrosion Sites: 7/24 (24 max.)

Crevice Corrosion on 7/24 feet of crevice washer  
Color tint staining on All surfaces of Specimen

data C22R209

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

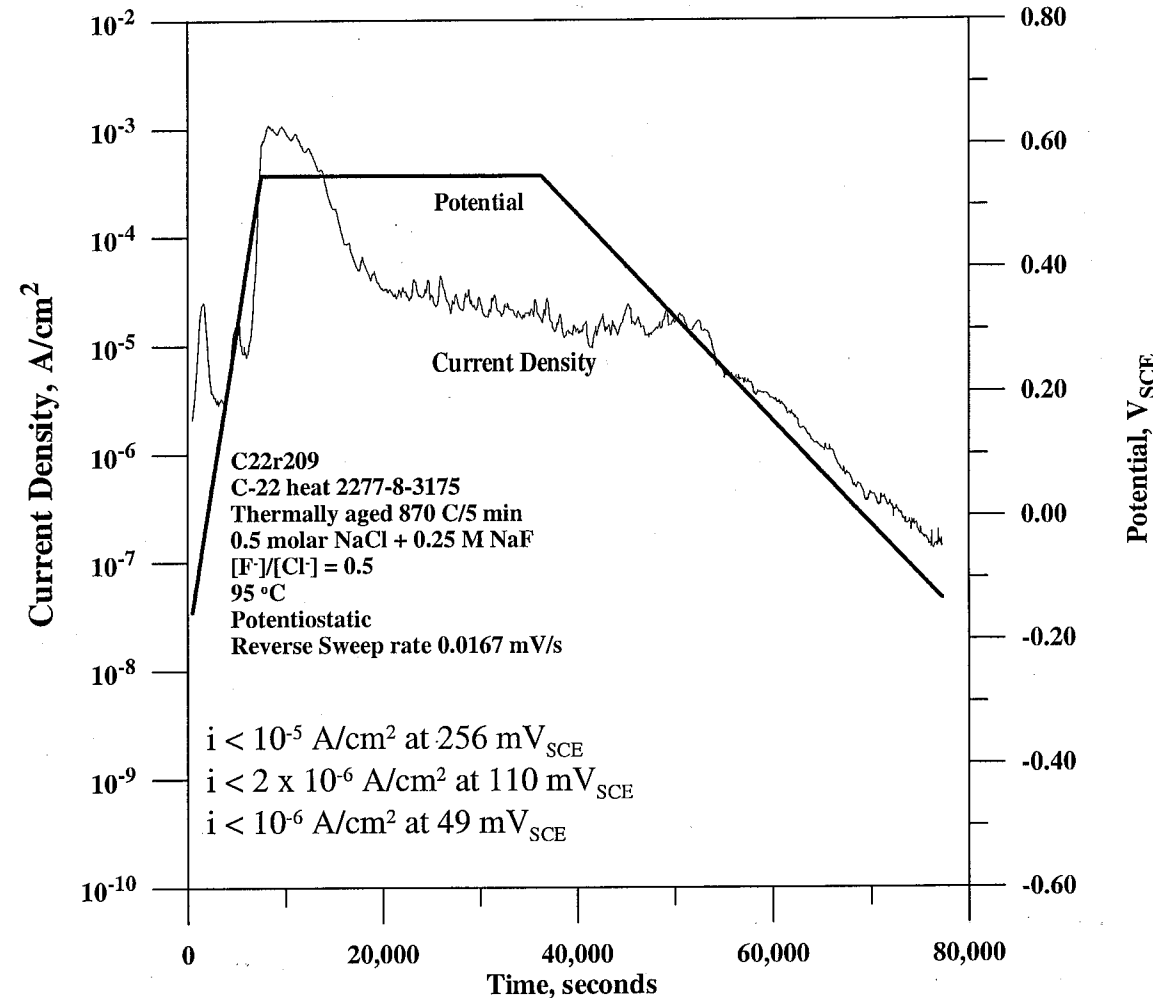
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Witnessed & Understood by me,

Date

Invented by

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From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
 Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.1256g Model: Sartorius Genius SN: 12809099  
 Final Weight: 41.0998g CAL: 11/14/03 Due: 5/14/04

Solution: 0.5 M NaCl + 0.2 M NaF  
 58.49g NaCl lot # 035421  
 16.826g NaF lot # 991559  
 + DI water to 2000mls

Reagents measured with Model: OHAUS SN: 2883  
 Cal: 2/04/04 Due: 8/04/04

Initial pH: 9.428 Model: Orion EA 940 SN: 2330  
 Final pH: 8.629 Cal: 7/15/03 Due: 7/15/04  
 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: 183305  
 Cal: 12/22/03 Due: 6/22/04

Counter Electrode: Platinum Flag  
 Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: -331mV Model: Keithley 614 SN: 467374  
 Ept: -2mV Cal: 11/6/03 Due: 11/6/04  
 Potentiostat: EG&G Model 273 SN: 41105

Number of Crevice Corrosion Sites: 2/24 (24 max.)  
 crevice corrosion on 2/24 locations on crevice washer  
 Gold tint staining on all surfaces of specimen

Date C22R210

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

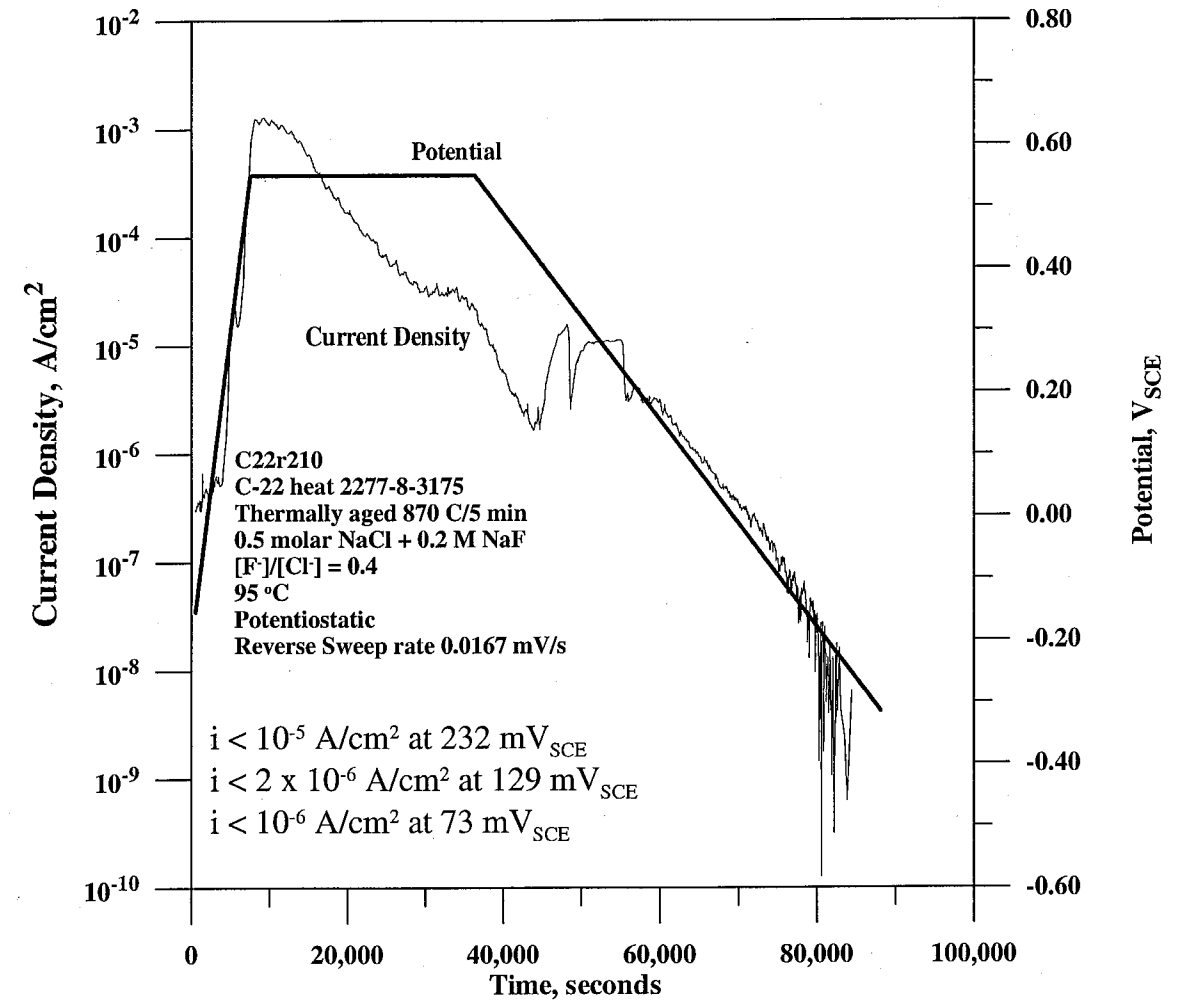
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Witnessed & Understood by me, \_\_\_\_\_

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2/17/04

From Page No. \_\_\_\_\_

**Repassivation Potential Test**

**Objective:** same as pg #1 and #2

**Alloy/Specimen:** C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

**Specimen Preparation:** Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

**Torque Screwdriver:** Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

**Initial Weight:** 41.18310 g Model: Sartorius Genius SN: 12809099  
**Final Weight:** 41.13378 g CAL:11/14/03 Due: 5/14/04

**Solution:** 0.5 M NaCl + 0.15 M NaF  
58.45g NaCl Lot # 991559  
12.643g NaF Lot # 991559  
+ DI water To 2000 ml

**Reagents measured with** Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

**Initial pH:** 9.515 Model: Orion EA 940 SN: 2330  
**Final pH:** 8.593 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

**Test Temperature:** 95°C Measured with Hg Thermometer SN: C96-377  
Cal: 1/15/04 Due: 7/15/04

**Counter Electrode:** Platinum Flag

**Reference Electrode:** Fisher 13-620-52 SN: 9250063

**Gas:** 99.999% Nitrogen Gas

**Ecorr:** -306 mV Model: Keithley 614 SN: 467374  
**Ept:** -58 mV Cal: 11/6/03 Due: 11/6/04

**Potentiostat:** EG&G Model 273 SN: 10120

**Number of Crevice Corrosion Sites:** 0 /24 (24 max.)

No crevice corrosion on specimen - Gold tint staining  
But some of staining was removed with cleaning  
transpassive dissolution on specimen

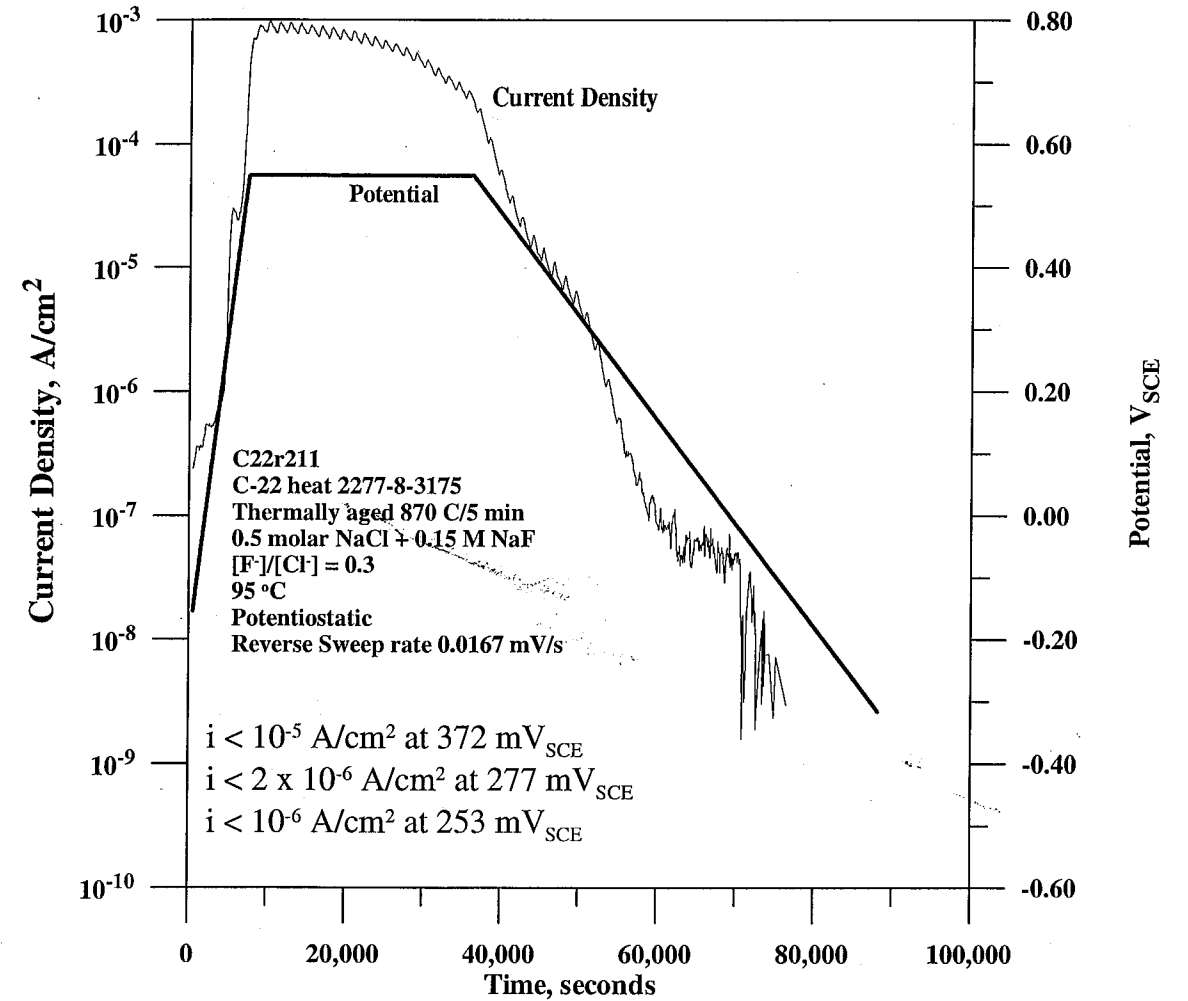
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		Recorded by <i>[Signature]</i>	2/17/04



From Page No. \_\_\_\_\_

**Repassivation Potential Test**

**Objective:** same as pg #1 and #2.

**Alloy/Specimen:** C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

**Specimen Preparation:** Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

**Torque Screwdriver:** Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

**Initial Weight:** 40.9034g Model: Sartorius Genius SN: 12809099  
**Final Weight:** 40.8432g CAL: 11/14/03 Due: 5/14/04

**Solution:** 0.5 m NaCl + 0.1 m NaF  
58.47g NaCl lot # 035421  
8.412g NaF lot # 991559

**Reagents measured with** Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

**Initial pH:** 7.561 Model: Orion EA 940 SN: 2330  
**Final pH:** 8.388 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

**Test Temperature:** 95°C Measured with Hg Thermometer SN: 183305  
Cal: 12/22/03 Due: 6/22/04

**Counter Electrode:** Platinum Flag

**Reference Electrode:** Fisher 13-620-52 SN: 0251439

**Gas:** 99.999% Nitrogen Gas

**Ecorr:** Not Measured Model: Keithley 614 SN: 467374  
**Ept:** Recorder Cal: 11/6/03 Due: 11/6/04  
**Potentiostat:** EG&G Model 273 SN: 41108

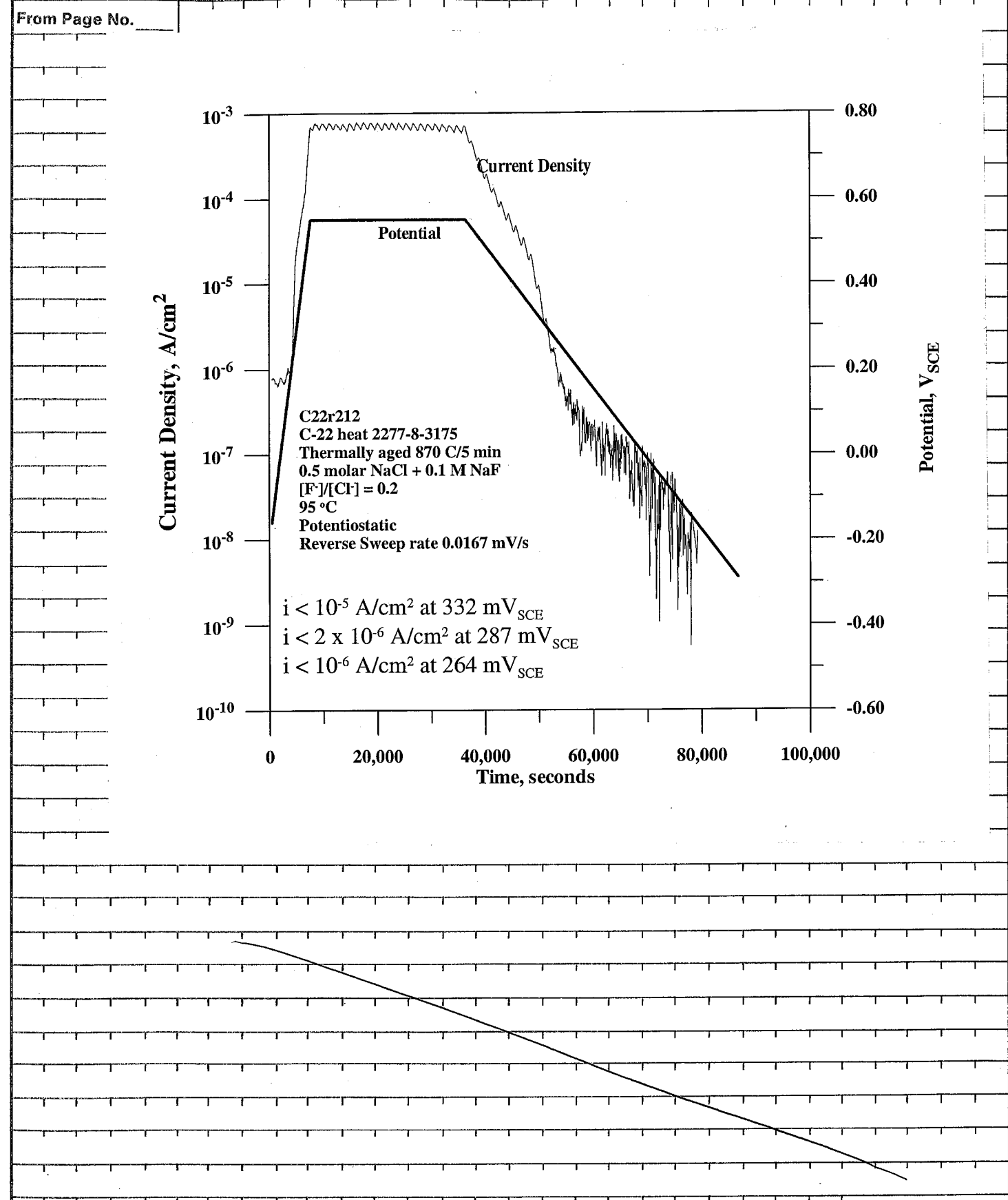
**Number of Crevice Corrosion Sites:** 2/24 (24 max.)

Crevice Corrosion on 2/24 feet of crevice washer  
barely Initiation of corrosion. Staining on All Surfaces  
of Specimen

Data C22E212

To Page No. \_\_\_\_\_

Witnessed & Understood by me,	Date	Invented by	Date	
		Recorded by	2/17/04	



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		Recorded by	2/17/04	

From Page No. \_\_\_\_\_

**Repassivation Potential Test**

**Objective:** same as pg #1 and #2

**Alloy/Specimen:** C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

**Specimen Preparation:** Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

**Torque Screwdriver:** Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

**Initial Weight:** 41.07719g Model: Sartorius Genius SN: 12809099  
**Final Weight:** 41.07643g CAL:11/14/03 Due: 5/14/04

**Solution:** 0.5 m NaCl + 0.4 m NaF  
58.46g NaCl lot #035421  
33.627g NaF lot # 006679  
+ DI water to 2000ml

**Reagents measured with** Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

**Initial pH:** 9.827 Model: Orion EA 940 SN:2330  
**Final pH:** 9.169 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

**Test Temperature:** 95°C Measured with Hg Thermometer SN: C96-377  
Cal: 1/15/04 Due: 7/15/04

**Counter Electrode:** Platinum Flag

**Reference Electrode:** Fisher 13-620-52 SN: 9250063

**Gas:** 99.999% Nitrogen Gas

**Ecorr:** Not Model: Keithley 614 SN: 467374  
**Ept:** Recorders Cal: 11/6/03 Due: 11/6/04

**Potentiostat:** EG&G Model 273 SN: 10120

**Number of Crevice Corrosion Sites:** 14 /24 (24 max.)

Crevice Corrosion on 14/24 feet of crevice washer  
staining on All surfaces of specimen

data C22 R213

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

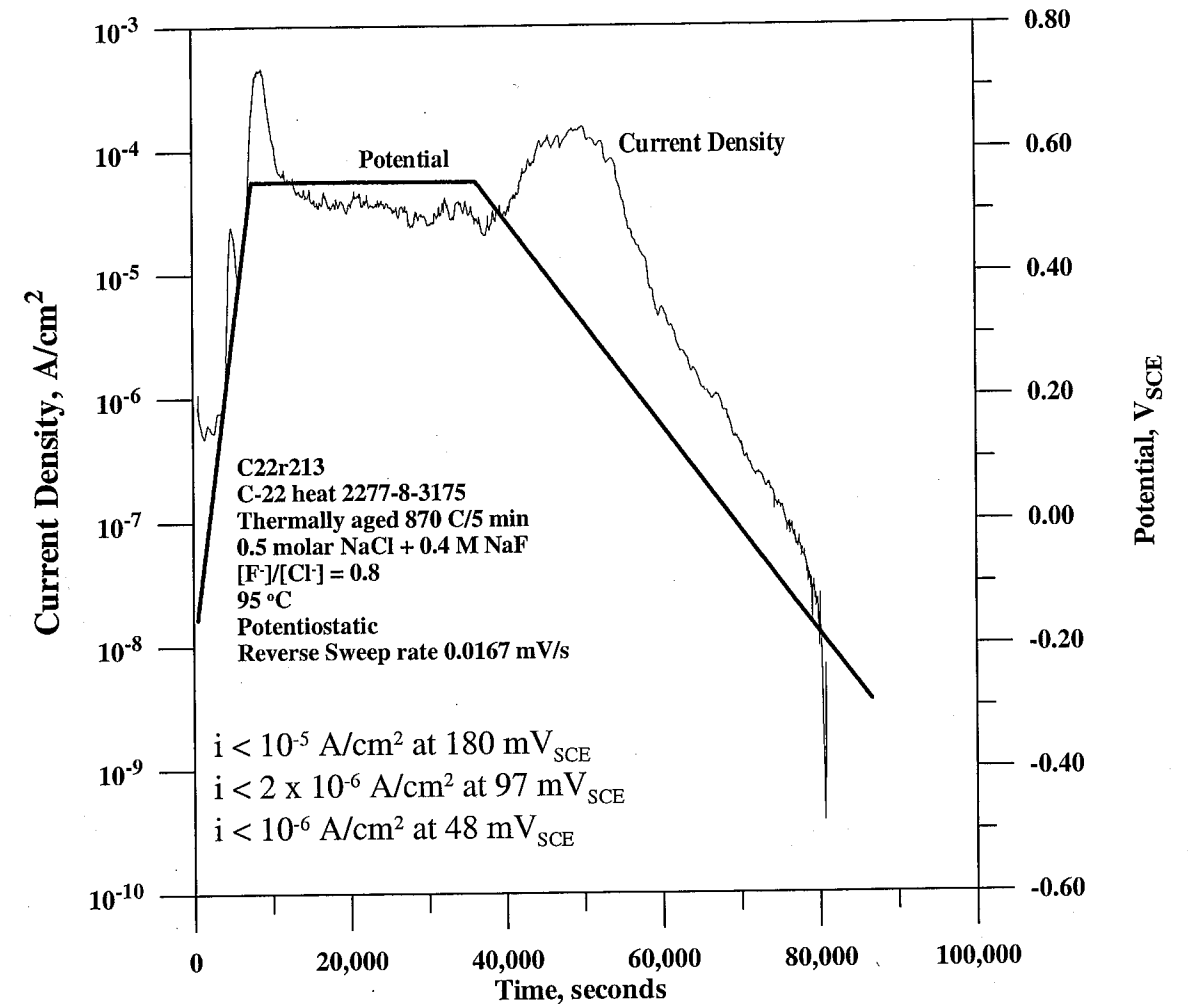
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Recorded by \_\_\_\_\_

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From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

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Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/17/04

From Page No. \_\_\_\_\_

### Thermally Age Procedure for C-22 Specimens

Specimen: C-22 Heat 2277-8-3175 - Crevice Specimens

Total Number of Specimens = 8

Oven: Lindberg SN# 90172 model # 51333

Oven Set point = 880 °C

Oven Temperature = 881.5 °C

Measurement Taken with Omega Microprocessor  
Thermometer Model # MH22 SN# 7-94140  
Cal 11/5/03 Due 5/5/04  
Thermocouple SN# 332 Cal 1/22/04 Due 7/22/04

5 min total time then water quenches

All Specimens will be polished to 600 Grit Finish  
Prior to Testing

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

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2/16/04

From Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

*[Signature]*

2/16/04

To Page No. \_\_\_\_\_

From Page No. \_\_\_\_\_

**Repassivation Potential Test**

**Objective:** same as pg #1 and #2

**Alloy/Specimen:** C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

**Specimen Preparation:** Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

**Torque Screwdriver:** Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

**Initial Weight:** 41.0000g Model: Sartorius Genius SN: 12809099  
**Final Weight:** 40.9940g CAL:11/14/03 Due: 5/14/04

**Solution:** 0.5 m NaCl + 0.3 m Na<sub>2</sub>SO<sub>4</sub>  
58.4g NaCl lot # 035401  
85.23g Na<sub>2</sub>SO<sub>4</sub> lot # 035451  
+ O<sub>2</sub> water to 2000 ml

**Reagents measured with** Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

**Initial pH:** 5.135 Model: Orion EA 940 SN:2330  
**Final pH:** 5.851 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

**Test Temperature:** 95°C Measured with Hg Thermometer SN: 183305  
Cal: 12/22/03 Due: 6/20/04

**Counter Electrode:** Platinum Flag

**Reference Electrode:** Fisher 13-620-52 SN: 0251439

**Gas:** 99.999% Nitrogen Gas

**Ecorr:** -552 Model: Keithley 614 SN: 467374  
**Ept:** +97 Cal: 11/6/03 Due: 11/6/04

**Potentiostat:** EG&G Model 273 SN: 41108

**Number of Crevice Corrosion Sites:** 0/24 (24 max.)

No crevice corrosion 1/4 feet of crevice washer  
Dark Gold tint staining on All Surfaces of Specimen

Data C22E214

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

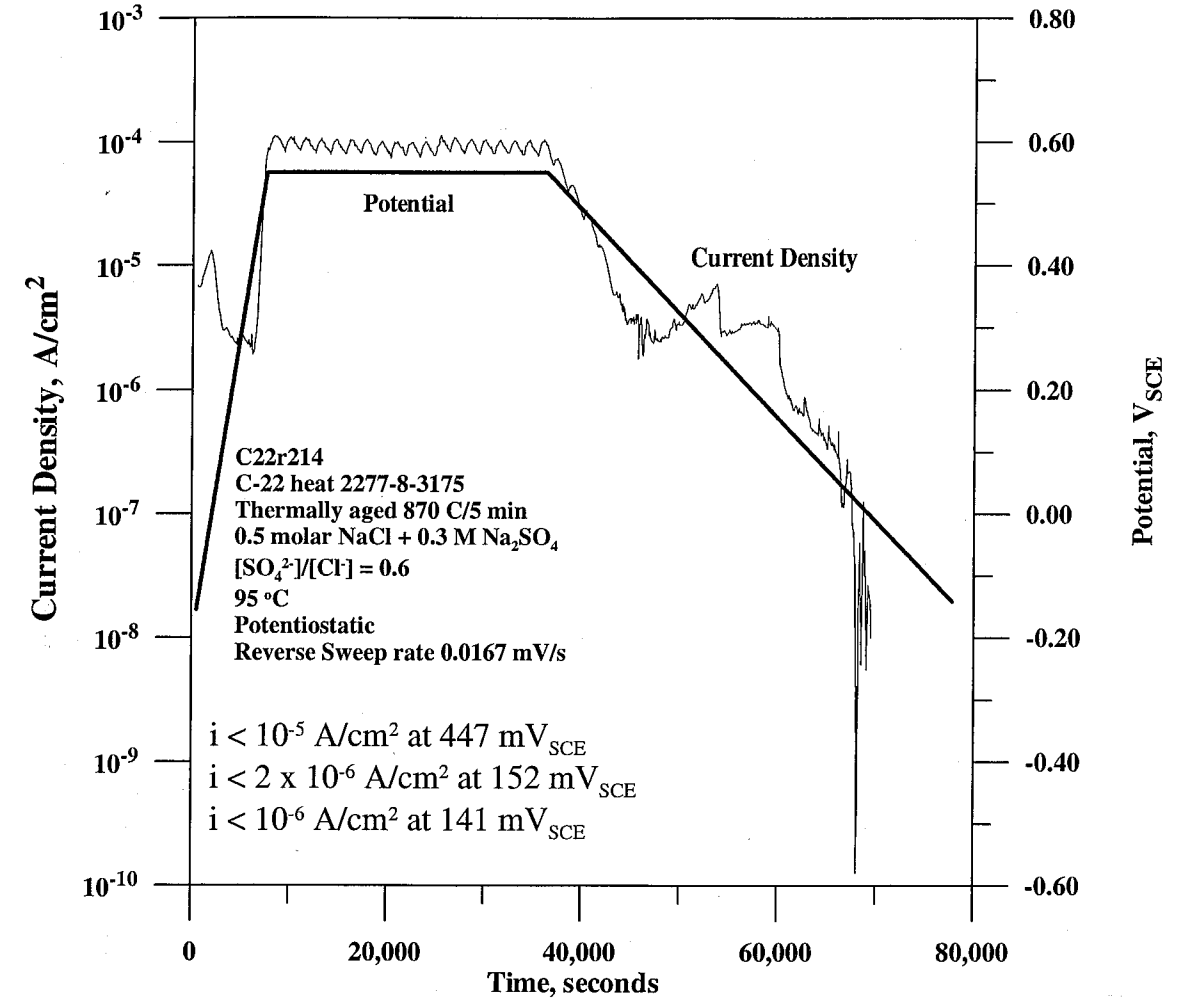
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Witnessed & Understood by me,

Date

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2/19/04

From Page No. \_\_\_\_\_

**Repassivation Potential Test**

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 40.94953 g Model: Sartorius Genius SN: 12809099  
Final Weight: 40.95221 g CAL: 11/14/03 Due: 5/14/04

Solution: 0.5 M NaCl + 0.25 M Na<sub>2</sub>SO<sub>4</sub>  
58.46g NaCl lot # 035421  
71.06g Na<sub>2</sub>SO<sub>4</sub> lot # 035451  
+ DI water to 2000ml

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 5.267 Model: Orion EA 940 SN: 2330  
Final pH: 6.314 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: C96-377  
Cal: 1/15/04 Due: 7/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 9250663

Gas: 99.999% Nitrogen Gas

Ecorr: -401mV Model: Keithley 614 SN: 467374  
Ept: +159mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 10120

Number of Crevice Corrosion Sites: 1/24 (24 max.)

Crevice Corrosion on 1/24 feet of crevice washer  
Dark Gold tint staining on All surfaces of Specimen

C22R215 QD  
Data C22R215 2/19/04

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

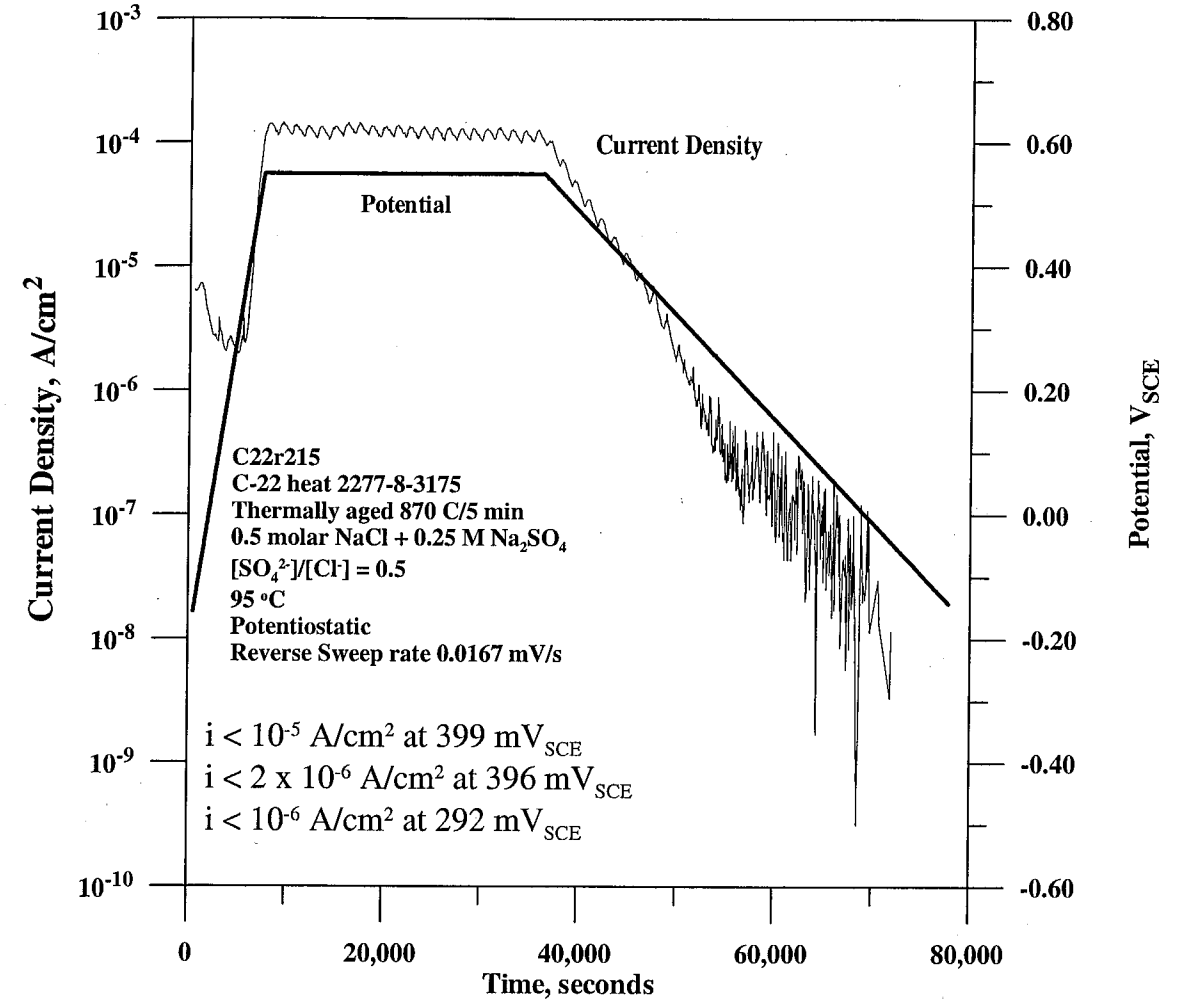
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Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/19/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.62591g Model: Sartorius Genius SN: 12809099 Final Weight: 41.01865g CAL: 11/14/03 Due: 5/14/04

Solution: 0.5 M NaCl + 0.2 M Na2SO4  
58.45g NaCl Lot # 038421  
56.8g Na2SO4 Lot # 035451  
+ DI water to 2000ml

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 5.121 Model: Orion EA 940 SN: 2330 Cal: 7/15/03 Due: 7/15/04 Final pH: 7.228 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 55°C Measured with Hg Thermometer SN: 183305 Cal: 12/22/03 Due: 6/22/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: -305mV Model: Keithley 614 SN: 467374 Ept: -252mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 41108

Number of Crevice Corrosion Sites: 0/24 (24 max.)

No crevice corrosion. Gold tint surface staining on specimen

DATA FILE: C22R216

\* Note Specimen Repolished for further testing

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

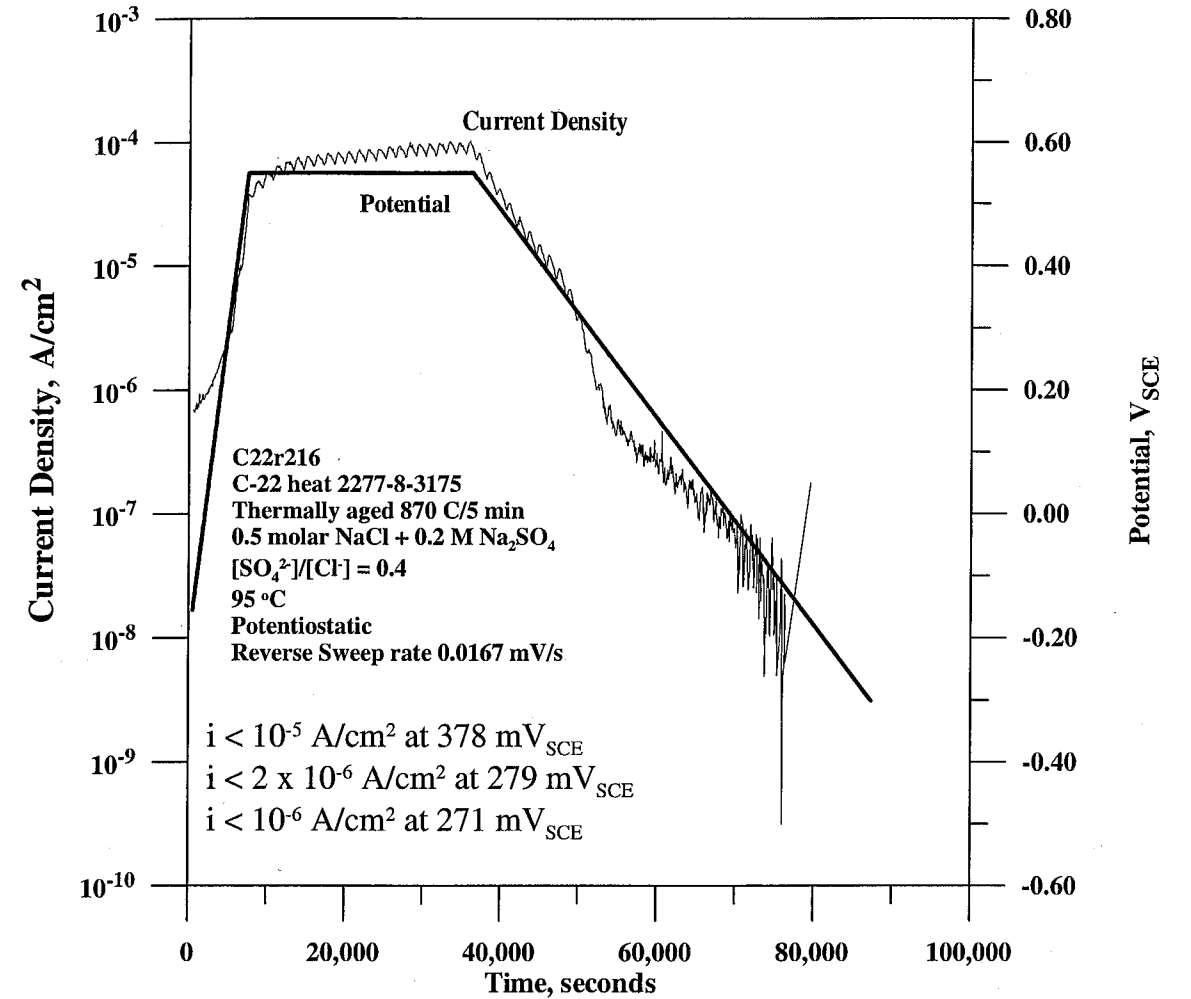
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Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

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2/19/04

From Page No. \_\_\_\_\_

### Repassivation Potential Test

**Objective:** same as pg #1 and #2

**Alloy/Specimen:** C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

**Specimen Preparation:** Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

**Torque Screwdriver:** Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

**Initial Weight:** 41.6507g Model: Sartorius Genius SN: 12809099  
**Final Weight:** 41.0468g CAL: 11/14/03 Due: 5/14/04

**Solution:** 0.5 M NaCl + 0.15 M Na<sub>2</sub>SO<sub>4</sub>  
58.41g NaCl lot # 035421  
42.03g Na<sub>2</sub>SO<sub>4</sub> lot # 035451

**Reagents measured with:** Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

**Initial pH:** 5.519 Model: Orion EA 940 SN: 2330  
**Final pH:** 6.499 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

**Test Temperature:** 95°C Measured with Hg Thermometer SN: C96-377  
Cal: 1/15/04 Due: 7/15/04

**Counter Electrode:** Platinum Flag

**Reference Electrode:** Fisher 13-620-52 SN: 9250063

**Gas:** 99.999% Nitrogen Gas

**Ecorr:** Model: Keithley 614 SN: 467374  
**Ept:** Cal: 11/6/03 Due: 11/6/04

**Potentiostat:** EG&G Model 273 SN: 10120

**Number of Crevice Corrosion Sites:** 0/24 (24 max.)

No Crevice Corrosion. Gold tint staining on all surfaces of specimen

DATA FILE C22R217

\* Note: Specimen Re-polished for further testing

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

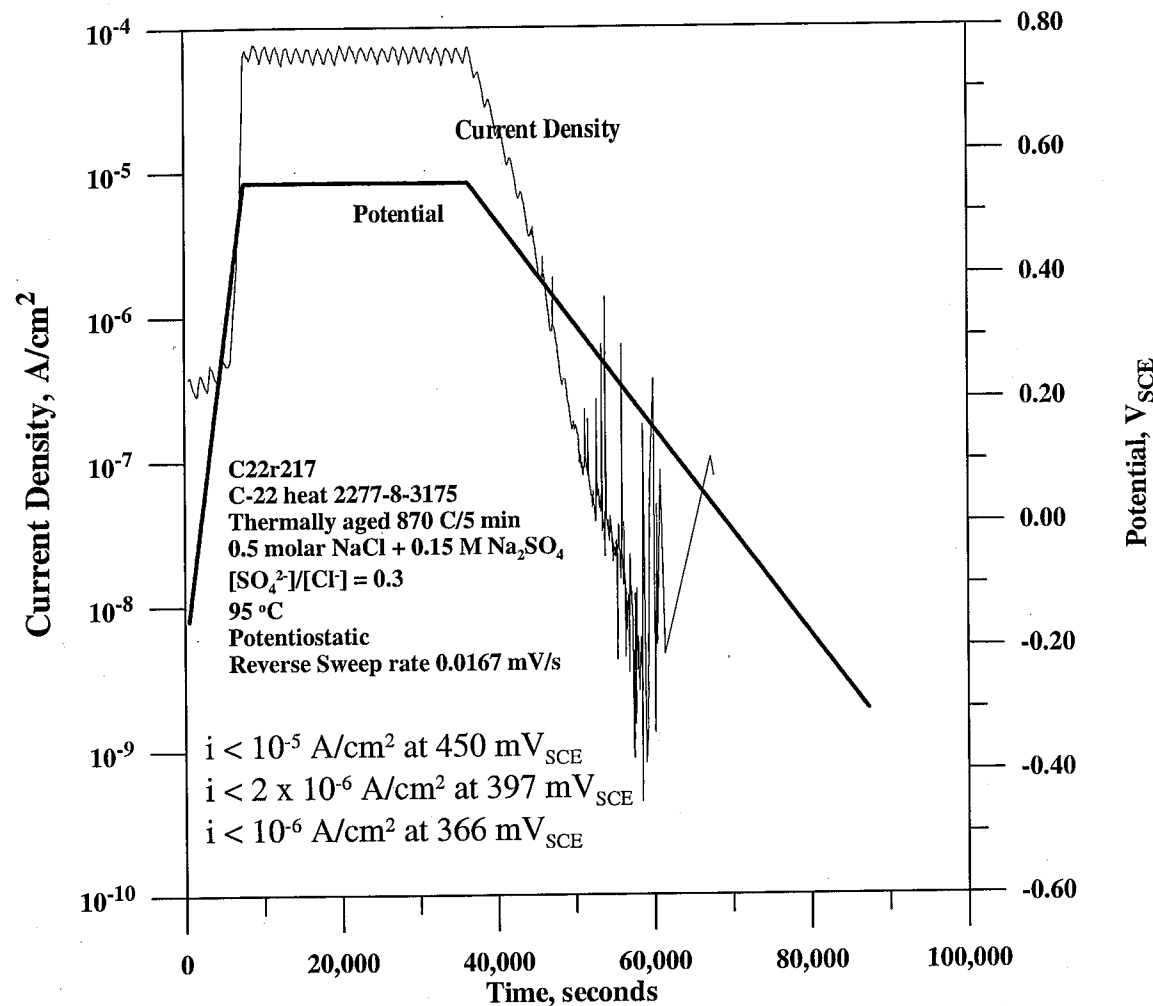
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Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/19/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.0611g Model: Sartorius Genius SN: 12809099

Final Weight: 40.9918g CAL:11/14/03 Due: 5/14/04

Solution: 0.5 m NaCl + 0.1 m Na<sub>2</sub>SO<sub>4</sub>  
58.46g NaCl lot# 035421  
28.403g Na<sub>2</sub>SO<sub>4</sub> lot# 035451  
+ DI water to 2000 ml

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 5.178 Model: Orion EA 940 SN:2330

Final pH: 4.963 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: A 2000-136  
Cal: 1/8/04 Due: 7/8/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 7282317

Gas: 99.999% Nitrogen Gas

Ecorr: -463 mV Model: Keithley 614 SN: 467374

Ept: -448 mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: IR 03101

Number of Crevice Corrosion Sites: 0 /24 (24 max.)

No crevice corrosion 1/24 feet of crevice washer  
very mild surface staining with gold tint

DATA FIG C22 R218

\* Note Specimen Replishes for further testing

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

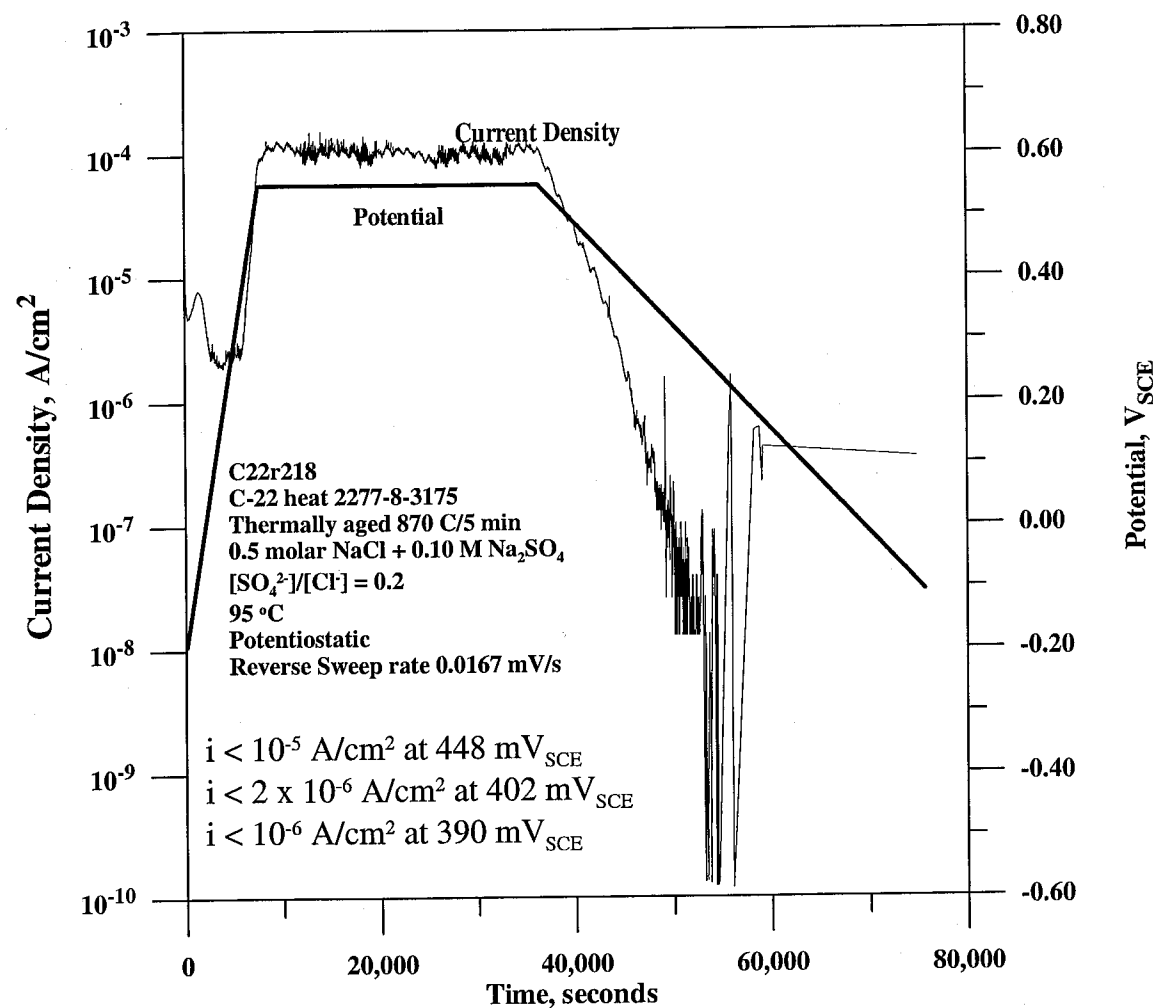
Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/18/04

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/19/04



From Page No. \_\_\_\_\_

**Repassivation Potential Test**

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.02342g Model: Sartorius Genius SN: 12809099  
Final Weight: 41.02498g CAL: 11/14/03 Due: 5/14/04

Solution: 0.5 m NaCl + 0.05 m Na<sub>2</sub>SO<sub>4</sub>  
58.62g NaCl lot # 035421  
17.201g Na<sub>2</sub>SO<sub>4</sub> lot # 035451  
+ DI To 2000ml

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 6.347 Model: Orion EA 940 SN: 2330  
Final pH: 7.039 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: 183305  
Cal: 12/22/03 Due: 6/22/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251435

Gas: 99.999% Nitrogen Gas

Ecorr: -364 Model: Keithley 614 SN: 467374  
Ept: +74 Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 41108

Number of Crevice Corrosion Sites: 0 / 24 (24 max.)

No crevice corrosion 1/4 inch of crevice washer  
Light surface staining

Date C22E219

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

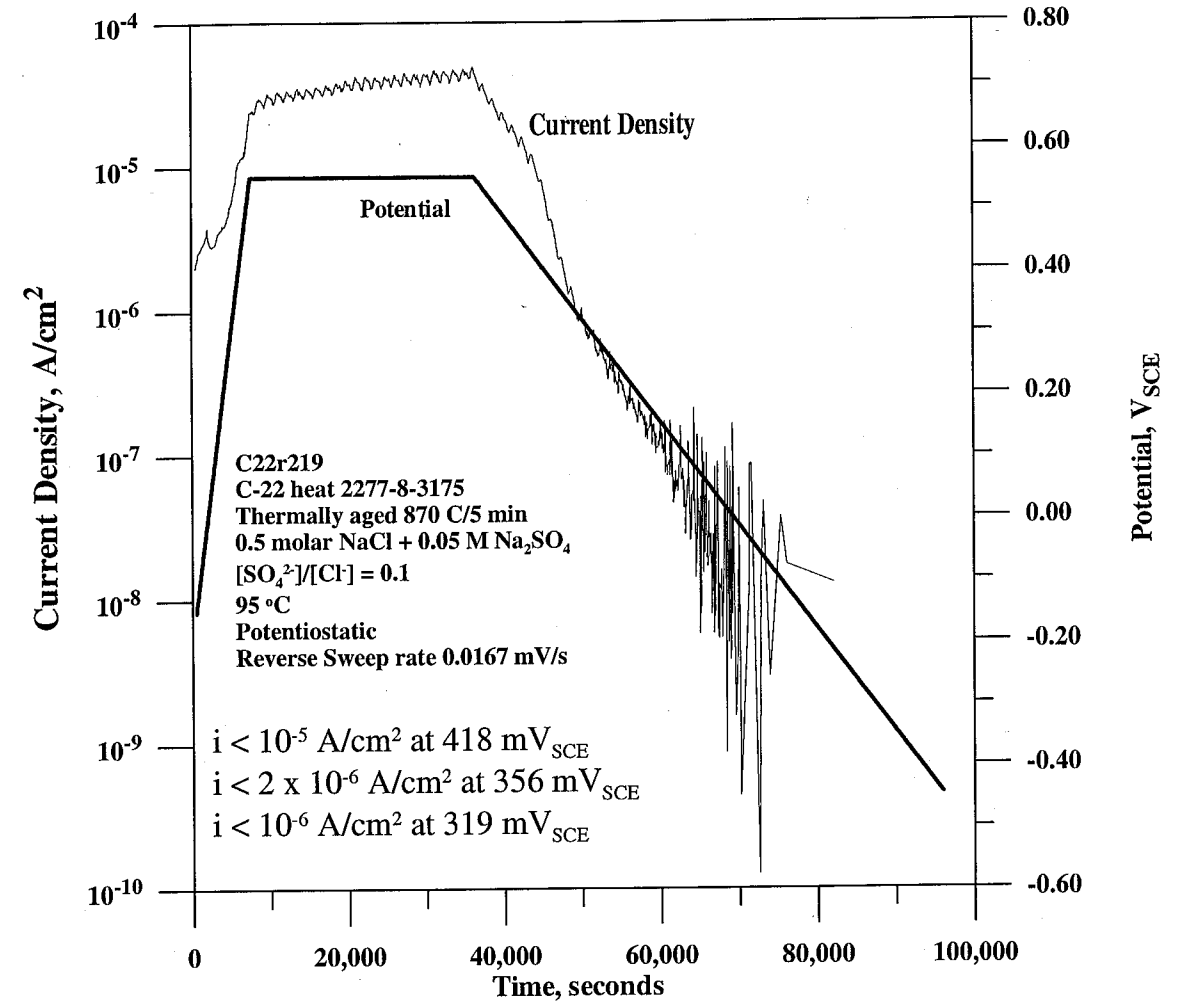
Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/23/04

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/24/04

From Page No. \_\_\_\_\_

**Repassivation Potential Test**

**Objective:** same as pg #1 and #2

**Alloy/Specimen:** C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

**Specimen Preparation:** Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

**Torque Screwdriver:** Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

**Initial Weight:** 40.90308 Model: Sartorius Genius SN: 12809099  
**Final Weight:** 40.90381 CAL:11/14/03 Due: 5/14/04

**Solution:** 4 m  $MgCl_2 \cdot 6H_2O$  + 1.2 m  $Mg(NO_3)_2$   
1626.25g  $MgCl_2 \cdot 6H_2O$  lot # 030326  
615.18g  $Mg(NO_3)_2$  lot # 0633942  
TDI water to 2000ml

**Reagents measured with** Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

**Initial pH:** 2.137 Model: Orion EA 940 SN:2330  
**Final pH:** 2.926 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

**Test Temperature:** 80°C Measured with Hg Thermometer SN: C96-377  
Cal: 1/15/04 Due: 7/15/04

**Counter Electrode:** Platinum Flag  
**Reference Electrode:** Fisher 13-620-52 SN: 9250063

**Gas:** 99.999% Nitrogen Gas

**Ecorr:** -140mv Model: Keithley 614 SN: 467374  
**Ept:** +332mv Cal: 11/6/03 Due: 11/6/04  
**Potentiostat:** EG&G Model 273 SN: 10120

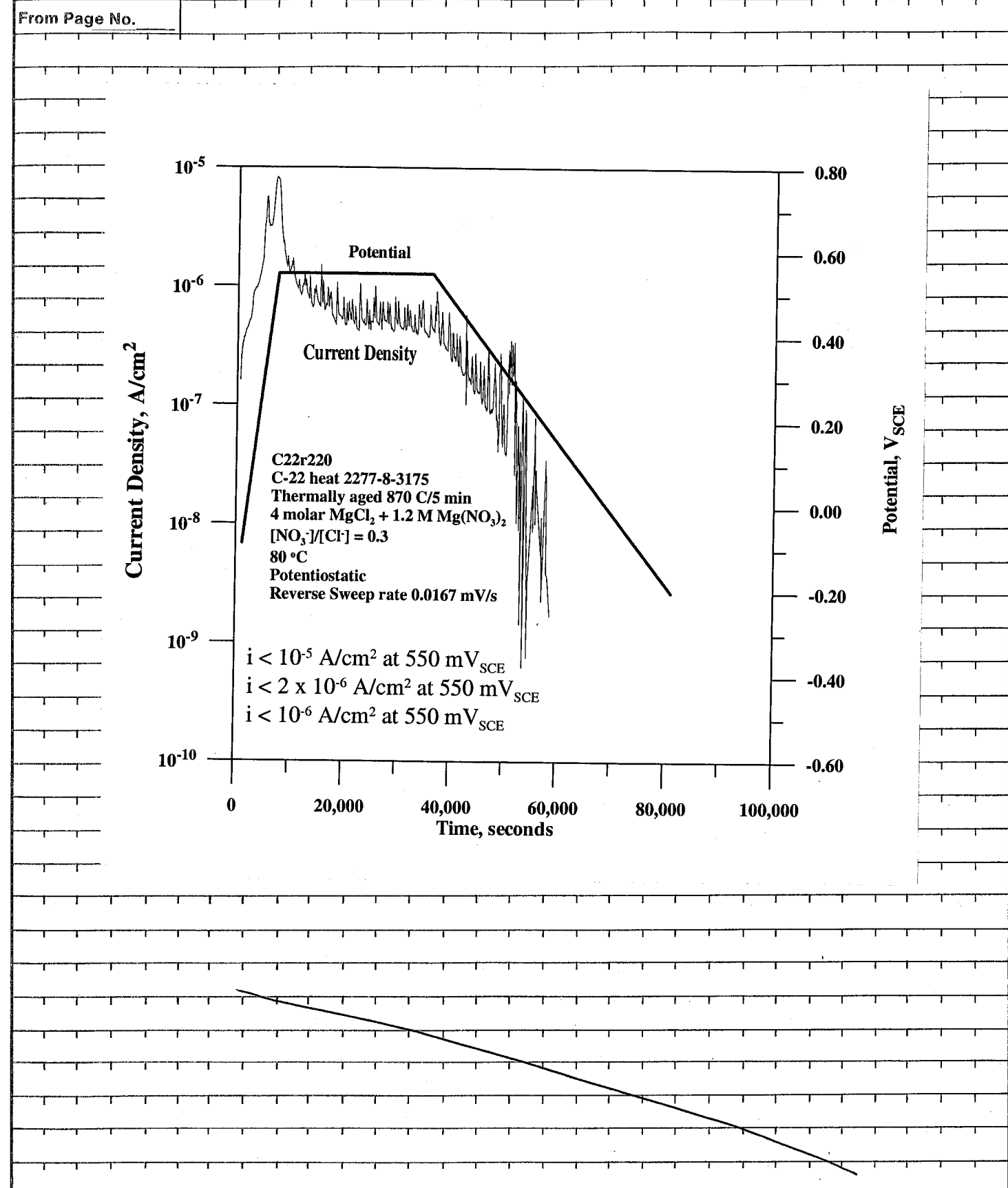
**Number of Crevice Corrosion Sites:** 0/24 (24 max.)

No Crevice Corrosion - Very mild Surface Staining

Data C22R220

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_ Date \_\_\_\_\_  
Invented by \_\_\_\_\_ Date \_\_\_\_\_  
Recorded by *B. R. J.* Date 2/25/04



Witnessed & Understood by me, \_\_\_\_\_ Date \_\_\_\_\_  
Invented by \_\_\_\_\_ Date \_\_\_\_\_  
Recorded by *B. R. J.* Date 2/27/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 40.88423g Model: Sartorius Genius SN: 12809099  
Final Weight: 40.88586g CAL: 11/14/03 Due: 5/14/04

Solution: 4 M MgCl<sub>2</sub> · 6H<sub>2</sub>O + 0.8 M Mg(NO<sub>3</sub>)<sub>2</sub>  
1626.13g MgCl<sub>2</sub> · 6H<sub>2</sub>O lot# 030326  
410.02g Mg(NO<sub>3</sub>)<sub>2</sub> lot# 033942  
+ DI water To 2000mls

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 2.751 Model: Orion EA 940 SN: 2330  
Final pH: 2.098 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 60 °C Measured with Hg Thermometer SN: A2000-130  
Cal: 1/8/04 Due: 7/8/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 282317

Gas: 99.999% Nitrogen Gas

Ecorr: -205 Model: Keithley 614 SN: 467374  
Ept: -249 Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: IR 03101

Number of Crevice Corrosion Sites: 0 /24 (24 max.)

No crevice corrosion 1/24 feet of crevice washer  
No surface staining

Date 2/25/04 C22R221

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

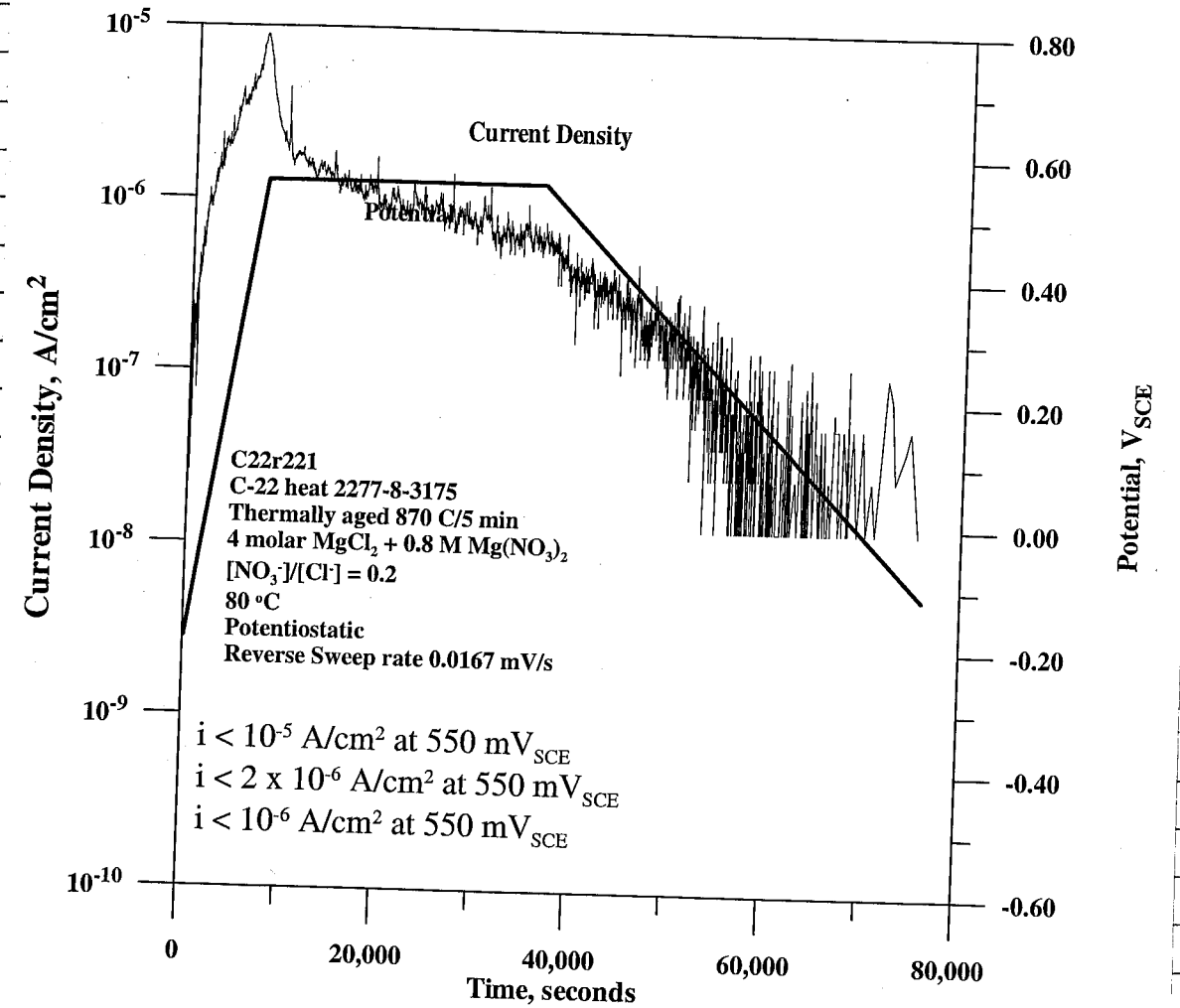
Date

Recorded by

*[Signature]*

2/25/04

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

*[Signature]*

2/27/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.12947 g Model: Sartorius Genius SN: 12809099 Final Weight: 41.14484 g CAL: 11/14/03 Due: 5/14/04

Solution: 4 M MgCl<sub>2</sub> · 6H<sub>2</sub>O + 0.4 M Mg(NO<sub>3</sub>)<sub>2</sub> 1628.28 g MgCl<sub>2</sub> · 6H<sub>2</sub>O lot # 030326 205.18 g Mg(NO<sub>3</sub>)<sub>2</sub> lot # 033942

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 3.117 Model: Orion EA 940 SN: 2330 Final pH: 3.331 Cal: 7/15/03 Due: 7/15/04 pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 80 °C Measured with Hg Thermometer SN: 183305 Cal: 12/22/03 Due: 6/22/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251439

Gas: 99.999% Nitrogen Gas

Ecorr: -230 mV Model: Keithley 614 SN: 467374 Ept: +480 mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 41108

Number of Crevice Corrosion Sites: 10/24 (24 max.)

Crevice Corrosion on 10/24 feet of crevice washer just starting to initiate. Almost looks like small pitting

Date C-22R222

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

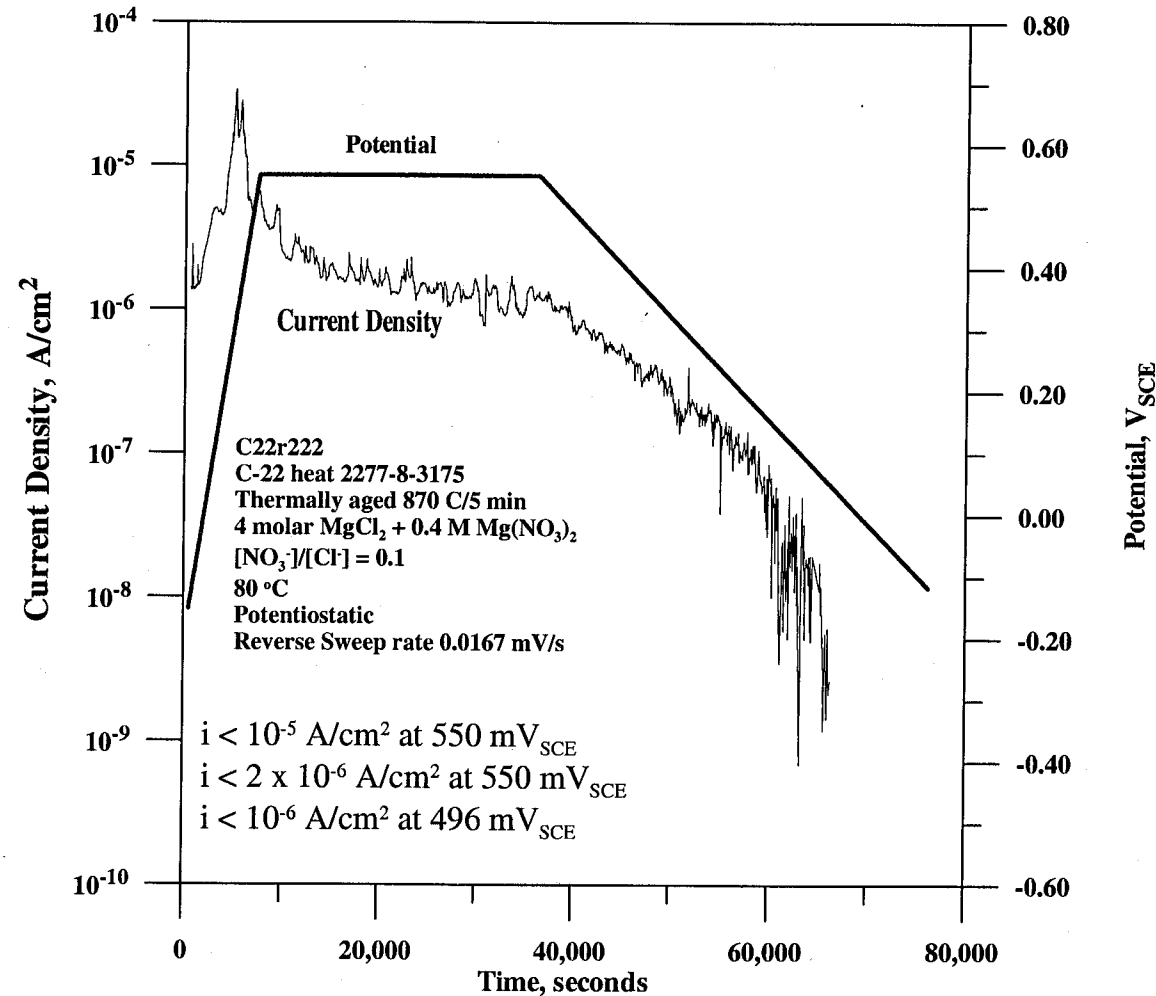
Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/25/04

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/27/04

From Page No. \_\_\_\_\_

**Repassivation Potential Test**

**Objective:** same as pg #1 and #2

**Alloy/Specimen:** C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

**Specimen Preparation:** Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

**Torque Screwdriver:** Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

**Initial Weight:** 40.94314g Model: Sartorius Genius SN: 12809099  
**Final Weight:** 40.96524g CAL:11/14/03 Due: 5/14/04

**Solution:** 4 M MgCl<sub>2</sub> · 6H<sub>2</sub>O + 1.6 M Mg(NO<sub>3</sub>)<sub>2</sub>  
1626.34g MgCl<sub>2</sub> · 6H<sub>2</sub>O Lot # 030320  
820.51g Mg(NO<sub>3</sub>)<sub>2</sub> Lot # 033942  
+ DI water to 2000mls

**Reagents measured with** Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

**Initial pH:** 3.497 Model: Orion EA 940 SN:2330  
**Final pH:** 2.883 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

**Test Temperature:** 110 °C Measured with Hg Thermometer SN: 183305  
Cal: 12/22/03 Due: 6/22/04

**Counter Electrode:** Platinum Flag

**Reference Electrode:** Fisher 13-620-52 SN: 0251479

**Gas:** 99.999% Nitrogen Gas

**Ecorr:** -13 Model: Keithley 614 SN: 467374  
**Ept:** -42 Cal: 11/6/03 Due: 11/6/04

**Potentiostat:** EG&G Model 273 SN: 41108

**Number of Crevice Corrosion Sites:** 0 /24 (24 max.)

No Crevice Corrosion - Very Mild Staining on All Surfaces

Data C-22 R229

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

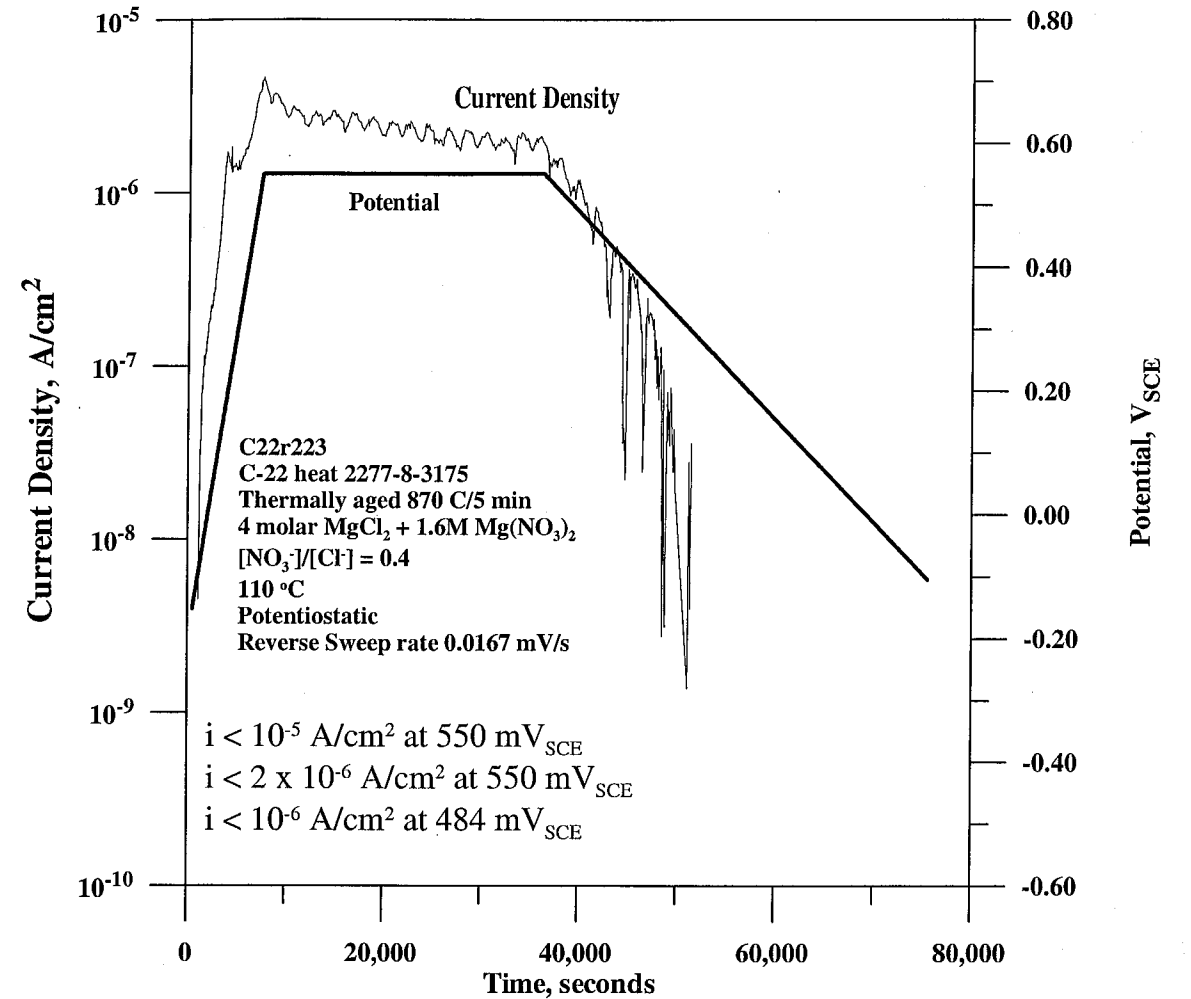
Date

Recorded by

*[Signature]*

2/27/04

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

*[Signature]*

3/2/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 /2277-8-3175 (see pg.96 NB 607)

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 41.1168g Model: Sartorius Genius SN: 12809099  
Final Weight: 41.13150g CAL:11/14/03 Due: 5/14/04

Solution: 4 M  $MgCl_2 \cdot 6H_2O$  + 0.2 M  $Mg(NO_3)_2$   
1626.73 g  $MgCl_2 \cdot 6H_2O$  lot# 030320  
102.79 g  $Mg(NO_3)_2$  lot# 033942  
+ DI water to 2000mls

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 3.719 Model: Orion EA 940 SN:2330  
Final pH: 2.601 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 80°C Measured with Hg Thermometer SN: C96-377  
Cal: 1/15/04 Due: 7/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 925-0063

Gas: 99.999% Nitrogen Gas

Ecorr: -210 mV Model: Keithley 614 SN: 467374  
Ept: +252 mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 10120

Number of Crevice Corrosion Sites: 8/24 (24 max.)

Crevice Corrosion on 8/24 feet of crevice washer  
Not Deep- Surface Initiation  
Very mlto surface staining

Data C22R224 BUS 2/27/04

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

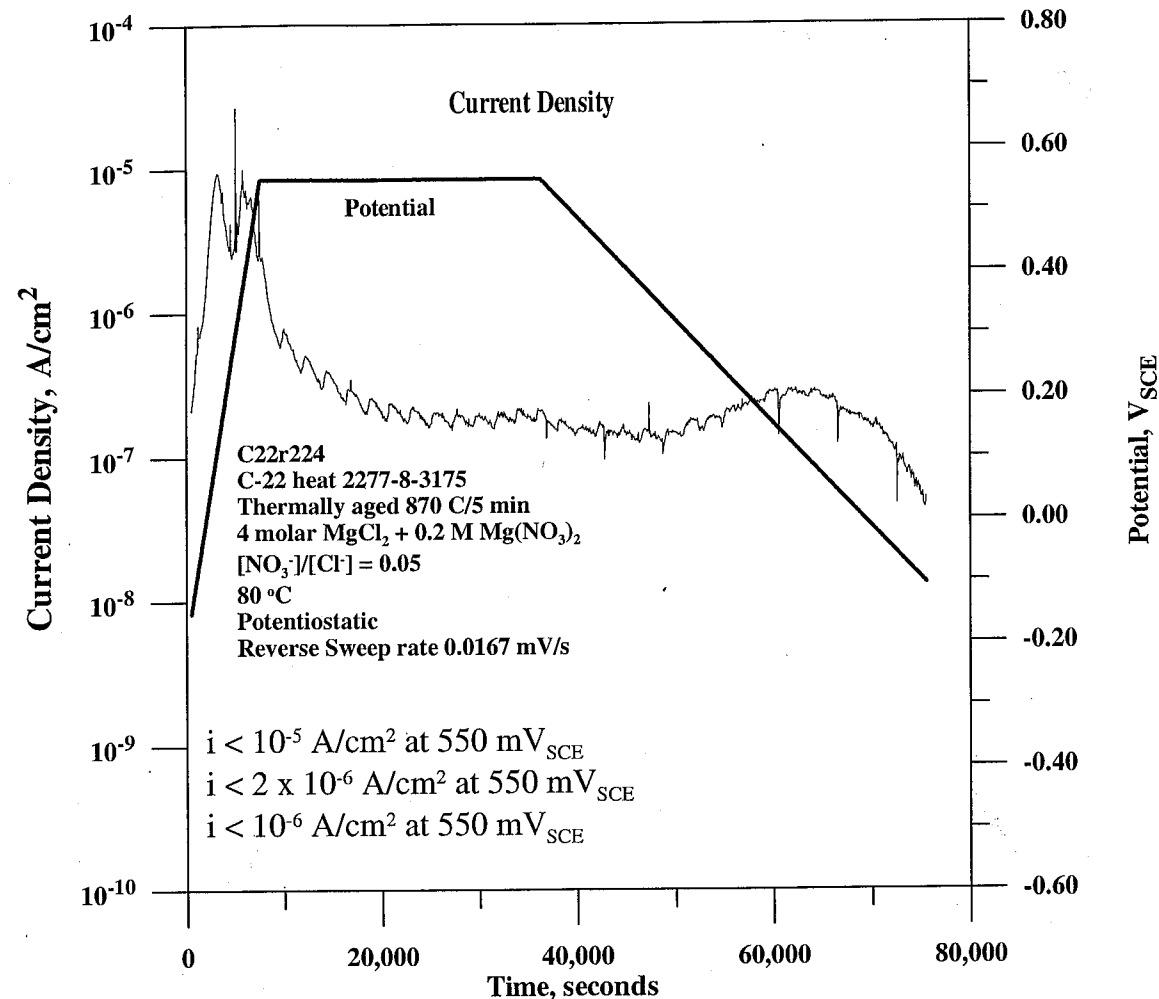
Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/27/04

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

3/2/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2 *8/2/04*

Alloy/Specimen: C22 ~~thermally aged~~ 22 / 2277-8-3175 (see pg. 96 NB-607) *8/2/04*

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

Initial Weight: *40.7315* Model: Sartorius Genius SN: 12809099  
Final Weight: *40.7465* CAL: 11/14/03 Due: 5/14/04  
*40.73003*

Solution: *4 m. MgCl<sub>2</sub> · 6H<sub>2</sub>O + 0.1 m Mg(NO<sub>3</sub>)<sub>2</sub>*  
*1626.02g MgCl<sub>2</sub> · 6H<sub>2</sub>O lot # 030320*  
*51.30g Mg(NO<sub>3</sub>)<sub>2</sub> lot # 033942*  
*+ DI water to 2000mls*

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: *2.106* Model: Orion EA 940 SN: 2330  
Final pH: *4.473* Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: *80°C* Measured with Hg Thermometer SN: *183305*  
Cal: *12/22/03* Due: *6/22/04*

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: *0251439*

Gas: 99.999% Nitrogen Gas

Ecorr: *-125mV* Model: Keithley 614 SN: *467374*  
Ept: *+450mV* Cal: *11/6/03* Due: *11/6/04*

Potentiostat: EG&G Model 273 SN: *41108*

Number of Crevice Corrosion Sites: *6 / 24 (24 max.)*

*Crevice Corrosion on 6/24 feet of crevice washer  
Very mild surface staining*

*Data C22R225*

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

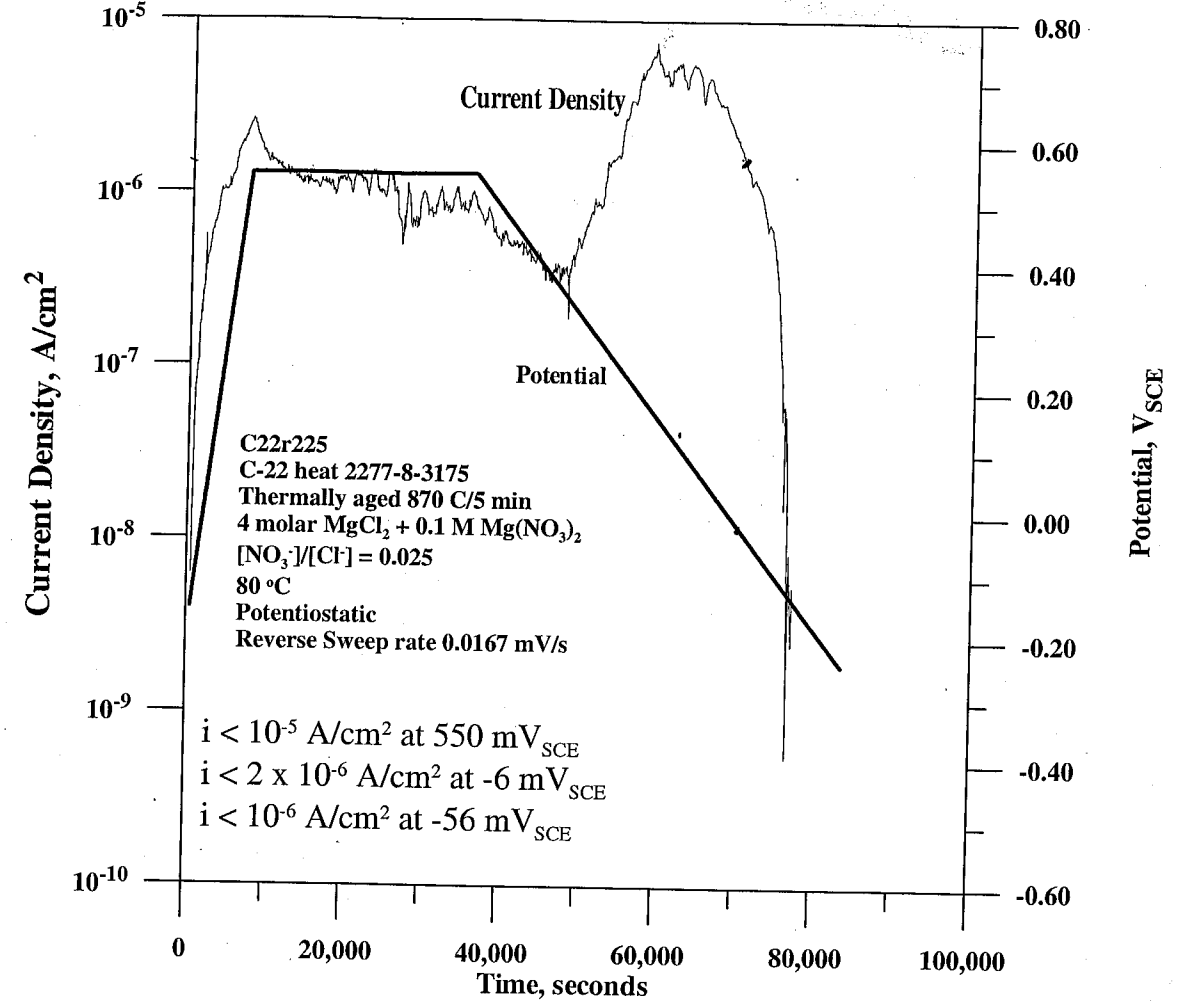
Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by *B. K. J.*

*3/2/04*

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by *Michael D.*

*3/2/04*

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 22 12277-8-3175 (see pg 96 NB 607) 9/20/04

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 40.76363g Model: Sartorius Genius SN: 12809099  
Final Weight: 40.76335g CAL: 11/14/03 Due: 5/14/04

Solution: 4 M NaCl + 0.2 M NaNO<sub>3</sub>  
467.58g NaCl lot # 035421  
34.040g NaNO<sub>3</sub> lot # 020809  
+ DI water to 2000 ml

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 4.968 Model: Orion EA 940 SN: 2330  
Final pH: 6.578 Cal: 7/15/03 Due: 7/15/04  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: C96-377  
Cal: 1/15/04 Due: 7/15/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 9250063

Gas: 99.999% Nitrogen Gas

Ecorr: -213 mV Model: Keithley 614 SN: 467574  
Ept: +151 mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: 10120

Number of Crevice Corrosion Sites: 0/24 (24 max.)

No crevice corrosion 0/24 feet of crevice washer  
mild staining on all surfaces

Date 0222226

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

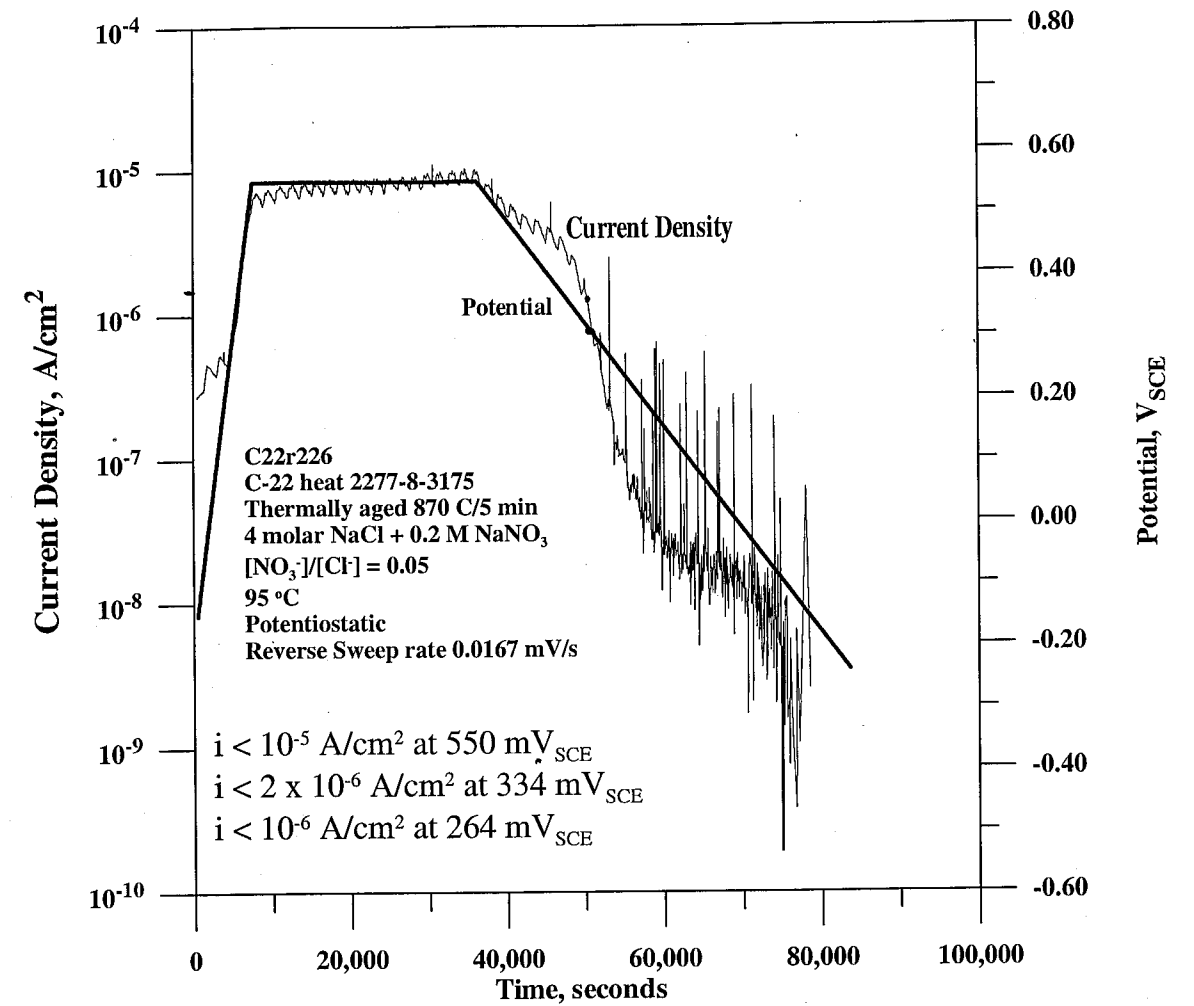
Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

3/2/04

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

3/2/04



From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2 *3/2/04*

Alloy/Specimen: C22 thermally aged 22 / 2277-8-3175 (~~see pg 96 NB 607~~) *3/2/04*

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 9/4/03 Due: 3/4/04

Initial Weight: 40.88130g Model: Sartorius Genius SN: 12809099  
Final Weight: 40.88220g CAL: 11/14/03 Due: 5/14/04

Solution: 4 M NaCl + 0.3 M NaNO<sub>3</sub>  
467.53 g NaCl lot # 035421  
51.01 g NaNO<sub>3</sub> lot # 020809  
+ DI water to 2000ml

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 6.541 Model: Orion EA 940 SN: 2330  
Final pH: 5.273 Cal: 7/15/03 Due: 7/15/03  
pH Probe: #13-620-296 SN: 2291257P6

Test Temperature: 95°C Measured with Hg Thermometer SN: A 2000-130  
Cal: 1/8/04 Due: 7/8/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 7282317

Gas: 99.999% Nitrogen Gas

Ecorr: -237 mV Model: Keithley 614 SN: 467374  
Ept: -67 mV Cal: 11/6/03 Due: 11/6/04

Potentiostat: EG&G Model 273 SN: FRO3101

Number of Crevice Corrosion Sites: 0/24 (24 max.)

No crevice corrosion 1/4 feet of crevice washer  
mild staining on all surfaces

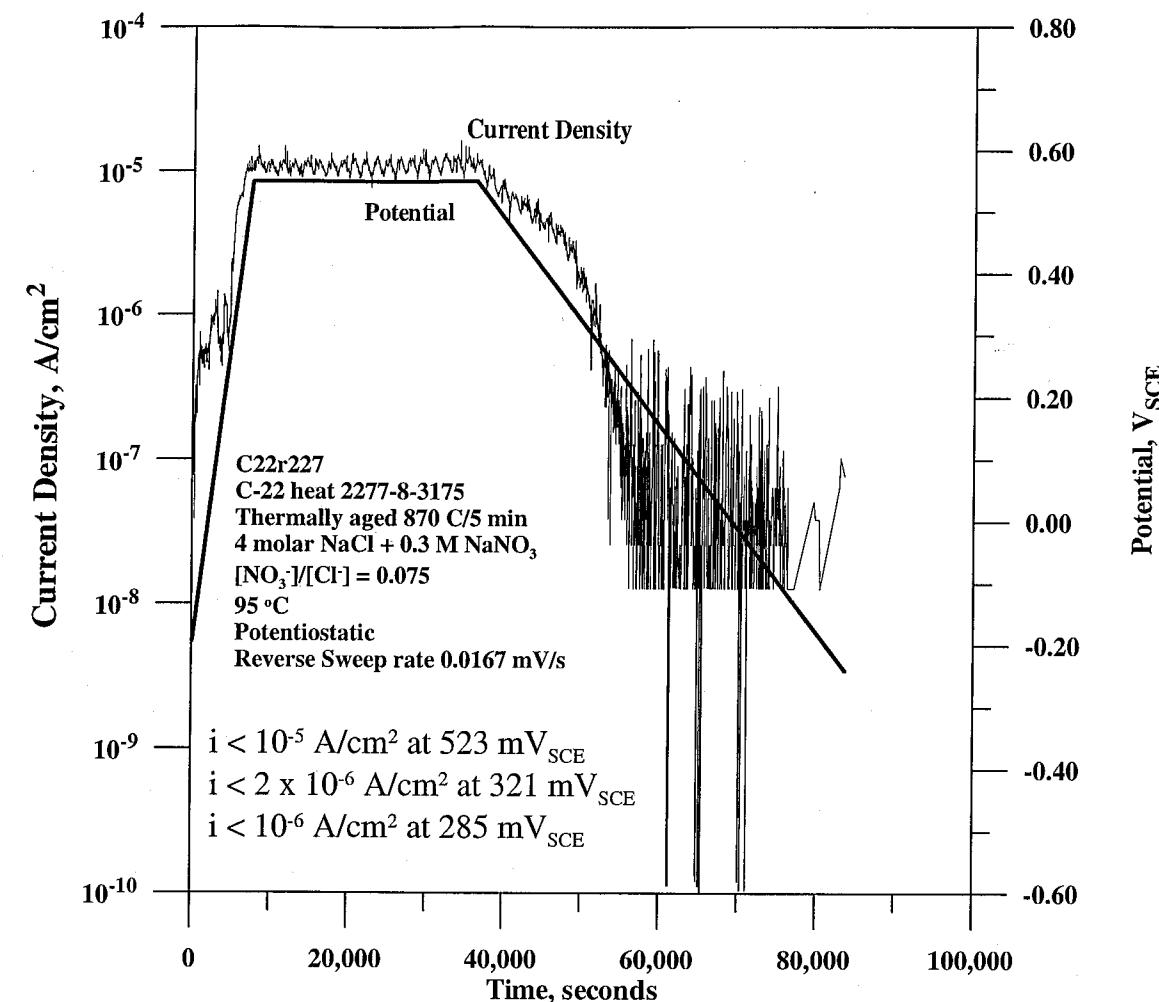
Date 02/22/04

To Page No. \_\_\_\_\_

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	3/2/04

TITLE \_\_\_\_\_

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	3/2/04

From Page No. \_\_\_\_\_

Requisition: 04012028 SOUTHWEST RESEARCH INSTITUTE Page 1 of 2  
 Requisitioner: Dunn, Darrell S. Date Printed: 05/10/2004  
 Req Organization: 1.20.05.04 Suggested Supplier: Texas Toolmakers Date Created: 03/24/2004  
 Phone: (210) 522-6090 City/State: San Antonio Requisition Date: 03/24/2004  
 Contact: Mike Ridgway  
 Phone: 494 3651 Fax: 494 6139

Line #	Item / Description	U/M	Need By Date	Requested Qty	Est Unit Cost	Estimated Costs
1	Wire EDM specimens from plate and machine t o dimensions provided in CNWRA drawing 20-01402-571-027 Deliver To: Darrell Dunn Building 57	EA	4/16/2004	50.00	149.50	7,475.00
				Account: 704-000	Organization: 1.20	Project: 06002.01.081
				Allocation Pct: 100.00		Total Estimated Cost: \$7,475.00

Government Project?: YES Property Type: G1 Is Govt. Property being sent to supplier?: YES  
 Quality Assurance?: YES ASL Required: YES Inspection Criteria: Dimensional Inspection per CNWRA Draqing 20-01402-571-027

Approvals: Requestor: Darrell S Dunn 3/24/2004 10:19:06 AM  
 Department/Division Management: Vijay Jain 3/24/2004 10:35:39 AM  
 Quality Assurance: Robert D Brient 3/24/2004 10:01:43 AM  
 Executive Management: David R Turner 3/24/2004 1:29:01 PM

Submitted By: Shirlee Garcia 3/24/2004 2:07:48 PM

SUPPLIER SHALL FURNISH DIMENSIONAL INSPECTION DATA VERIFYING COMPLIANCE WITH THE REQUIREMENTS OF THE FABRICATION DRAWINGS.

Your organization will provide goods or services to the Center for Nuclear Waste Regulatory Analyses (CNWRA) in accordance with the requirements of your quality system or that of the CNWRA Quality Assurance Manual. Any special technical or QA procedures required in the performance of your staff members' work will be provided. Special CNWRA requirements apply to scientific and engineering software and must be followed. Your organization's product will be accepted based on an evaluation by the CNWRA Principal Investigator or technical staff member and will be returned for rework at Seller's expense if the product does not meet CNWRA requirements. If scientific notebooks are utilized, they are subject to periodic review and must be returned at the conclusion of work to the CNWRA QA Records Room, or invoice remittance will be withheld. Additionally, there shall be "right of access" to your facility to confirm effective implementation of the quality requirements with the possibility of audits, source inspections, or surveillances. Any special documentation requirements shall be specified in the purchase order and will be supplied to the CNWRA with the product. The Seller shall notify CNWRA QA of any nonconformance to the requirements of this purchase order; further work shall not be done unless directed by CNWRA QA. If there are any QA-related questions, please call the CNWRA Director of QA at (210) 522-5537.

To Page No. \_\_\_\_\_

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	5/27/04

TITLE \_\_\_\_\_

From Page No. \_\_\_\_\_

### DIMENSIONAL INSPECTION REPORT

TEXAS TOOLMAKERS, INC.

Job No.: 35523/1	Part No.: 20-1402-571-027	Rev. No.: -	P.O. No.: 452665J
Customer:	Part Name: Cravice Repassivation Specimen		Log No.: 4086002-C
Inspection Plan: <input type="checkbox"/> 100 % <input checked="" type="checkbox"/> Specified Dim.	Quantity: 50	Sample Size: 50	Accept No.: 50 Reject No.: <del>0</del> NR No.: <del>0</del>
<input type="checkbox"/> 1st Article			

Zone	Dim. / Char.	Tolerance*	Actual	Equipment S/N	Comments
1	.300		.299-.302	TI 103	
2	# 5-40 Thds	J.250	# 5-40 X .250	TI gage / 204	
3	.325		.323	TI 103	
4	.375		.375	TI 081/204	
5	.750		.746-.753	TI 204	
6	.375		.375	TI 081/204	
7	.750		.748-.752	TI 204	
8	.750		.747-.752	TI 204	
9	min .020 R		.030 R	TI 024 / gage	

\* Recorded if not affected by tolerance block. Sheet 1 of 1

Inspection Performed by: *[Signature]* Date: 4/30/04 Customer (as applicable): \_\_\_\_\_ Date: \_\_\_\_\_

TTI Form QF-100201 Rev 2

To Page No. \_\_\_\_\_

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>[Signature]</i>	5/27/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 2277-3-3266

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 03/03/2004 Due: 09/03/2004 Model: Sartorius Genius SN: 12809099 CAL: 05/14/2004 Due: 11/14/2004

Solution: 4M MgCl2 + 0.04M Mg(NO3)2 1.626480g MgCl2 lot# 030320 20.5128g Mg(NO3)2 lot# 033942 } + DI water to 200mls

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 3.42 Model: ORION EA940 SN: 2330 Final pH: 6.07 Cal: 07/15/2003 Due: 07/15/2004 pH Probe: 13-620-296 SN: 4079126P

Test Temperature: 80°C Measured with Hg Thermometer SN: E9891 Cal: 06/09/2004 Due: 12/09/2004

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251433

Gas: 99.999% Nitrogen Gas

Ecorr: -366 mV Model: Keithley 614 SN: 0704934 Ept: +433 mV Cal: 7/12/2004 Due: 7/04/05 Potentiostat: EG&G Model 273 SN: 41108 X-H 7/15/2004

DATA FILE: C22r228

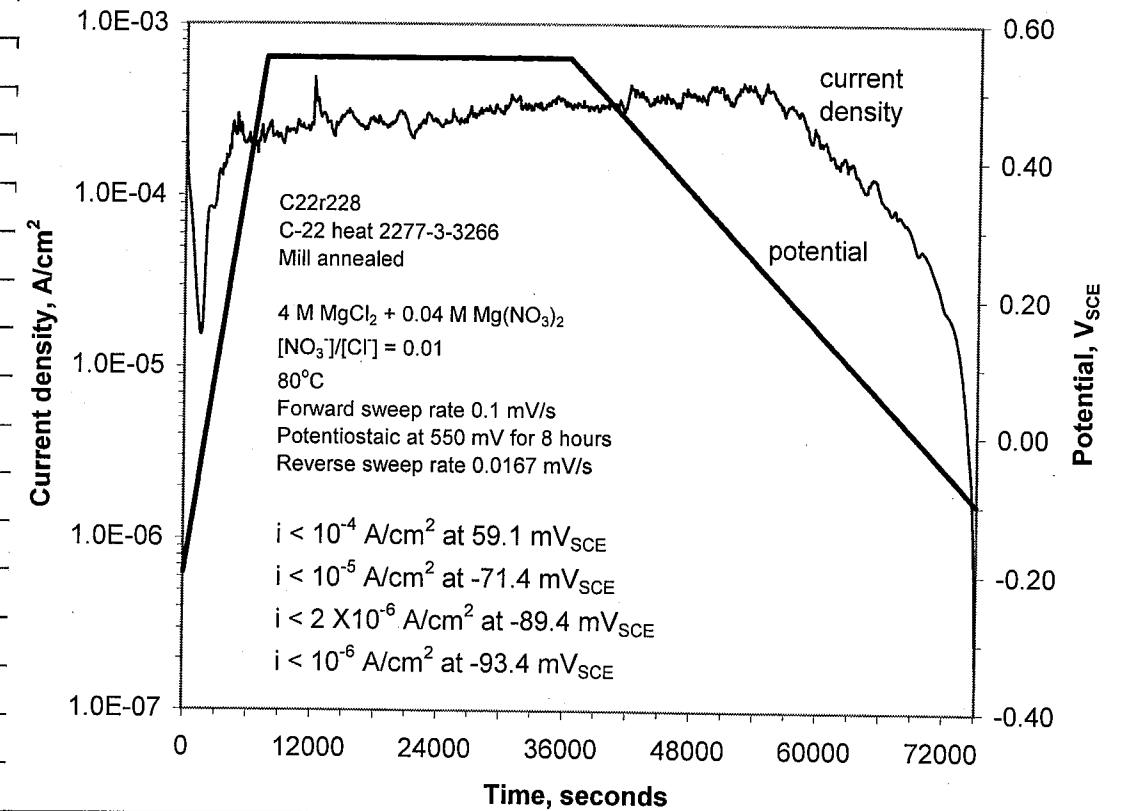
Number of Crevice Corrosion Sites: 10 / 24 (24 max.)

Corrosion noticed in creviced bolt hds mild surface staining on all sides of specimen X-H 7/19/04

To Page No. \_\_\_\_\_

Witnessed & Understood by me, Date Invented by Date Recorded by Xihua He 7/15/2004

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, Date Invented by Date Recorded by Xihua He 7/19/2004

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 2277-3-3266

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
 Cal: 03/03/2004 Due: 09/03/2004  
 Model: Sartorius Genius SN: 12809099  
 CAL: 05/14/2004 Due: 11/14/2004

Solution: 4 M MgCl<sub>2</sub> + 0.2 M Mg(NO<sub>3</sub>)<sub>2</sub>  
 2033.1 g MgCl<sub>2</sub> lot# 030320 } + DI water to 2500 ml  
 128.2 g Mg(NO<sub>3</sub>)<sub>2</sub> lot# 033942 }

Reagents measured with Model: OHAUS SN: 2883  
 Cal: 2/04/04 Due: 8/04/04  
 Model: ORION EA 940 SN: 2330  
 Cal: 07/15/2003 Due: 07/15/2004  
 pH Probe: 13-620-296 SN: 4079126P

Test Temperature: 80°C Measured with Hg Thermometer SN: E98-191  
 Cal: 06/09/2004 Due: 12/09/2004

Counter Electrode: Platinum Flag  
 Reference Electrode: Fisher 13-620-52 SN: 0251433

Gas: 99.999% Nitrogen Gas  
 Ecorr: -366.6 mV Model: Keithley 614 SN: 070493K  
 Ept: +403.6 mV Cal: 7/12/04 Due: 7/12/05  
 Potentiostat: EG&G Model 273 SN: 41108

DATA FILE: C22r229

Number of Crevice Corrosion Sites: 0 / 24 (24 max.)

No crevice corrosion, mild surface staining on small part of surfaces. Specimen will be polished for future use.

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

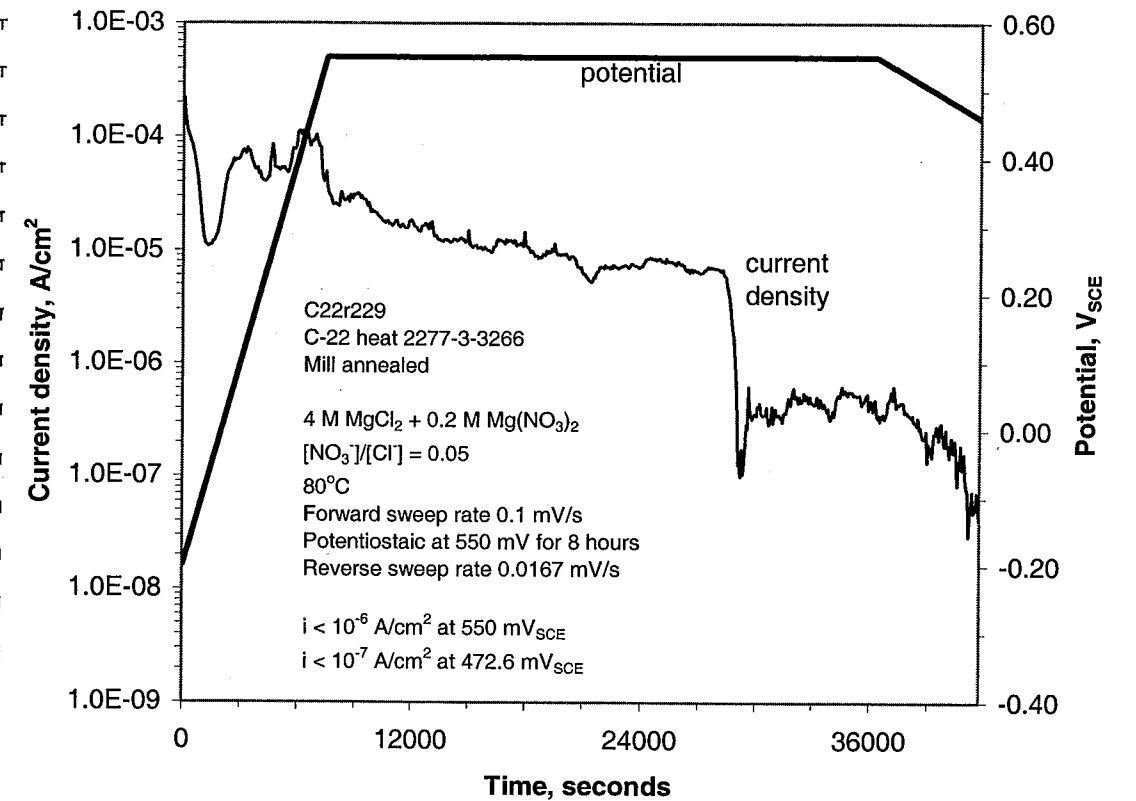
Date \_\_\_\_\_

Recorded by \_\_\_\_\_

Xihua He

7/19/2004

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

Xihua He

7/23/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 2277-3-3266

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 03/03/2004 Due: 09/03/2004  
Model: Sartorius Genius SN: 12809099 CAL: 05/14/2004 Due: 11/14/2004

Solution: 4M MgCl<sub>2</sub> + 0.2M Mg(NO<sub>3</sub>)<sub>2</sub> + DI water to 2500ml  
2033.1 g MgCl<sub>2</sub> Lot # 030320  
128.2 g Mg(NO<sub>3</sub>)<sub>2</sub> Lot # 033942

Reagents measured with Model: OHAUS SN: 2883 Cal: 2/04/04 Due: 8/04/04

Initial pH: 3.860 Model: ORION EA940 SN: 2330 Due: 07/15/2003  
Final pH: 4.981 Cal: 07/15/2003 SN: 4079126 P  
pH Probe: 13-620-296

Test Temperature: 80°C Measured with Hg Thermometer SN: C96-816 Cal: 06/09/04 Due: 12/09/2004

Counter Electrode: Platinum Flag Reference Electrode: Fisher 13-620-52 SN: 3329075 P

Gas: 99.999% Nitrogen Gas Ecorr: -350.1 mV Model: Keithley 614 SN: 070493K  
Ept: +431.2 Cal: 7/12/04 Due: 7/12/05  
Potentiostat: EG&G Model 273 SN: 10120

DATA FILE: C22r230

Number of Crevice Corrosion Sites: 2 /24 (24 max.)

2 tiny crevice corroded spots on one face, the other side is damage free and stain free.

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

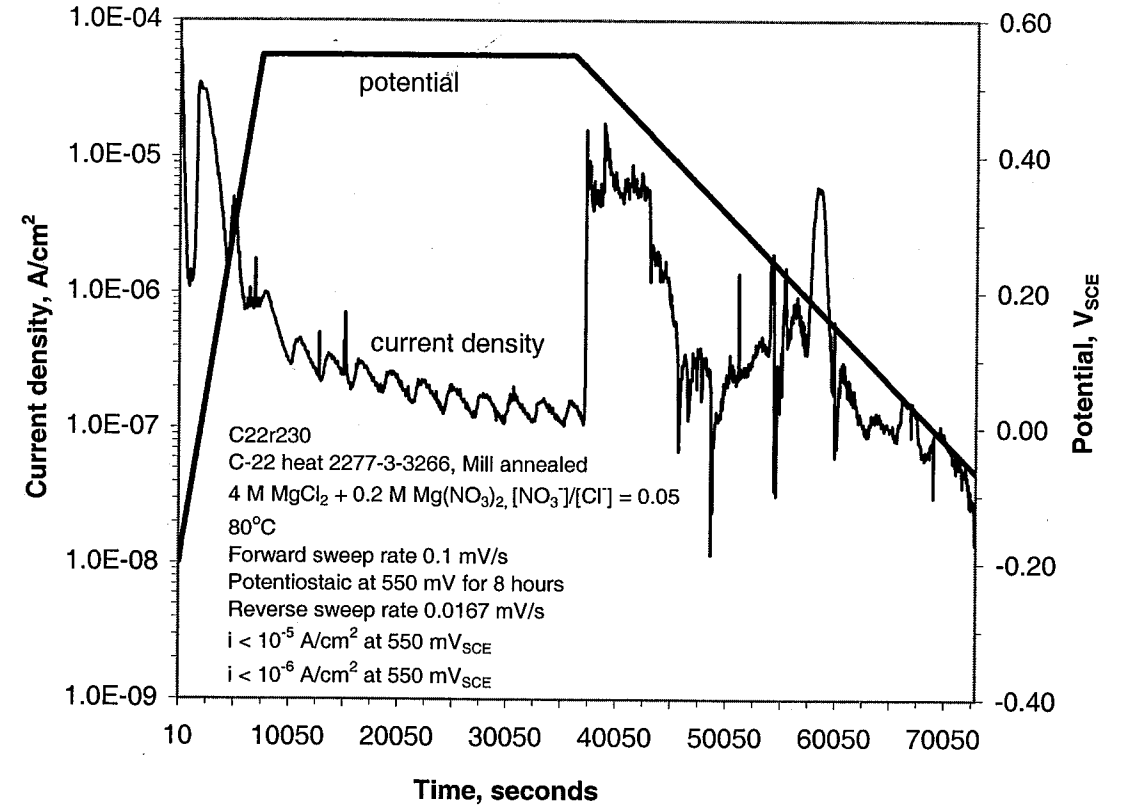
Date

Recorded by

Xihua He

2/19/2004

From Page No. \_\_\_\_\_



Xihua He 9/1/04

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

From Page No. \_\_\_\_\_

## Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22

2277-3-3266

**Specimen Preparation:** Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver:

Snap-on USA

SN: 1001200319

Cal: 03/03/2004

Due: 09/03/2004

Initial Weight: 40.12303

Model: Sartorius Genius

SN: 12809099

Final Weight: 40.11752

CAL: 05/14/2004

Due: 11/14/2004

Solution:

4 M MgCl<sub>2</sub> + 0.16 M Mg(NO<sub>3</sub>)<sub>2</sub>2033.19 MgCl<sub>2</sub> · 6H<sub>2</sub>O Lot # 030320102.56 g Mg(NO<sub>3</sub>)<sub>2</sub> · 6H<sub>2</sub>O Lot # 033942 } + DI water to 25L

Reagents measured with

Model: OHAUS

SN: 2883

Cal: 2/04/04

Due: 8/04/04

Initial pH: 4.16

Model: ORION EA940

SN: 2330

Final pH: 5.32

Cal: 7/21/04

Due: 7/21/05

pH Probe: 13-620-296

SN:

4079126P

Test Temperature: 80°C

Measured with Hg Thermometer SN: E98-191

Due: 12/09/2004

Cal: 06/09/2004

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52

SN: 0251433

Gas: 99.999% Nitrogen Gas

Ecorr: -358.1 mV

Model: Keithley 614

SN: 0704934

Ept: +439.2 mV

Cal: 7/12/04

Due: 7/12/05

Potentiostat: EG&amp;G Model 273

SN: 41108

DATA FILE: C22r231

Number of Crevice Corrosion Sites:

7/24 (24 max.)

8 crevice corroded spots. 2 on one tooth

To Page No. \_\_\_\_\_

Witnessed &amp; Understood by me,

Date

Invented by

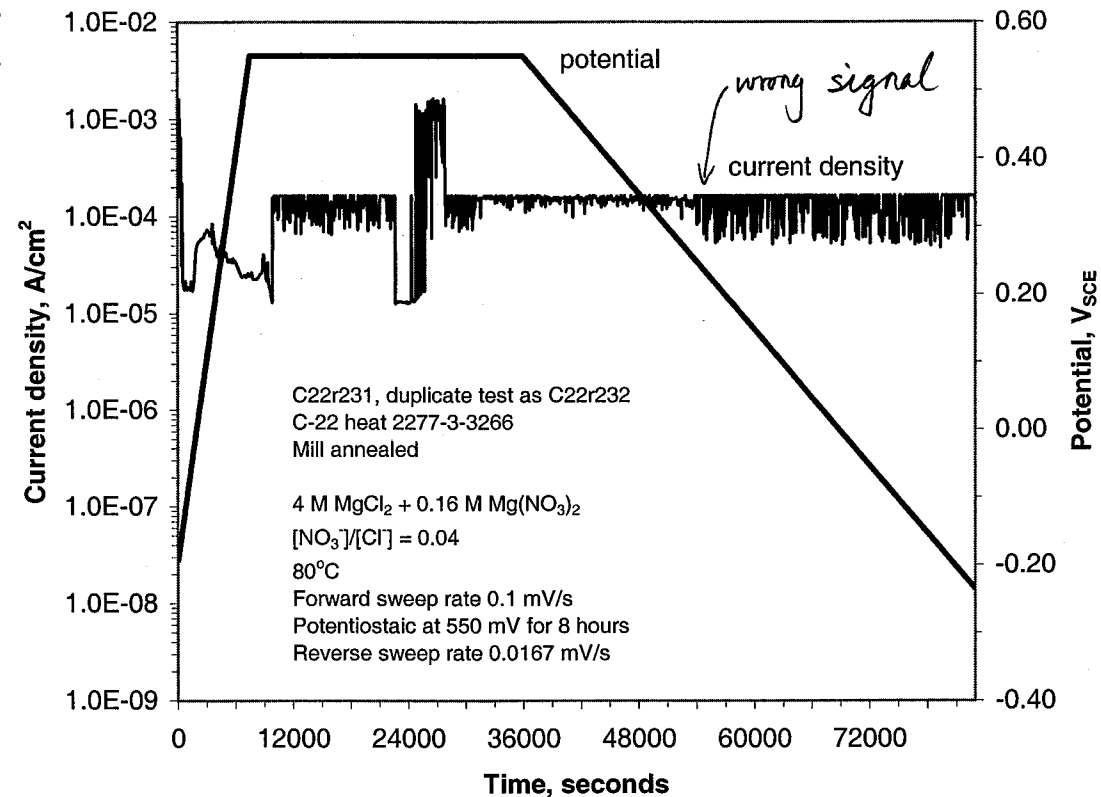
Date

Recorded by

Xihua He

7/21/2004

From Page No. \_\_\_\_\_



\* Current density signal is wrong. It didn't respond to potential and time change as C22r232 (page 73). Alligator clips for current conducting is rusting.

To Page No. \_\_\_\_\_

Witnessed &amp; Understood by me,

Date

Invented by

Date

Recorded by

Xihua He

7/23/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22

2277-3-3266

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver:

Snap-on USA

SN: 1001200319

Cal: 03/03/2004

Due: 09/03/2004

Initial Weight: 40.35179

Model: Sartorius Genius

SN: 12809099

Final Weight: 40.34185

Cal: 05/14/2004

Due: 11/14/2004

Solution:

4 M MgCl<sub>2</sub> + 0.16 M Mg(NO<sub>3</sub>)<sub>2</sub>  
2033.19 MgCl<sub>2</sub> · 6H<sub>2</sub>O Lot# 030320 } + DI water to 25L  
102.569 Mg(NO<sub>3</sub>)<sub>2</sub> · 6H<sub>2</sub>O Lot# 033942

Reagents measured with

Model: OHAUS  
Cal: 2/04/04

SN: 2883  
Due: 8/04/04

Initial pH: 4.16

Model: ORION EA940

SN: 2330

Final pH: 5.38

Cal: 7/21/04

Due: 7/21/05

pH Probe:

SN: 4079126P

13-620-296

Test Temperature:

80°C

Measured with Hg Thermometer SN: C96-816

Due: 12/09/2004

Cal: 06/09/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52

SN: 3329075P

Gas: 99.999% Nitrogen Gas

Ecorr: -357.4 mV

Model: Keithley 614

SN: 0704934

Ept: +428.7 mV

Cal: 7/12/04

Due: 7/12/05

Potentiostat: EG&G Model 273

SN: 10120

DATA FILE: C22r232

Number of Crevice Corrosion Sites:

1/24 (24 max.)

One crevice corroded spot. Bolt hole is corroded. There are corrosion product deposits on surfaces.

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

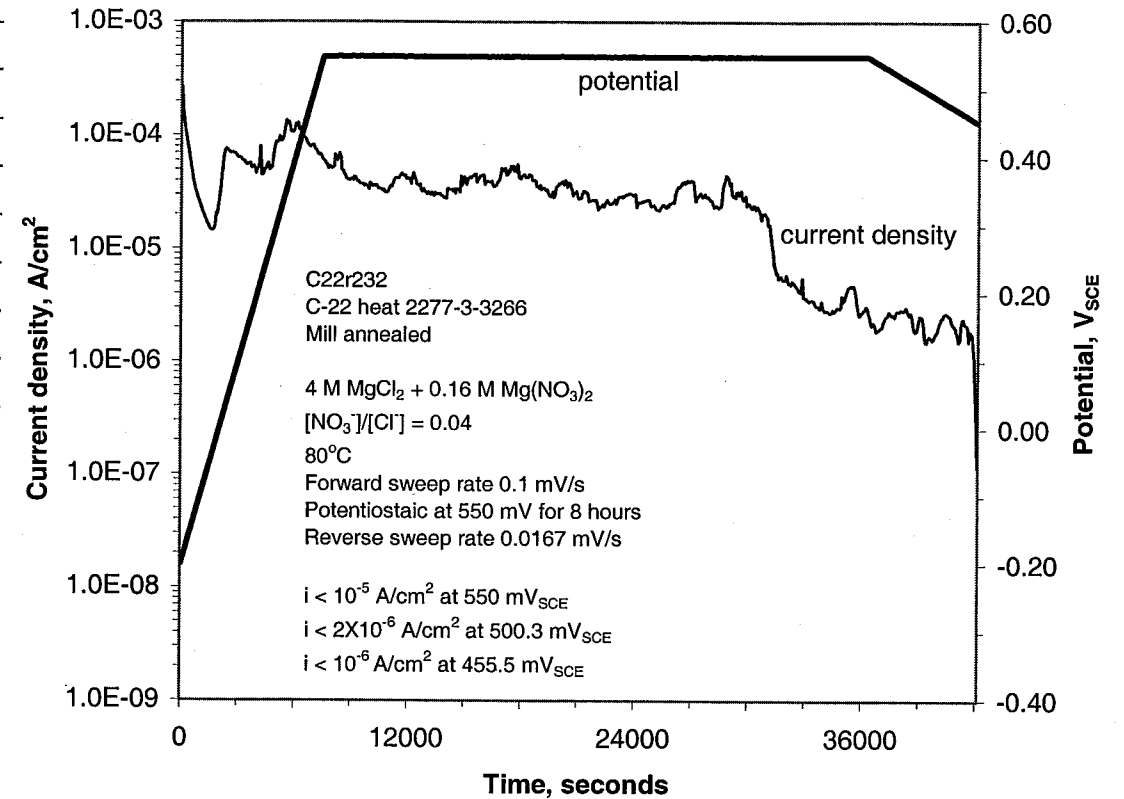
Date

Recorded by

Xihua He

7/22/04

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Xihua He

7/23/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 2277-3-3266  
*X.H. 7/26/04*

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.27640 Model: Sartorius Genius SN: 12809099

Final Weight: *5.17* 40.27075 CAL: 05/14/04 Due: 11/14/04

Solution: 4M MgCl<sub>2</sub> + 0.4M Mg(NO<sub>3</sub>)<sub>2</sub>  
2033.1g MgCl<sub>2</sub>·6H<sub>2</sub>O lot # 041703 } + DI water to 2.5L  
256.4g Mg(NO<sub>3</sub>)<sub>2</sub>·6H<sub>2</sub>O lot # 033942

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 4.55 Model: Orion EA 940 SN: 2330

Final pH: 5.17 Cal: 7/21/04 Due: 7/21/05  
pH Probe: #13-620-296 SN: 4079126P

Test Temperature: 80°C Measured with Hg Thermometer SN: E98-191  
Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251433

Gas: 99.999% Nitrogen Gas

Ecorr: -426.5 Model: Keithley 614 SN: 0704934

Ept: +360.2 Cal: 7/12/04 Due: 7/12/05

Potentiostat: EG&G Model 273 SN: 41108

DATA FILE: C22r233

Number of Crevice Corrosion Sites: 0 /24 (24 max.)

*No crevice corrosion, mild surface staining.  
bolt hole is corroded slightly*

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

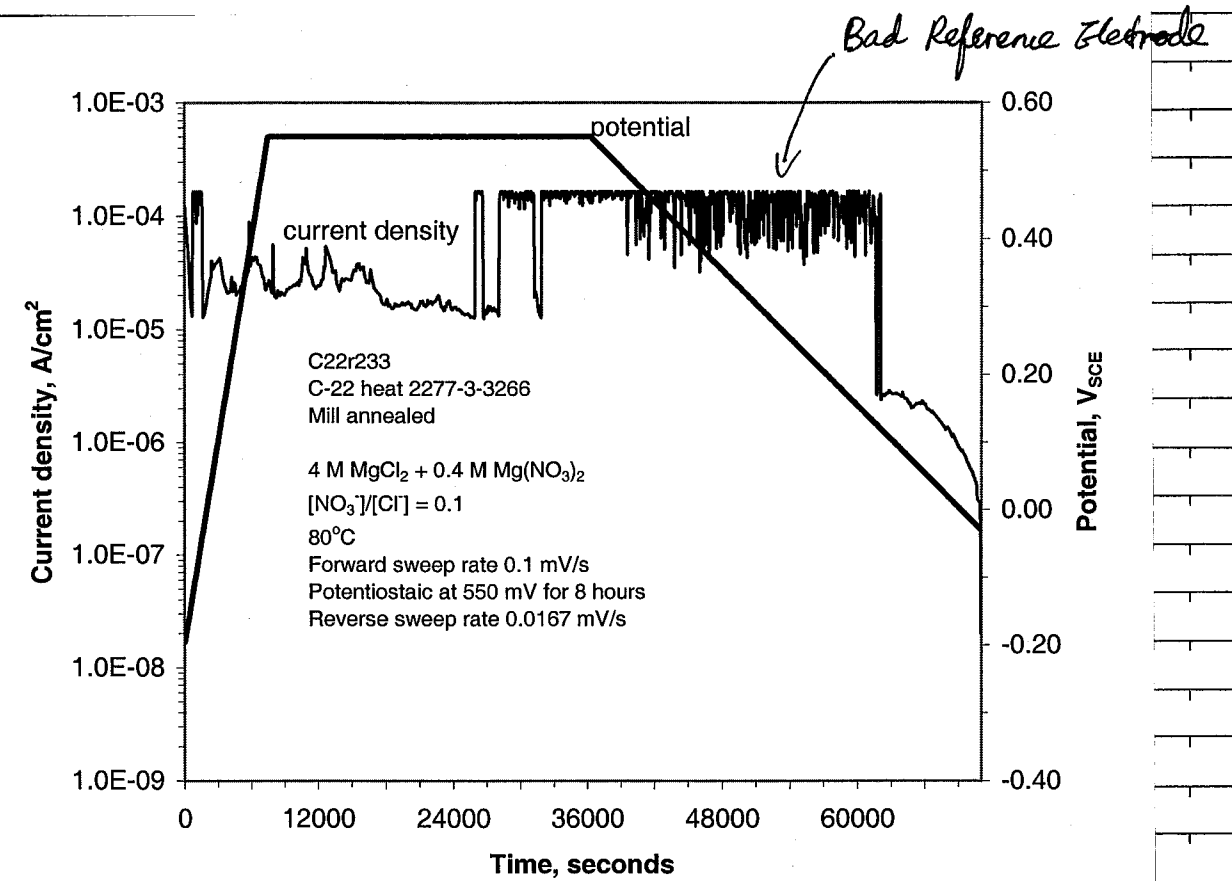
*Xihua He*

*7/26/04*

From Page No. \_\_\_\_\_

*There is problem with the pstat. One cable lost connection. The cable was replaced.*

*Performance verification for this pstat is needed.*



*\* We will replace reference electrode*

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

*Xihua He*

*7/30/04*



From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 2277-3-3266  
7/26/04 X.H

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.30187 Model: Sartorius Genius SN: 12809099  
Final Weight: 40.29818 CAL: 05/14/04 Due: 11/14/04

Solution: 4M MgCl<sub>2</sub> + 0.4M Mg(NO<sub>3</sub>)<sub>2</sub>  
2033.1g MgCl<sub>2</sub>·6H<sub>2</sub>O Lot # 041703 } + DI H<sub>2</sub>O to 2.5L  
256.4g Mg(NO<sub>3</sub>)<sub>2</sub>·6H<sub>2</sub>O Lot # 033942

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 4.55 Model: Orion EA 940 SN: 2330  
Final pH: 5.15 Cal: 7/21/04 Due: 7/21/05  
pH Probe: #13-620-296 SN: 4079126P

Test Temperature: 110°C Measured with Hg Thermometer SN: C96-816  
Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 3329075P

Gas: 99.999% Nitrogen Gas

Ecorr: -374.1 Model: Keithley 614 SN: 0704934  
Ept: +433.5 Cal: 7/12/04 Due: 7/12/05

Potentiostat: EG&G Model 273 SN: 10120

DATA FILE: C22r234

Number of Crevice Corrosion Sites: 1 /24 (24 max.)

Mild surface staining on two faces.

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

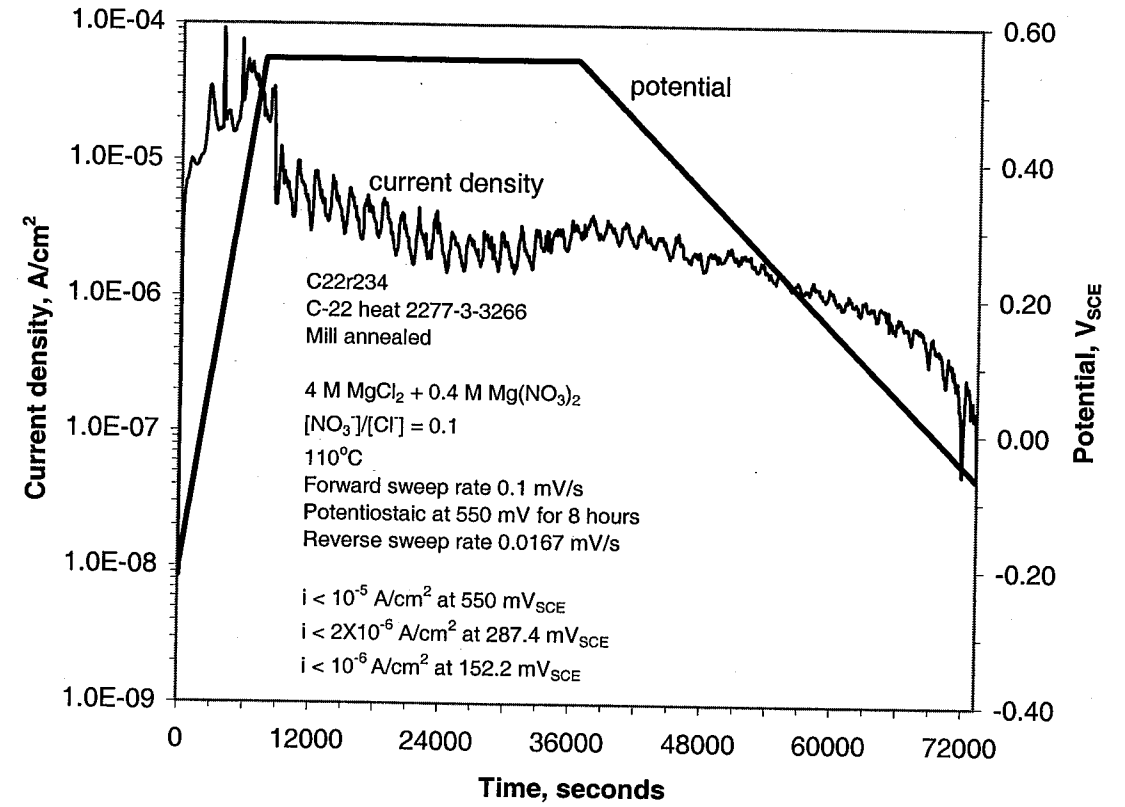
Date

Recorded by

X. He

7/26/04

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

Xihua He

7/30/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 2277-3-3266  
X-n. 7/29/04

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.16715 Model: Sartorius Genius SN: 12809099  
Final Weight: 40.16327 CAL: 05/14/04 Due: 11/14/04

Solution: 4M MgCl<sub>2</sub> + 0.4M Mg(NO<sub>3</sub>)<sub>2</sub>  
975.8 g MgCl<sub>2</sub> · 6H<sub>2</sub>O Lot # 041703 } + DI H<sub>2</sub>O to 1.2L  
123 g Mg(NO<sub>3</sub>)<sub>2</sub> · 6H<sub>2</sub>O Lot # 033942

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 4.48 Model: Orion EA 940 SN: 2330  
Final pH: 5.04 Cal: 7/21/04 Due: 7/21/05  
pH Probe: #13-620-296 SN: 4079126P

Test Temperature: 80°C Measured with Hg Thermometer SN: C96-816  
Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag SN: 3329075P

Reference Electrode: Fisher 13-620-52

Gas: 99.999% Nitrogen Gas

Ecorr: -332.7 Model: Keithley 614 SN: 0704934  
Ept: +438.9 Cal: 7/12/04 Due: 7/12/05

Potentiostat: EG&G Model 273 SN: 10120

DATA FILE: C22r235

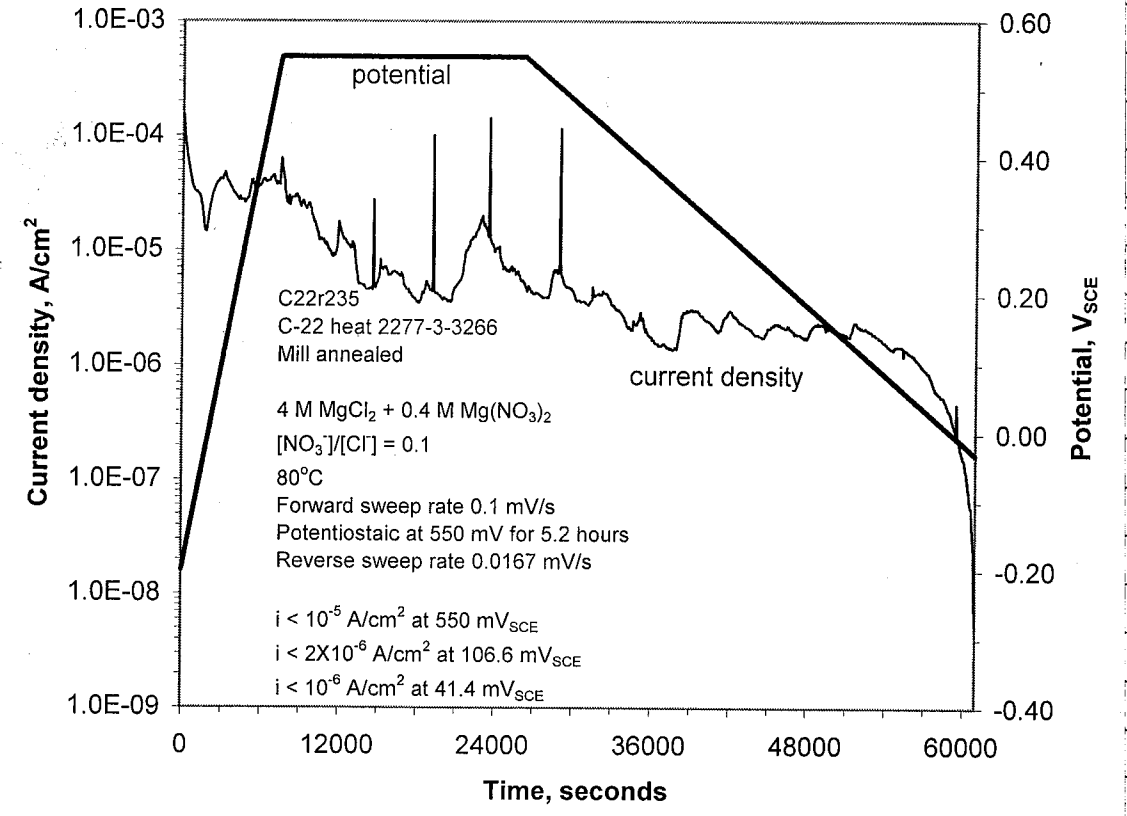
Number of Crevice Corrosion Sites: ( /24 (24 max.)

One tiny crevice corroded spot on one face.  
Mild surface slaining on two faces.  
Very small surface area of bolt hole is etched.

To Page No. \_\_\_\_\_

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by Xihua He	7/29/2004

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by Xihua He	7/30/2004

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 2277-3-3266  
*7/30/04 X.H.*

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.15167 Model: Sartorius Genius SN: 12809099

Final Weight: 39.82003 CAL: 05/14/04 Due: 11/14/04

Solution: 4M MgCl<sub>2</sub>  
203.1g MgCl<sub>2</sub> · 6H<sub>2</sub>O lot # 041703 + DI water to 2.5L

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 4.47 Model: Orion EA 940 SN: 2330

Final pH: 5.60 Cal: 7/21/04 Due: 7/21/05  
pH Probe: #13-620-296 SN: 4079126P

Test Temperature: 80°C Measured with Hg Thermometer SN: E98-191  
Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0251433 X.H. 7/30/04  
4028023P

Gas: 99.999% Nitrogen Gas

Ecorr: -375.8 Model: Keithley 614 SN: 0704934

Ept: +427.5 Cal: 7/12/04 Due: 7/12/05

Potentiostat: EG&G Model 273 SN: 41108

DATA FILE: c22r237

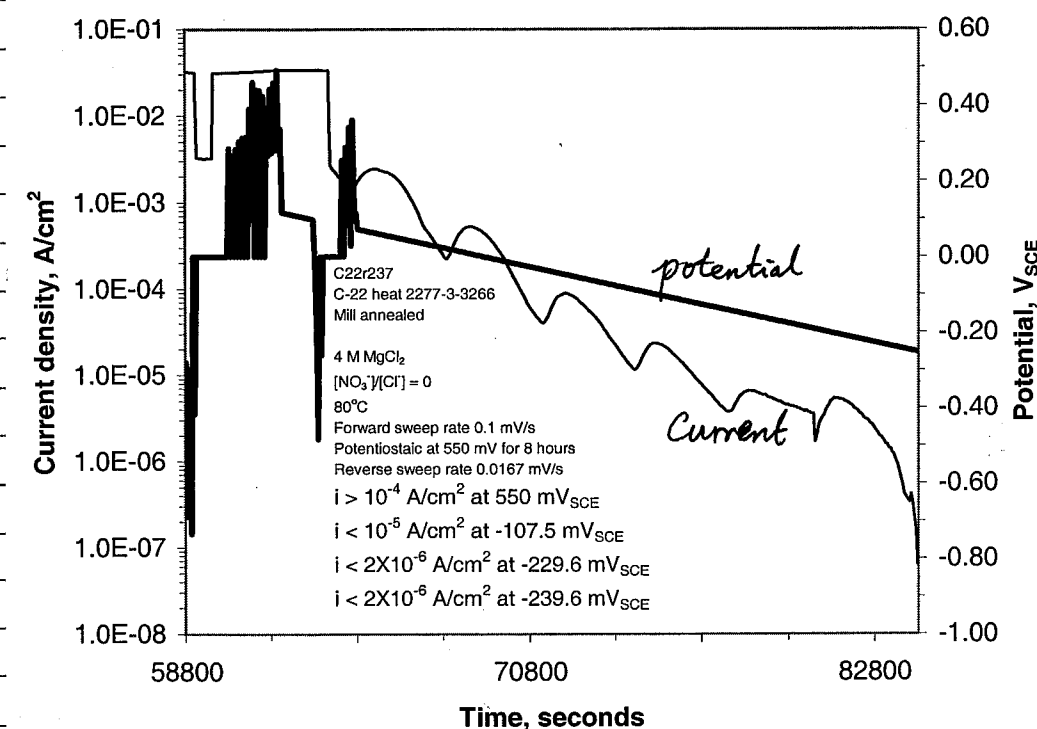
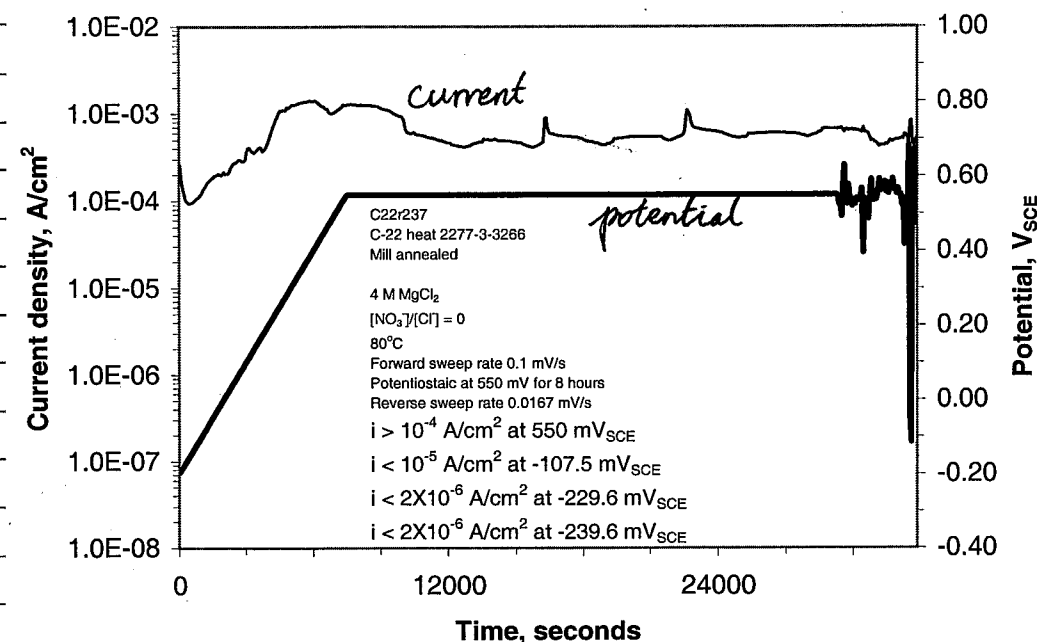
Number of Crevice Corrosion Sites: 24 / 24 (24 max.)

All the teeth are crevice corroded. Part of bolt hole is corroded. Surface staining on all faces. There is pitting corrosion at sides.

To Page No. \_\_\_\_\_

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Xihua He</i>	<i>7/30/04</i>

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>Xihua He</i>	<i>8/3/2004</i>



From Page No. \_\_\_\_\_ To Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 2277-3-3266  
*X.H. 7/30/04*

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.05091 Model: Sartorius Genius SN: 12809099  
Final Weight: 38.20299 CAL: 05/14/04 Due: 11/14/04

Solution: 4 M MgCl<sub>2</sub>

*(same solution as C22R237, pg.80)*

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 4.47 Model: Orion EA 940 SN: 2330  
Final pH: 3.01 Cal: 7/21/04 Due: 7/21/05  
pH Probe: #13-620-296 SN: 4079126P

Test Temperature: 80°C Measured with Hg Thermometer SN: C96-816  
Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag  
Reference Electrode: Fisher 13-620-52 SN: 3329075P

Gas: 99.999% Nitrogen Gas  
Ecorr: -365.0 Model: Keithley 614 SN: 0704934  
Ept: +410.7 Cal: 7/12/04 Due: 7/12/05  
Potentiostat: EG&G Model 273 SN: 10120

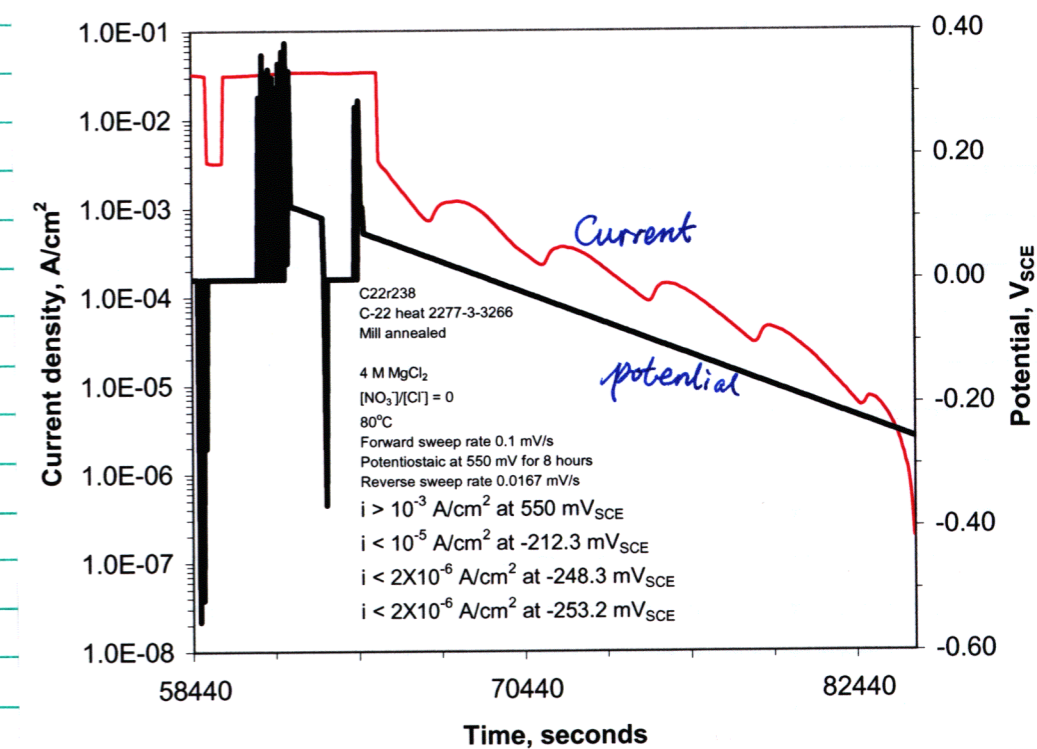
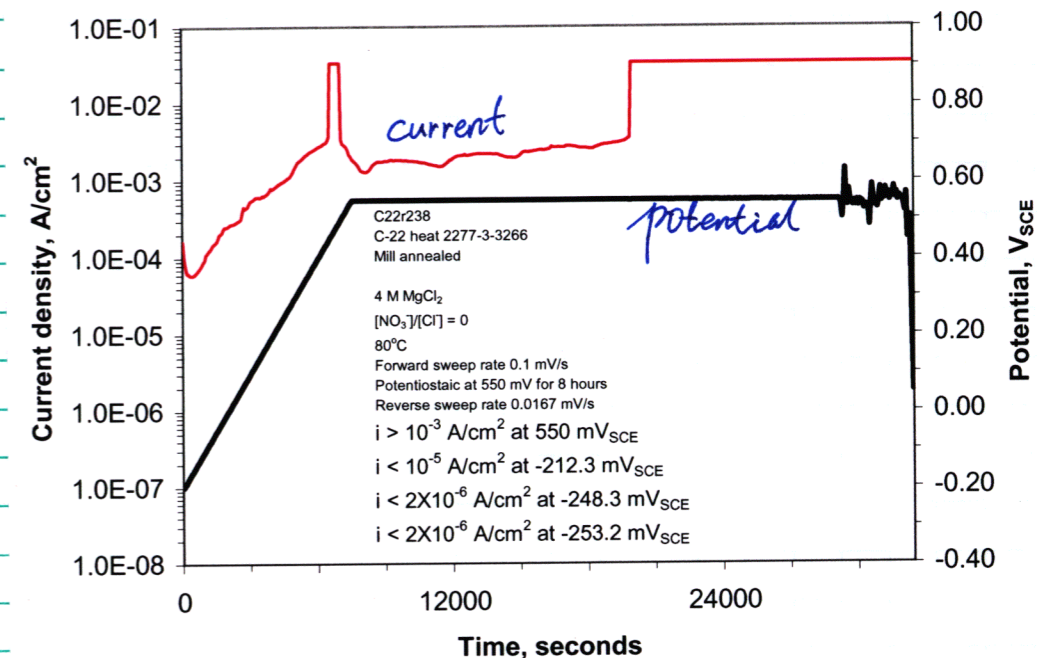
DATA FILE: C22R238

Number of Crevice Corrosion Sites: 24 /24 (24 max.)

*All the teeth are heavily corroded. The entire  
bolt hole is corroded. Surface staining on all faces.  
Pitting corrosion at sides.*

Witnessed & Understood by me, \_\_\_\_\_ Date \_\_\_\_\_  
Invented by \_\_\_\_\_ Date \_\_\_\_\_  
Recorded by: *Xihua He* 7/30/04

From Page No. \_\_\_\_\_ To Page No. \_\_\_\_\_



Witnessed & Understood by me, \_\_\_\_\_ Date \_\_\_\_\_  
Invented by \_\_\_\_\_ Date \_\_\_\_\_  
Recorded by: *[Signature]* 9/5/04

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 2277-3-3266  
8/2/04 X.H

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.12768 Model: Sartorius Genius SN: 12809099  
Final Weight: 40.11912 CAL: 05/14/04 Due: 11/14/04

Solution: 4 M MgCl<sub>2</sub> + 0.08 M Mg(NO<sub>3</sub>)<sub>2</sub>  
2033.1 g MgCl<sub>2</sub> · 6H<sub>2</sub>O Lot# 041703 } + DI H<sub>2</sub>O to 2.5L  
51.3 g Mg(NO<sub>3</sub>)<sub>2</sub> · 6H<sub>2</sub>O Lot# 033942

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 2.56 Model: Orion EA 940 SN: 2330  
Final pH: 5.99 Cal: 7/21/04 Due: 7/21/05  
pH Probe: #13-620-296 SN: 4079126P

Test Temperature: 80°C Measured with Hg Thermometer SN: E98-191  
Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0254433 X.H  
4028023P 8/2/04

Gas: 99.999% Nitrogen Gas

Ecorr: -395.4 mV Model: Keithley 614 SN: 0704934  
Ept: -393.9 mV Cal: 7/12/04 Due: 7/12/05

Potentiostat: EG&G Model 273 SN: 41108

DATA FILE: C22r239

Number of Crevice Corrosion Sites: 8 / 24 (24 max.)

Eight teeth are corroded. Staining on surface part of bolt hole is corroded.

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

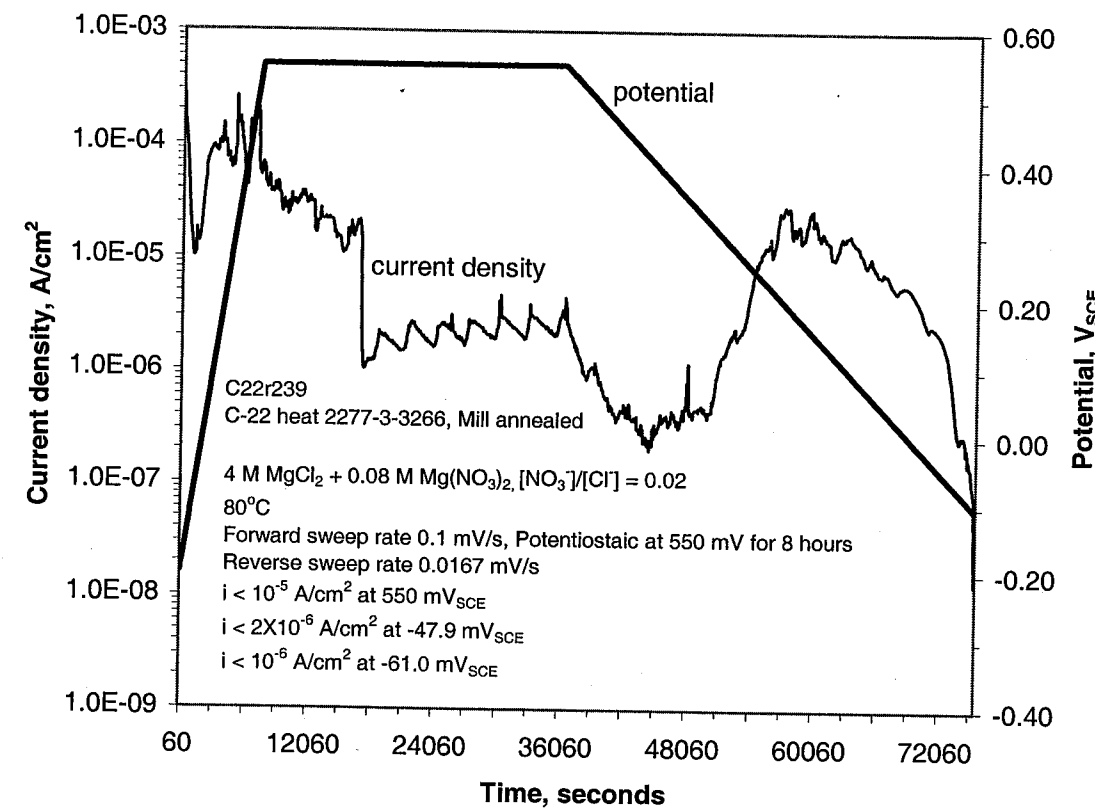
Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by Xihua He

8/2/2004

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by Xihua He

8/5/2004

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 2277-3-3266  
x.r. 8/2/04

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.34550 Model: Sartorius Genius SN: 12809099  
Final Weight: 40.33200 CAL: 05/14/04 Due: 11/14/04

Solution: 4M MgCl<sub>2</sub> + 0.08 M Mg(NO<sub>3</sub>)<sub>2</sub>

Same solution as C22r239 (p.84)

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 Due: 8/04/04

Initial pH: 2.56 Model: Orion EA 940 SN: 2330  
Final pH: 5.84 Cal: 7/21/04 Due: 7/21/05  
pH Probe: #13-620-296 SN: 4079126P

Test Temperature: 80°C Measured with Hg Thermometer SN: C96-816  
Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag  
Reference Electrode: Fisher 13-620-52 SN: 3329075P

Gas: 99.999% Nitrogen Gas  
Ecorr: -378.1 Model: Keithley 614 SN: 0704934  
Ept: -373.5 Cal: 7/12/04 Due: 7/12/05  
Potentiostat: EG&G Model 273 SN: 10120

DATA FILE: C22r240

Number of Crevice Corrosion Sites: 10 / 24 (24 max.)

Bolt hole is corroded. Surface staining.

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

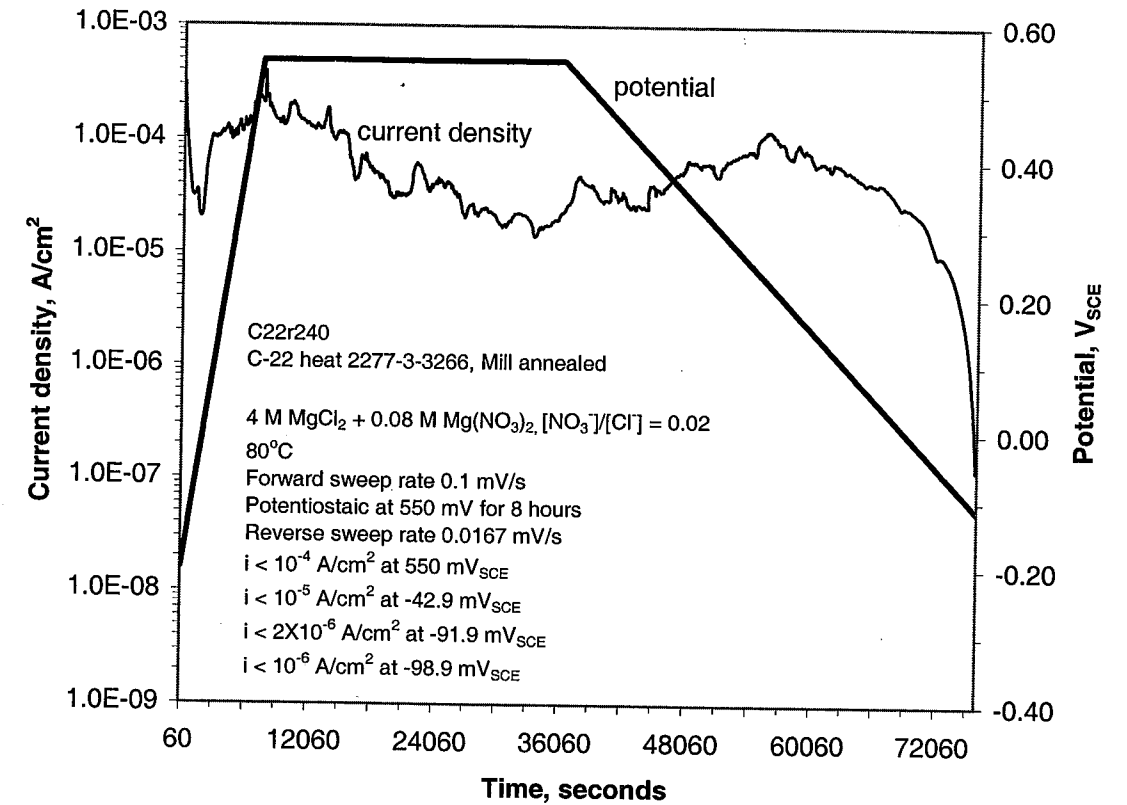
Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by Xihua He

8/2/2004

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by Xihua He

8/5/2004



From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 2277-3-3266

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319 Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.23003 Model: Sartorius Genius SN: 12809099

Final Weight: 39.96774 CAL: 05/14/04 Due: 11/14/04

Solution: 4M MgCl<sub>2</sub> + 0.3M Mg(NO<sub>3</sub>)<sub>2</sub> } + DI water  
2033.1g MgCl<sub>2</sub> · 6H<sub>2</sub>O Lot # 041703 }  
192.3g Mg(NO<sub>3</sub>)<sub>2</sub> · 6H<sub>2</sub>O Lot # 033942 } to 2500ml

Reagents measured with Model: OHAUS SN: 2883 Cal: 2704704 7/15/04 Due: 8/04/04 11/5/05

Initial pH: 3.27 Model: Orion EA 940 SN: 2330 X.H. 8/15/04

Final pH: 6.03 Cal: 7/21/04 Due: 7/21/05 8/15/04  
pH Probe: #13-620-296 SN: 4079126P

Test Temperature: 110°C Measured with Hg Thermometer SN: E98-191 Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 4028023P

Gas: 99.999% Nitrogen Gas

Ecorr: -370.5 mV Model: Keithley 614 SN: 0704934

Ept: -219.4 mV Cal: 7/12/04 Due: 7/12/05

Potentiostat: EG&G Model 273 SN: 41108

DATA FILE: C22r241

Number of Crevice Corrosion Sites: 15/24 (24 max.)

Bolt hole is corroded. Most of the corrosion on the teeth is close to the edge of the hole.

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

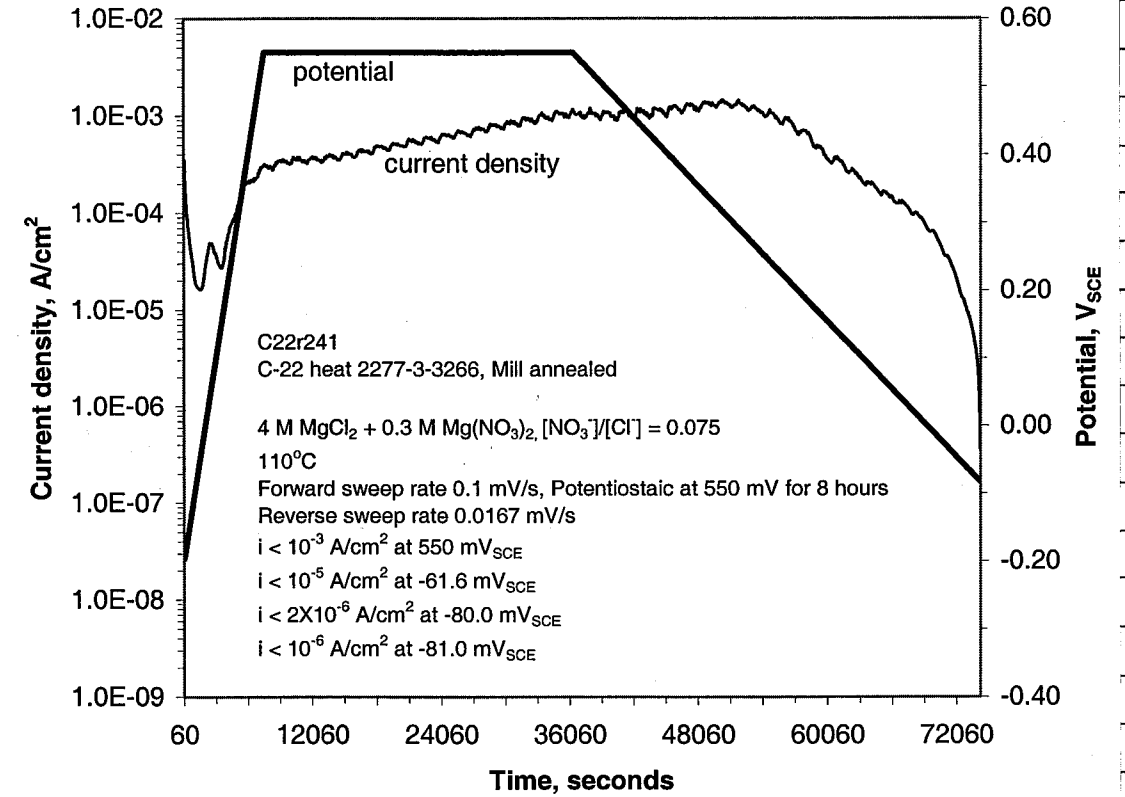
Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by Xihua He

8/5/2004

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by Xihua He

8/6/2004

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 2277-3-3266  
8/5/04, X.H

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.11505 Model: Sartorius Genius SN: 12809099  
Final Weight: 39.90447 CAL: 05/14/04 Due: 11/14/04

Solution: 4M MgCl<sub>2</sub> + 0.3M Mg(NO<sub>3</sub>)<sub>2</sub>

same solution as C22r241 (Pg. 88)

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 7/15/04 X.H Due: 8/04/04 1/15/05 X.H  
Initial pH: 3.27 Model: Orion EA 940 SN: 2330 X.H  
Final pH: 6.05 Cal: 7/21/04 Due: 7/21/05 8/5/04  
pH Probe: #13-620-296 SN: 4079126P

Test Temperature: 110°C Measured with Hg Thermometer SN: C96-816  
Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag SN: 3329075P  
Reference Electrode: Fisher 13-620-52

Gas: 99.999% Nitrogen Gas  
Ecorr: -347.4 mV Model: Keithley 614 SN: 0704934  
Ept: -294.9 mV Cal: 7/12/04 Due: 7/12/05  
Potentiostat: EG&G Model 273 SN: 10120

DATA FILE: C22r242

Number of Crevice Corrosion Sites: 16 / 24 (24 max.)

Bolt hole is corroded. Most of the corrosion on the teeth is close to the edge of the bolt hole.

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

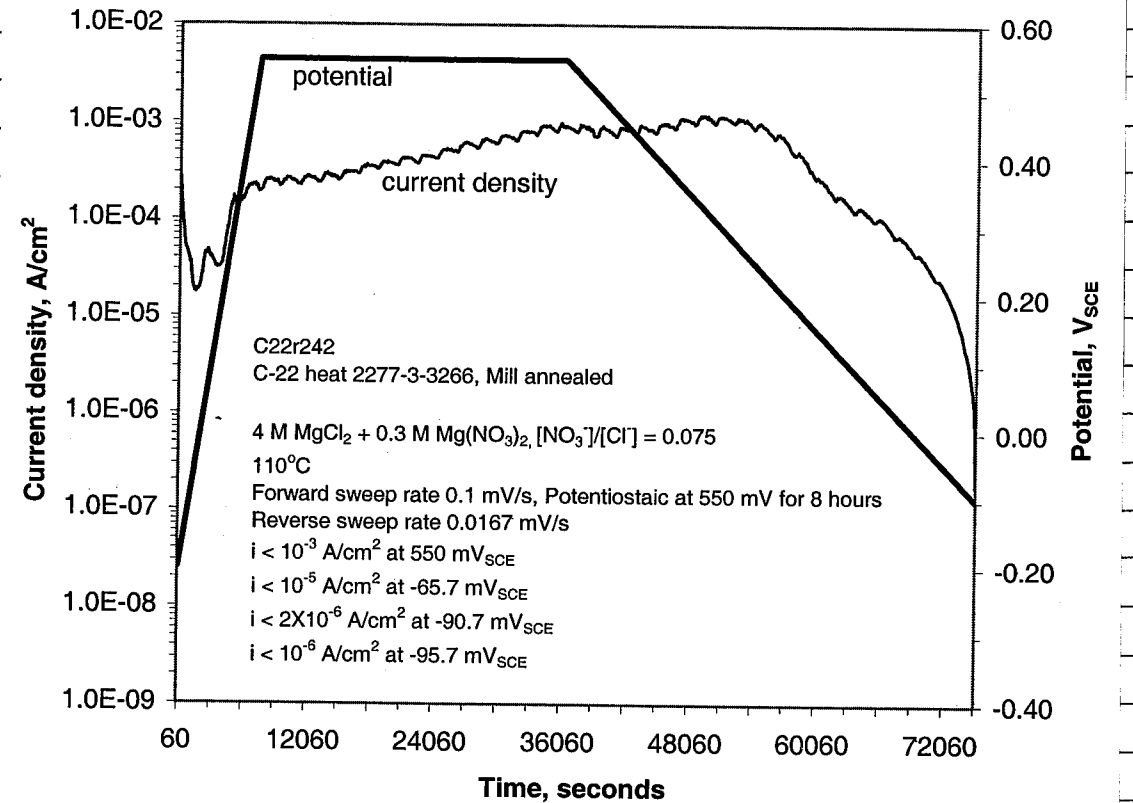
Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by Xihua He

8/5/2004

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by Xihua He

8/6/2004



From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 <sup>thermally aged</sup> 2277-3-3266

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.3967g Model: Sartorius Genius SN: 12809099

Final Weight: 40.39448 CAL: 05/14/04 Due: 11/14/04

Solution: 4M MgCl<sub>2</sub> + 0.6M Mg(NO<sub>3</sub>)<sub>2</sub> Lot # 041703  
1016.5g MgCl<sub>2</sub>·6H<sub>2</sub>O + DI water to 1.25 L  
192.3g Mg(NO<sub>3</sub>)<sub>2</sub>·6H<sub>2</sub>O lot # 033942

Reagents measured with Model: OHAUS SN: 2883  
Cal: 2/04/04 7/15/04 X.H. Due: 8/04/04  
Initial pH: 2.78 Model: Orion EA 940 SN: 2330 1/15/05  
Final pH: 5.10 Cal: 7/21/04 Due: 7/21/05 X.H.  
pH Probe: #13-620-296 SN: 4079126P 8/19/04

Test Temperature: 110°C Measured with Hg Thermometer SN: E98-191  
Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag  
Reference Electrode: Fisher 13-620-52 SN: 4028023P

Gas: 99.999% Nitrogen Gas  
Ecorr: -346.0 mV Model: Keithley 614 SN: 0704934  
Ept: +399.5 mV Cal: 7/12/04 Due: 7/12/05  
Potentiostat: EG&G Model 273 SN: 41108

DATA FILE: C22r243

Number of Crevice Corrosion Sites: 0 /24 (24 max.)

Very mild surface staining. Specimen will be polished for future use.

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

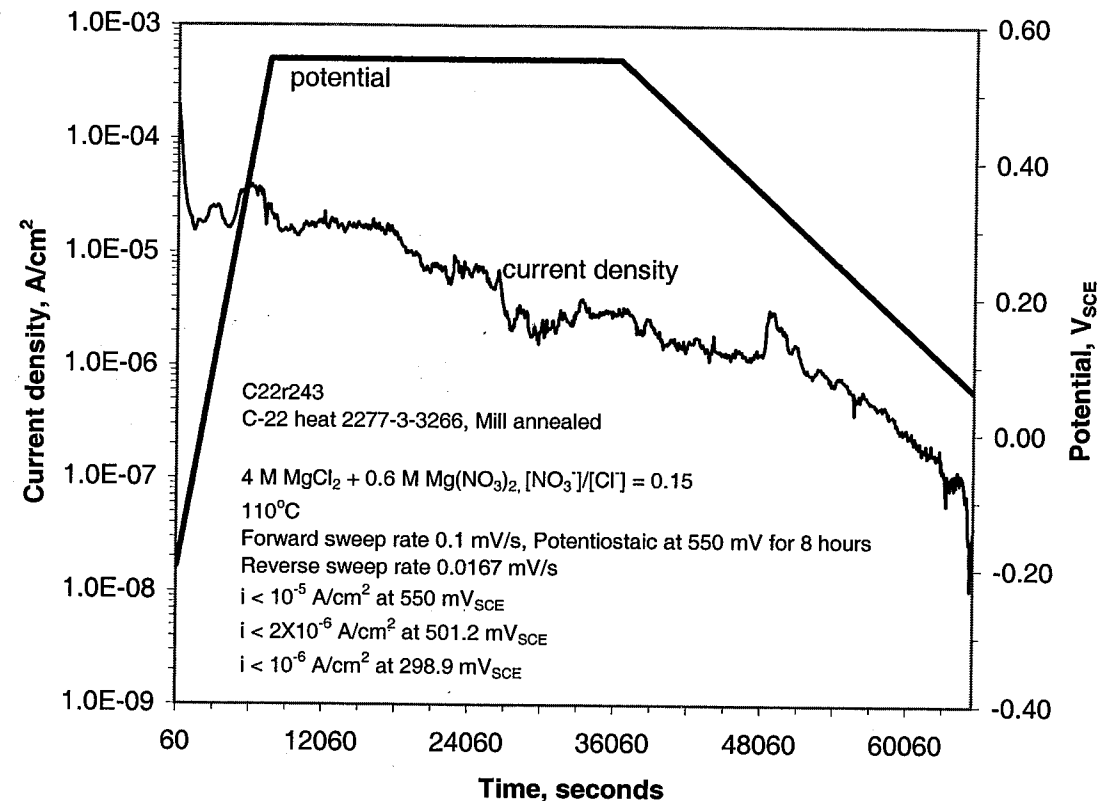
Date

Recorded by

X.Hua He

8/19/2004

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

X.Hua He

8/10/2004

From Page No. \_\_\_\_\_

Repassivation Potential Test

Objective: same as pg #1 and #2

Alloy/Specimen: C22 thermally aged 2277-3-3266

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing. Specimen surfaces polished to 600 Grit finish using SiC paper. Specimen cleaned in acetone and rinsed in DI water. PTFE crevice forming washers attached to specimen using insulated C-276 hardware. Hardware Torque to 50 in-oz.

Torque Screwdriver: Snap-on USA SN: 1001200319  
Cal: 03/03/04 Due: 9/03/04

Initial Weight: 40.43497 Model: Sartorius Genius SN: 12809099

Final Weight: 40.12747 CAL: 05/14/04 Due: 11/14/04

Solution: 4 M MgCl<sub>2</sub> + 0.2 M Mg(NO<sub>3</sub>)<sub>2</sub>  
106.5g MgCl<sub>2</sub>·6H<sub>2</sub>O Lot # 040837 } + DI H<sub>2</sub>O  
64.1g Mg(NO<sub>3</sub>)<sub>2</sub>·6H<sub>2</sub>O Lot # 033942 } to 1.25L

Reagents measured with Model: OHAUS SN: 2883  
Cal: 7/15/04 Due: 8/15/05

Initial pH: 3.57 Model: Orion EA 940 SN: 2330  
Final pH: 6.12 Cal: 7/21/04 Due: 7/21/05

pH Probe: #13-620-296 SN: 4079126P

Test Temperature: 110°C Measured with Hg Thermometer SN: C96-816  
Cal: 06/09/04 Due: 12/09/04

Counter Electrode: Platinum Flag  
Reference Electrode: Fisher 13-620-52 SN: 3329075P

Gas: 99.999% Nitrogen Gas  
Ecorr: -388.7 mV Model: Keithley 614 SN: 0704934  
Ept: +366.9 mV Cal: 7/12/04 Due: 7/12/05  
Potentiostat: EG&G Model 273 SN: 10120

DATA FILE: C22r244

Number of Crevice Corrosion Sites: 16/24 (24 max.)

16 teeth are crevice corroded. Bolt hole is also corroded. Most of the corrosion is around the edge of the teeth and the edge of the bolt hole.

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

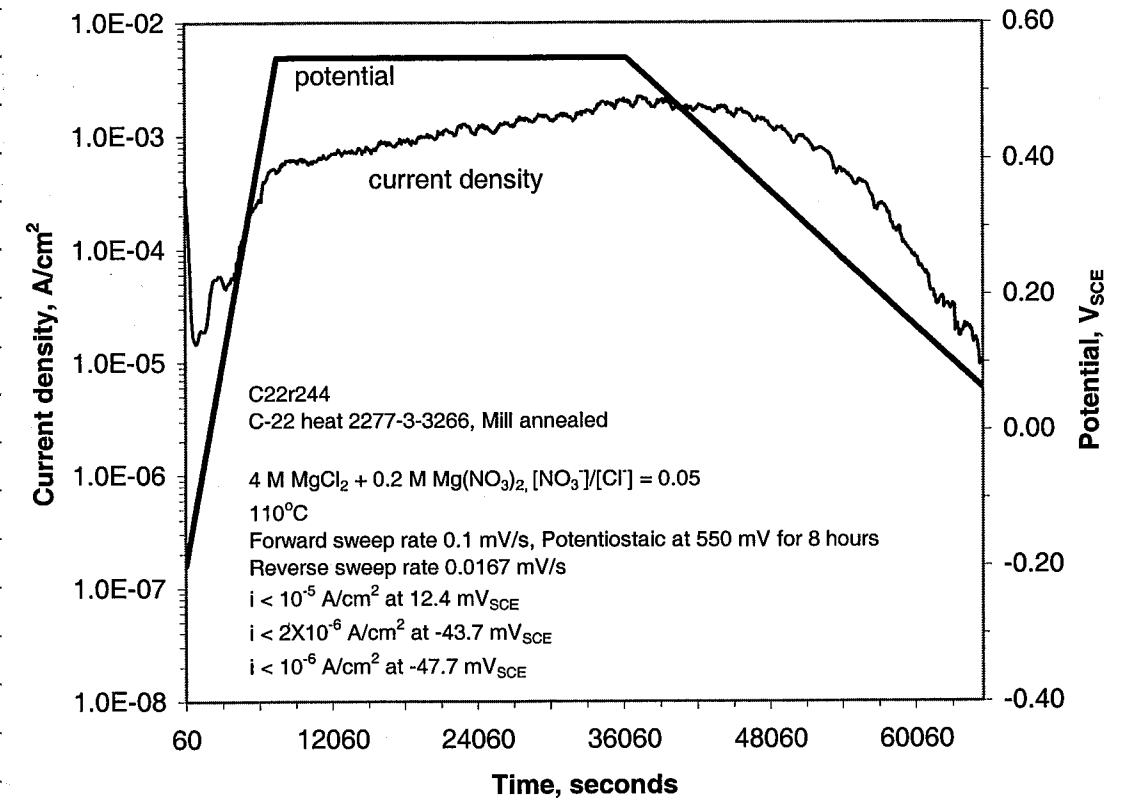
Invented by

Date

Recorded by Xihua He

08/09/2004

From Page No. \_\_\_\_\_



To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by Xihua He

8/10/2004



From Page No. \_\_\_\_\_

Test continuing in Notebook # 672

I have reviewed this scientific notebook and find it in compliance with QAP-001. There is sufficient information regarding procedures used for conducting tests, acquiring and analyzing data so that another qualified individual could repeat the activity.

*[Handwritten Signature]*

9/29/04  
USAR.

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

*[Handwritten Signature]*

9/5/04