

POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No.: C-22 HT# 2277-3-3277 Ti7 Crevice Washers And Hardware SN# CN 2775

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 2000 Grit finish using Alumina Paste Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz. or 75 in lbs. Used Alumina Paste To Polish To A 0.3 Micron Finish.

Torque Screwdriver: Photo 6104 Model# & Torque: 50 In-Oz SN: 139072 Cal: 9/20/06 Due: 3/20/07

Initial Weight: 23.50353g Model: Sartorius Genius SN: 12809099 Final Weight: 23.49938g Cal: 11/8/06 Due: 5/8/07

Solution: 4.0 M NaCl 467.53g NaCl Lot # 054171 + DI To 2000mls Test ID: BA22Ti702jk x.9/2/07

Reagents measured with Model: OHAUS SN: 2883 Cal: 1/2/07 Due: 7/2/07

Initial pH: 8.72 Model: Orion EA 940 SN: 2330 Final pH: 7.89 Cal: 7/6/06 Due: 7/6/07 pH Probe: #13-620-296 SN: 4065196

Test Temperature: 95°C Measured with Hg Thermometer SN: C96-816 Cal: 11/28/06 Due: 5/28/07

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 0199568

Gas: 99.999% N2

Ecorr: -411 mV vs SCE Model: Keithley 614 SN: 467324 Ept: +220 mV vs SCE Cal: 1/25/07 Due: 1/25/08

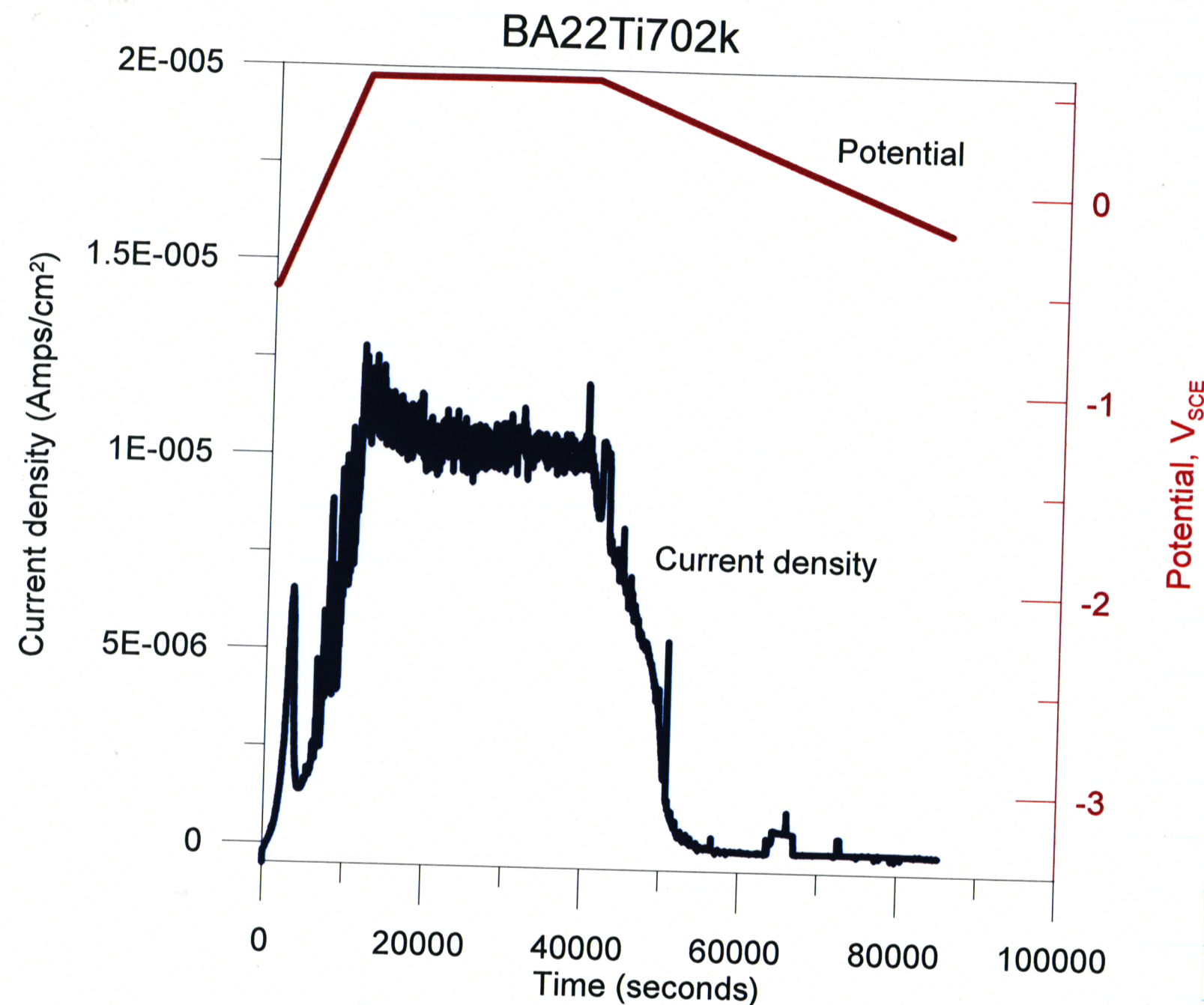
Potentiostat: Solartron 1287 ~~SN: 00186634~~ SN: 00186634 Cal: 11/7/06 Due: 5/7/07 148500 x.H 2/2/07

DATA FILE: C22Ti7a-sp, C22Ti7a-SU, C22Ti7a-SH, C22Ti7a-SD

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

No Crevice Corrosion on C-22 specimen Ti7 Washers And Hardware No Corrosion. Gold tint staining on Specimen m.l.o Gold tint staining on Ti7

* m.l.o surface scratches on Specimen formed when Crevice Washers were Torqued to 50 In-Oz B.K.J. 1/30/07



Mill annealed Alloy 22 to Ti Gr7 crevice, Ti7 bolt and nut
 Crevice specimen to washer area ratio: ~1/3; Torque: 50 in-oz;
 Specimen and washers with very fine polish
 N₂ deaerated, 95 °C, 4 M NaCl solution
 Forward scan rate: 0.1 mV/s, Potential hold: 550 mV_{SCE} for 8 hours.
 Reverse scan rate: 0.0167 mV/s
 Using entire assembly area for current density calculation:
 i < 10⁻⁵ A/cm² at 550 mV_{SCE}; i < 2*10⁻⁶ A/cm² at 376 mV_{SCE};
 i < 10⁻⁶ A/cm² at 371 mV_{SCE}
 Using crevice specimen area for current density calculation:
 i < 10⁻⁵ A/cm² at 386 mV_{SCE}; i < 2*10⁻⁶ A/cm² at 357 mV_{SCE};
 i < 10⁻⁶ A/cm² at 339 mV_{SCE}

Xihua He 2/2/07

POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No.: C-22 HT # 2277-3-3266 Ti7 Crevice Washers And Hardware HT# CN 2775

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 2000 Grit finish using Alumina Paste Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz. or 75 in lbs. Use Alumina Paste To Polish To 0.3 micron

To Polish To 0.3 micron

Torque Screwdriver: Photo 6104 Model# & Torque: 50 In-oz SN: 139072 Cal: 9/20/06 Due: 3/20/07

Initial Weight: 23.40368g Model: Sartorius Genius SN: 12809099 Cal: 11/8/06 Due: 5/8/07

Solution: 4.0 M NaCl 467.57g NaCl Lot # 054171 + DI To 2000 ml

Test ID: BA22Ti702L

Reagents measured with Model: OHAUS SN: 2883 Cal: 1/2/07 Due: 7/2/07

Initial pH: 8.64 Model: Orion EA 940 SN: 2330 Final pH: 8.32 Cal: 7/6/06 Due: 7/4/07 pH Probe: #13-620-296 SN: 4065196

Test Temperature: 95°C Measured with Hg Thermometer SN: M98-170 Cal: 4/7/06 Due: 4/6/07

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 4028036

Gas: 99.999% N2 Ecorr: -531 mV vs SCE Model: Keithley 614 SN: 467374 Ept: +53 mV vs SCE Cal: 1/25/07 Due: 1/25/08 Potentiostat: Solartron 1287 SN: 00148500

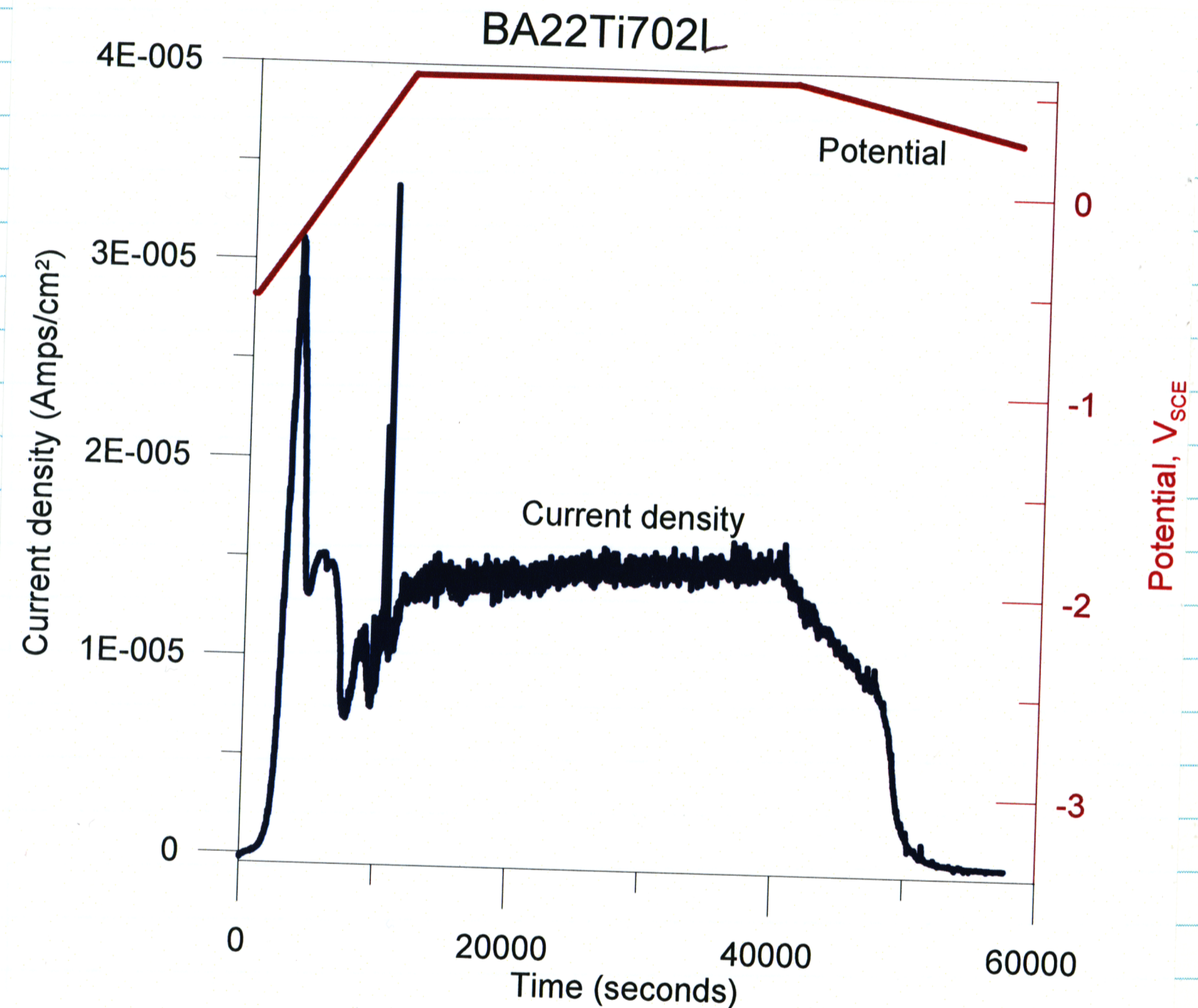
DATA FILE: C22Ti76-SP, C22Ti76-SU, C22Ti76-SH, C22Ti76-SD Cal: 11/7/06 Due: 5/7/07

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

C-22 No Corrosion 9/24 fact of Ti7 crevice washer Gold tint staining on All Surfaces of Specimen Dull tint staining on Ti7 Material with A slight Gold tint

* Note mild scratches on surface of specimen from crevice washers being Torque To 50 In-oz

B.F. 1/30/07



Mill annealed Alloy 22 to Ti Gr7 crevice, Ti7 bolt and nut
 Crevice specimen to washer area ratio: ~1/3; Torque: 50 in-oz;
 Specimen and washers with very fine polish
 N₂ deaerated, 95 °C, 4 M NaCl solution
 Forward scan rate: 0.1 mV/s, Potential hold: 550 mV_{SCE} for 8 hours.
 Reverse scan rate: 0.0167 mV/s
 Using entire assembly area for current density calculation:
 i < 10⁻⁵ A/cm² at 456 mV_{SCE}; i < 2*10⁻⁶ A/cm² at 397 mV_{SCE};
 i < 10⁻⁶ A/cm² at 389 mV_{SCE}
 Using crevice specimen area for current density calculation:
 i < 10⁻⁵ A/cm² at 404 mV_{SCE}; i < 2*10⁻⁶ A/cm² at 374 mV_{SCE};
 i < 10⁻⁶ A/cm² at 355 mV_{SCE}

Xi Hua He 2/2/07

POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No.: C-22 Specimen HT# 2277-3-3266 / C-22 Crevice Washers And Hardware HT# 2277-3-3266

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 0.3 Micron Grit finish using Alumina Paste. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz. or 75 in lbs.

Torque Screwdriver: Proto 6104 Model# & Torque: 50 In-oz SN: 139072 Cal: 9/20/06 Due: 3/20/07

Initial Weight: 23.65203g Model: Sartorius Genius SN: 12809099 Cal: 11/8/06 Due: 5/8/07

Solution: 4.0 M NaCl 467.56g NaCl lot # 054171 + DI To 2000mls

Test ID: BA22BA2201C

Reagents measured with Model: OHAUS SN: 2883 Cal: 1/2/07 Due: 7/2/07

Initial pH: 8.05 Model: Orion EA 940 SN: 2330 Final pH: 6.96 Cal: 7/6/06 Due: 7/6/07 pH Probe: #13-620-296 SN: 4065196

Test Temperature: 95°C Measured with Hg Thermometer SN: H98-170 Cal: 4/7/06 Due: 4/6/07

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 4028036

Gas: 99.999% N₂

Ecorr: -536 mV vs SCE Model: Keithley 614 SN: 467374 Ept: +563 mV vs SCE Cal: 1/25/07 Due: 1/25/08

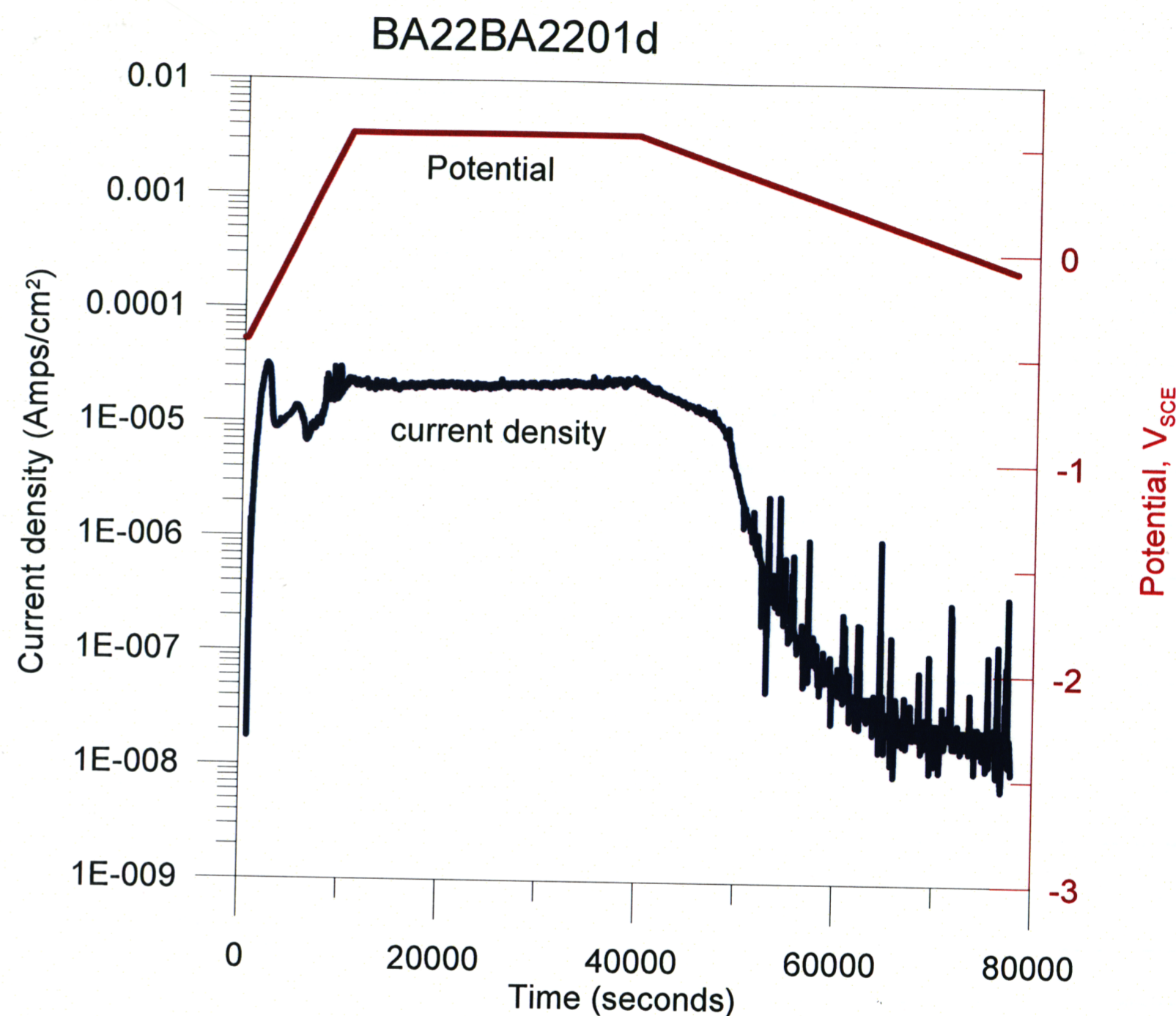
Potentiostat: Solarton 1287 SN: 00153550 Cal: 11/7/06 Due: 5/7/07

DATA FILE: C22C22prep, C22C22SU, C22C22SH, C22C22SD

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

C-22 specimen No Crevice Corrosion 0/24 feet of Crevice Washers - No Corrosion on C-22 Washers or Hardware. All Material Has Gold tint staining on All Surfaces - Except Crevice feet.

B. J. 2/1/07



Base Alloy 22 with Base Alloy 22 crevice
 Base Alloy 22 bolt and nut, no Teflon tape wrapped
 Specimen to washer area ratio: ~1/3, Torque: 50 in-oz,
 Specimen and washers are prepared with very fine finish
 N₂ deaerated, 95 °C, 4 M NaCl solution
 Forward scan rate: 0.1 mV/s, Potential hold: 550 mV_{SCE}, for 8 hours;
 Reverse scan rate: 0.0167 mV/s
 Using crevice assembly area for calculatin current density:
 i < 10⁻⁵ A/cm² at 404 mV_{SCE}; i < 2*10⁻⁶ A/cm² at 366 mV_{SCE};
 i < 10⁻⁶ A/cm² at 351 mV_{SCE}
 Using crevice specimen area for calculatin current density:
 i < 10⁻⁵ A/cm² at 374 mV_{SCE}; i < 2*10⁻⁶ A/cm² at 332 mV_{SCE};
 i < 10⁻⁶ A/cm² at 311 mV_{SCE}

Xuhua He 2/1/07

POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No.: C-22 Specimen HT# 2277-3-3266 with C-22 Washers And Hardware HT# 2277-3-3266

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 0.3 micron Grit finish using Alumina Paste Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz. or 75 in lbs.

Torque Screwdriver: Proto 6104 Model# & Torque: 50 In-oz SN: 139072 Cal: 9/20/06 Due: 3/20/07

Initial Weight: 23.6238g Model: Sartorius Genius SN: 12809099 Final Weight: 23.61978g Cal: 11/8/06 Due: 5/5/07

Solution: 4.0 M NaCl 467.58g NaCl Lot # 054171 + DI To 2000ml

Test ID: BA22BA2201d

Reagents measured with Model: OHAUS SN: 2883 Cal: 1/2/07 Due: 7/2/07

Initial pH: 8.26 Model: Orion EA 940 SN: 2330 Final pH: 6.83 Cal: 7/6/06 Due: 7/6/07 pH Probe: #13-620-296 SN: 4065196

Test Temperature: 95°C Measured with Hg Thermometer SN: C 96-816 Cal: 11/28/06 Due: 5/28/07

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 3328225

Gas: 99.999% N2

Ecorr: -407 mV vs SCE Model: Keithley 614 SN: 467374 Ept: +180 mV vs SCE Cal: 1/25/07 Due: 1/25/08

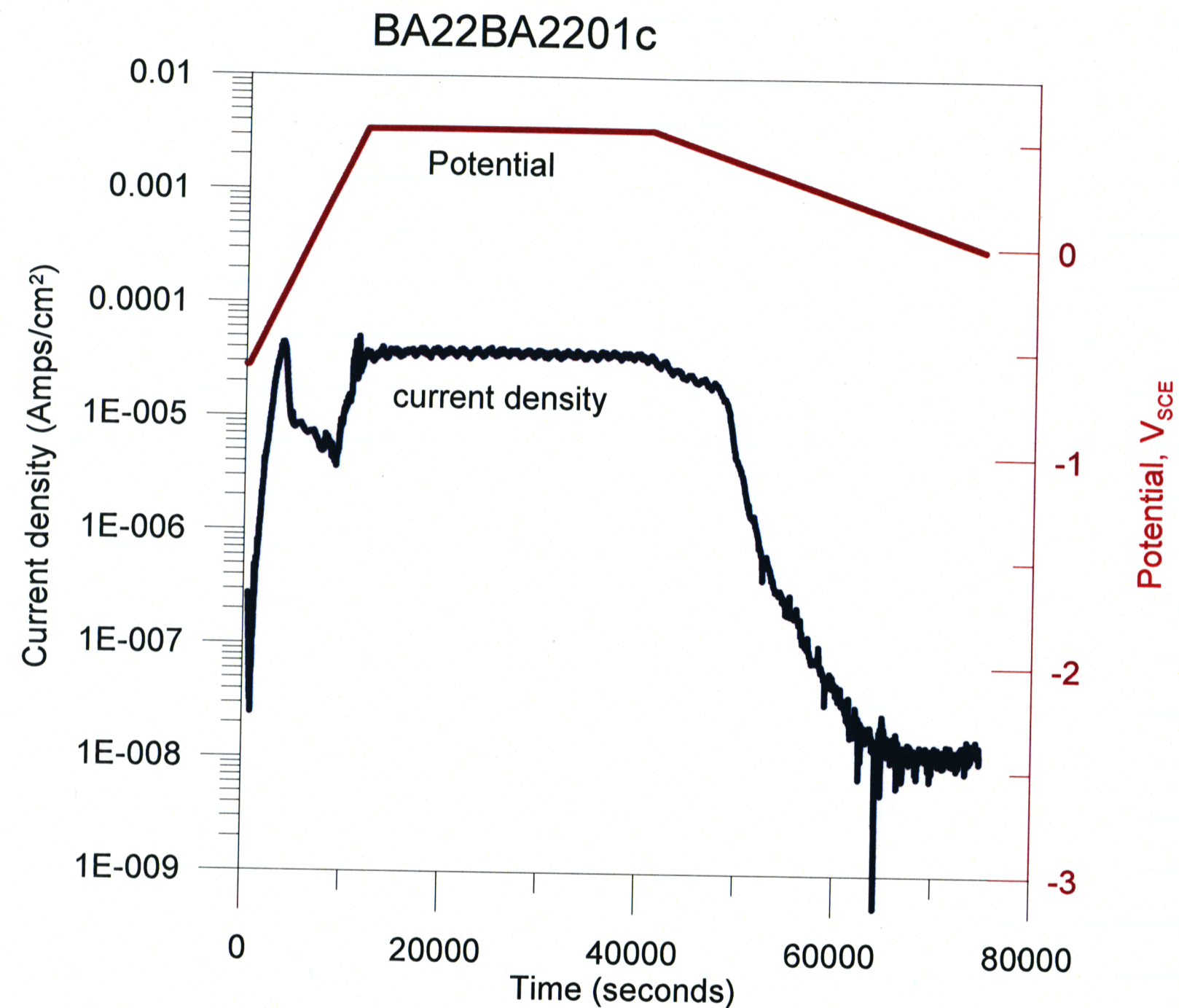
Potentiostat: Solatron 1287 SN: 0648500 cal: 11/7/06 Due: 5/7/07

DATA FILE: c22c22b-sp, c22c22b-su, c22c22b-sh, c22c22b-sd

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

C-22 No Crevice Corrosion 24 feet of crevice washers - C-22 crevice washers And Hardware No Corrosion - bobbin staining on all C-22 material.

B-E 2/1/07



Base Alloy 22 with Base Alloy 22 crevice
 Base Alloy 22 bolt and nut, no Teflon tape wrapped
 Specimen to washer area ratio: ~1/3, Torque: 50 in-oz,
 N₂ deaerated, 95 °C, 4 M NaCl solution
 Forward scan rate: 0.1 mV/s, Potential hold: 550 mV_{SCE}, for 8 hours;
 Reverse scan rate: 0.0167 mV/s
 Using crevice assembly area for calculatin current density:
 i < 10⁻⁵ A/cm² at 412 mV_{SCE}; i < 2*10⁻⁶ A/cm² at 383 mV_{SCE};
 i < 10⁻⁶ A/cm² at 365 mV_{SCE}
 Using crevice specimen area for calculatin current density:
 i < 10⁻⁵ A/cm² at 389 mV_{SCE}; i < 2*10⁻⁶ A/cm² at 349 mV_{SCE};
 i < 10⁻⁶ A/cm² at 329 mV_{SCE}

Xi Hua He 2/2/2007

POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No.: C-22 M[#] 2277-3-3266 w/ Ti7 H[#] CN2275 Crevice washers And Hardware *ratio: 1/3*

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC Paper Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz. or 75 in lbs.

Torque Screwdriver: Proto 6104 Model# & Torque: 50 In-oz SN: 139072 Cal: 9/20/06 Due: 3/20/07

Initial Weight: 23.91552g Model: Sartorius Genius SN: 12809099 Cal: 11/8/06 Due: 5/8/07
Final Weight: 23.91289g

Solution: 4.0 M NaCl
467.56g NaCl lot # 054171
+ DI To 2000 mL

Reagents measured with Model: OHAUS SN: 2883 Cal: 1/2/07 Due: 7/2/07

Initial pH: 8.35 Model: Orion EA 940 SN: 2330 Cal: 7/6/06 Due: 7/6/07
Final pH: 7.01 pH Probe: #13-620-296 SN: 4065196

Test ID: BA22Ti702m

Test Temperature: 95°C Measured with Hg Thermometer SN: H98-170 Cal: 4/7/06 Due: 4/6/07

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 4028036

Gas: 99.999% N₂

Ecorr: -567 mV vs SCE Model: Keithley 614 SN: 467374 Cal: 1/25/07 Due: 1/25/08
Ept: -442 mV vs SCE

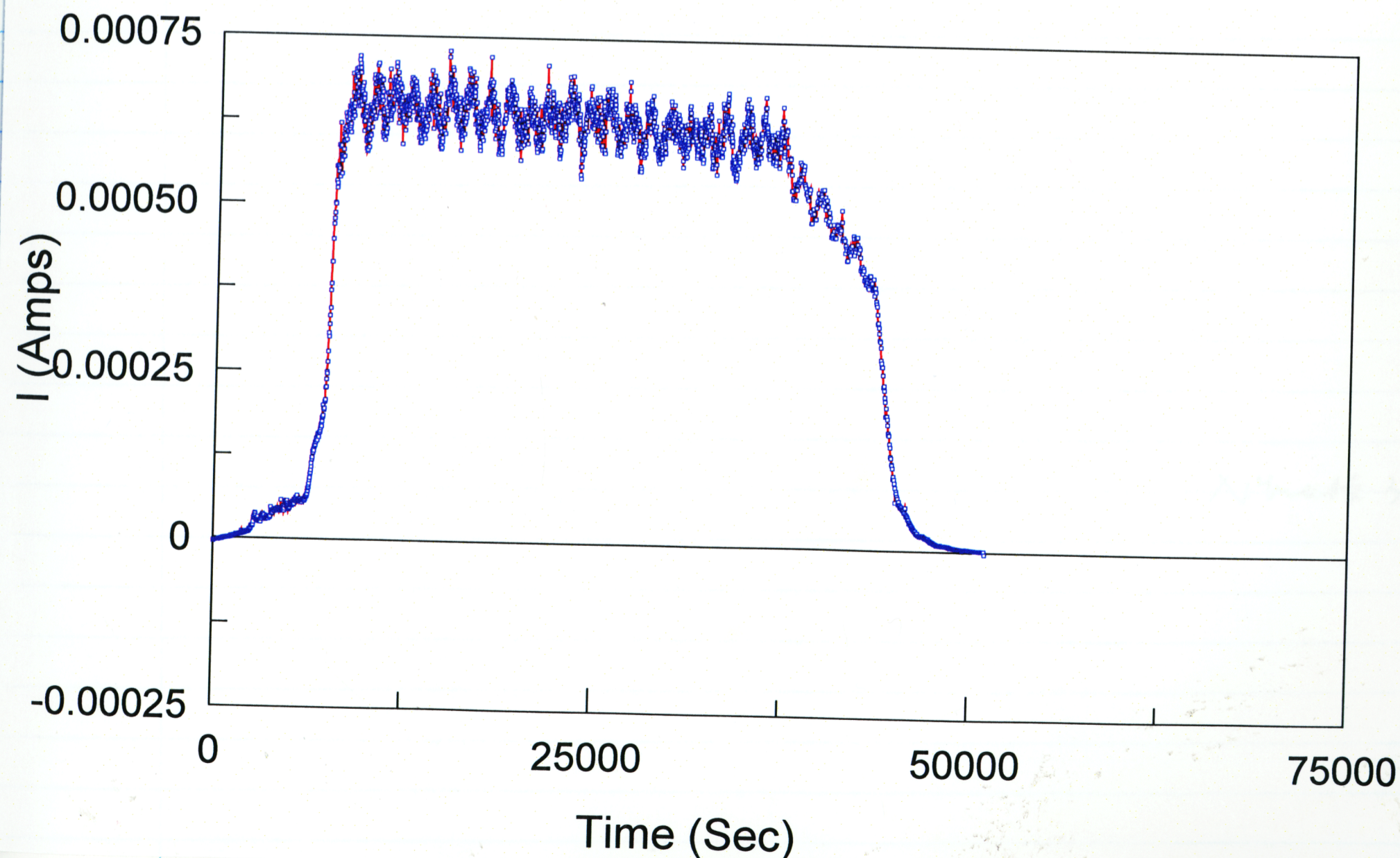
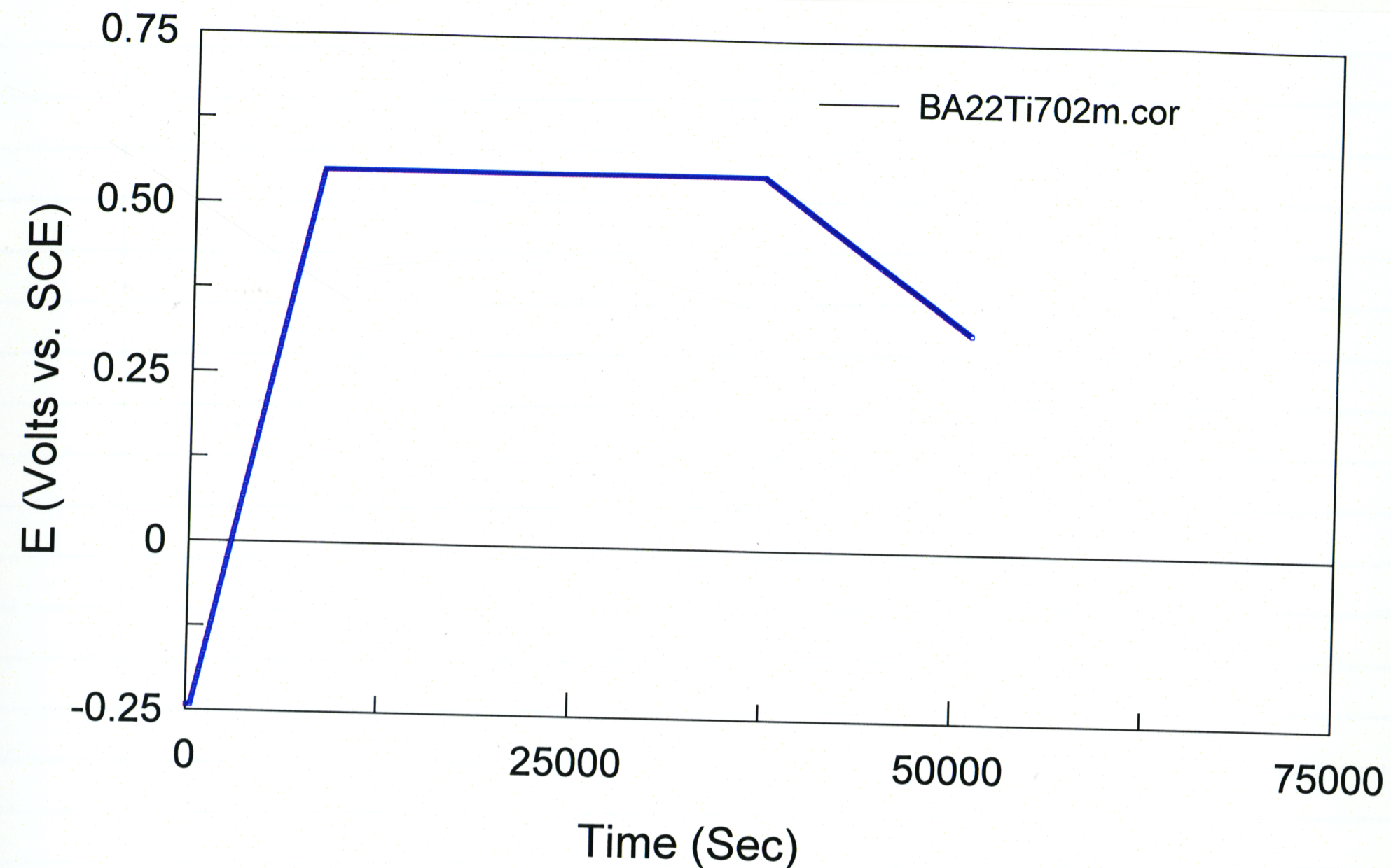
Potentiostat: Solartron 1287 SN: 00153550 Cal: 11/7/06 Due: 5/7/07

DATA FILE: C22Ti7spa-600grit, C22Ti7sla-600grit
C22Ti7sta-600grit, C22Ti7sla-600grit

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

C-22 No Crevice Corrosion 0/24 feet of Crevice Washer
Ti7 crevice washers And Hardware No Corrosion
Gold tint staining on All surfaces of C-22 specimen
slight Dull Gold Tint staining on Ti7 material

[Signature] 2/5/07



[Signature] 3/2/07

POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No. : C-22 HT# 2277-3-3266 w/ Ti7 HT# CN2775 Crevice Washers And Hardware

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using Sic Paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz. or 75 in lbs.

Torque Screwdriver: Proto 6604 Model# & Torque: 50 In-oz SN: 139072 Cal: 9/20/06 Due: 3/20/07

Initial Weight: 23.75037g Model: Sartorius Genius SN: 12809099 Cal: 11/8/06 Due: 5/5/07

Solution: 4.0 M NaCl
467.54g NaCl Lot# 054171
+ DI To 2000 ml

Reagents measured with Model: OHAUS SN: 2883 Cal: 1/2/07 Due: 7/2/07

Initial pH: 8.76 Model: Orion EA 940 SN: 2330
Final pH: 7.33 Cal: 7/6/06 Due: 7/6/07
pH Probe: #13-620-296 SN: 4065196

Test ID: BA22Ti702N
Test Temperature: 95°C Measured with Hg Thermometer SN: H98-170 Cal: 4/7/06 Due: 4/6/07

Counter Electrode: Platinum Flag
Reference Electrode: Fisher 13-620-52 SN: 4028036

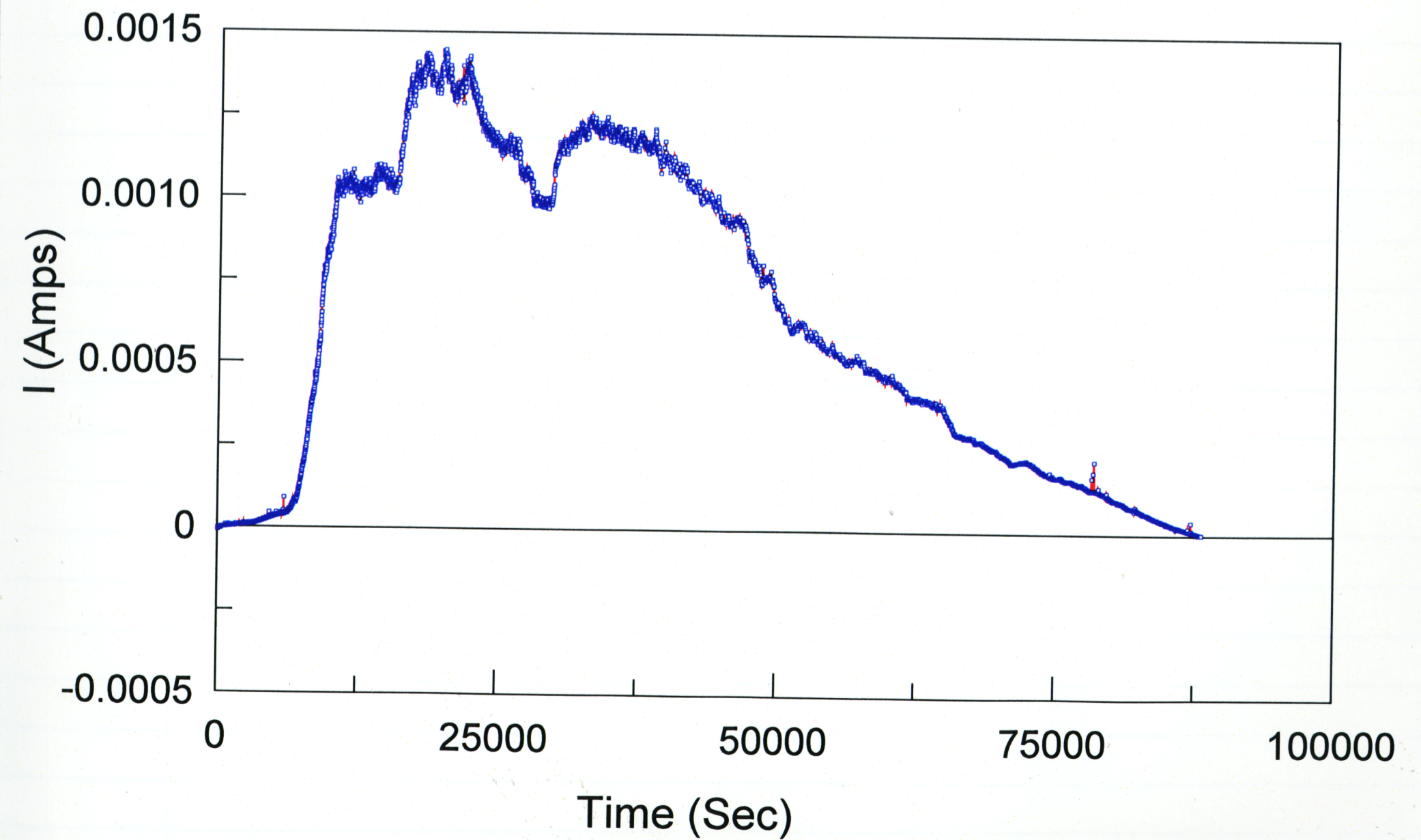
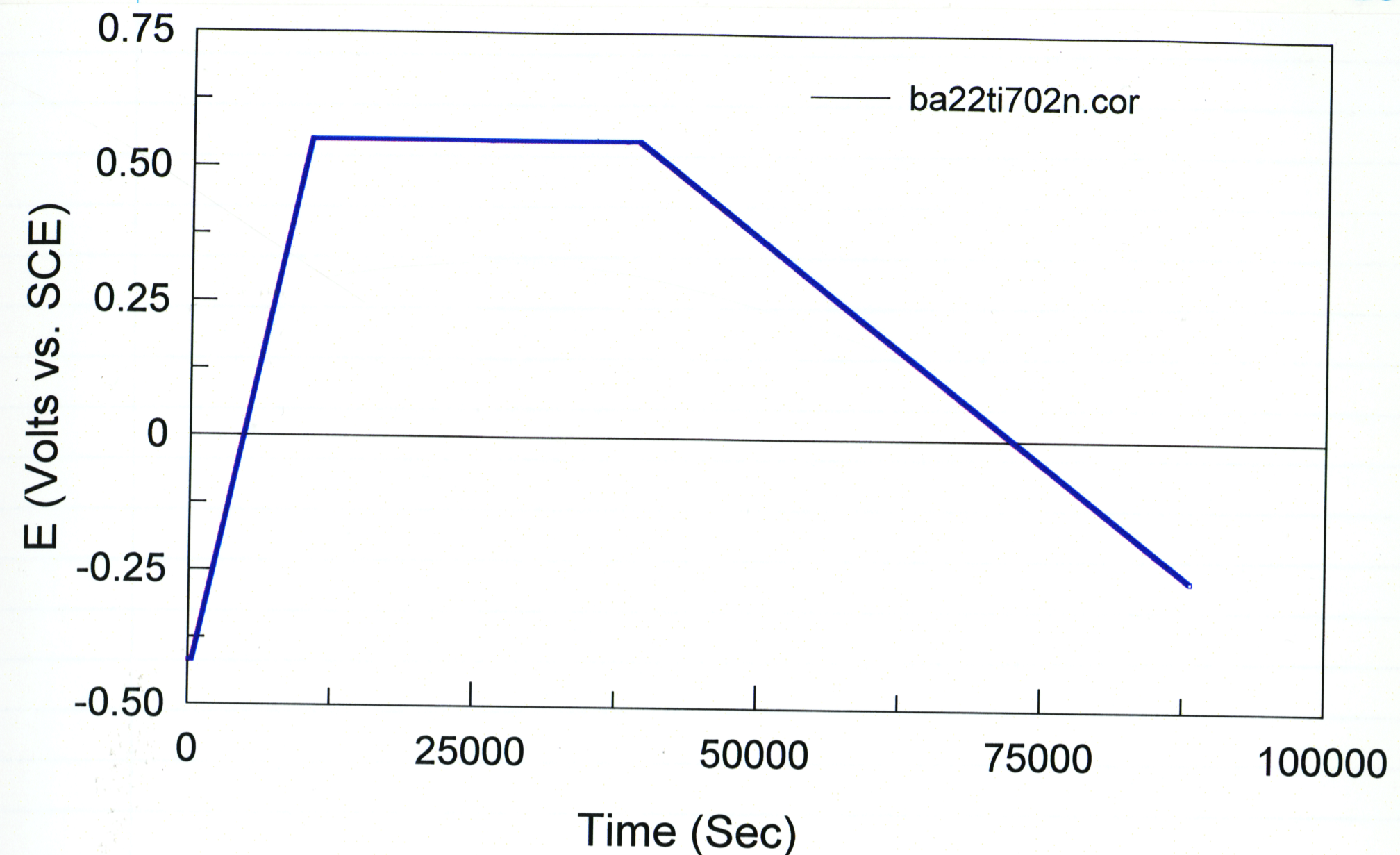
Gas: 99.999% N₂
Ecorr: -419 mV vs SCE Model: Keithley 614 SN: 467374
Ept: +105 mV vs SCE Cal: 1/25/07 Due: 1/25/07

Potentiostat: Solartron 1287 SN: 00148500 Cal: 11/7/06 Due: 5/7/07

DATA FILE: C22Ti76SP-600grit, C22Ti76SH-600grit, C22Ti76SD-600grit
C22Ti76SH-600grit, C22Ti76SD-600grit

Number of Crevice Corrosion Sites: 0/24 (24 max.)
C-22 No Crevice Corrosion 24 feet of Crevice Washers
Ti7 Crevice Washers And Hardware - No Corrosion
C-22 Specimen Gold tint staining on All Surfaces
Ti7 Crevice Washers And Hardware - Dull Gold
Tint staining on Surfaces

[Signature]
2/5/07



[Signature] 3/1/07

POTENTIAL SCAN AND HOLD

Objective: See page 1.

Alloy / Heat No.: C-22 HT# 2277-3-3266 w/ C-22 HT# 2277-3-3266 crevice washers and hardware

Specimen Preparation: Specimen machined to dimensions specified in CNWRA Drawing #20.06002.01.322.002. Specimen surfaces polished to 600 Grit finish using SiC Paper. Specimen cleaned in acetone then crevice forming washers attached to specimen using hardware. Torque to 50 in-oz. or 75 in lbs.

Torque Screwdriver: Proto 6104 Model# & Torque: 50 In-oz SN: 139072
Cal: 9/20/06 Due: 3/20/07

Initial Weight: 23.96921 Model: Sartorius Genius SN: 12809099
Final Weight: 23.95967 Cal: 11/8/06 Due: 5/8/07

Solution: 4 M NaCl
467.56g NaCl lot # 054171
+ DI to 2000 ml

Reagents measured with Model: OHAUS SN: 2883
Cal: 1/2/07 Due: 7/2/07

Initial pH: 7.96 Model: Orion EA 940 SN: 2330
Final pH: 7.12 Cal: 7/6/06 Due: 7/6/07
pH Probe: #13-620-296 SN: 4065196

Test ID: BA22017 X.H 3/2/07
BA22BA2201e

Test Temperature: 95°C Measured with Hg Thermometer SN: C96-816
Cal: 11/28/06 Due: 5/28/07

Counter Electrode: Platinum Flag

Reference Electrode: Fisher 13-620-52 SN: 3328225

Gas: 99.999% N₂

Ecorr: -568 mV_{SCE} Model: Keithley 614 SN: 467374
Ept: 117 mV_{SCE} Cal: 1/25/07 Due: 1/25/07

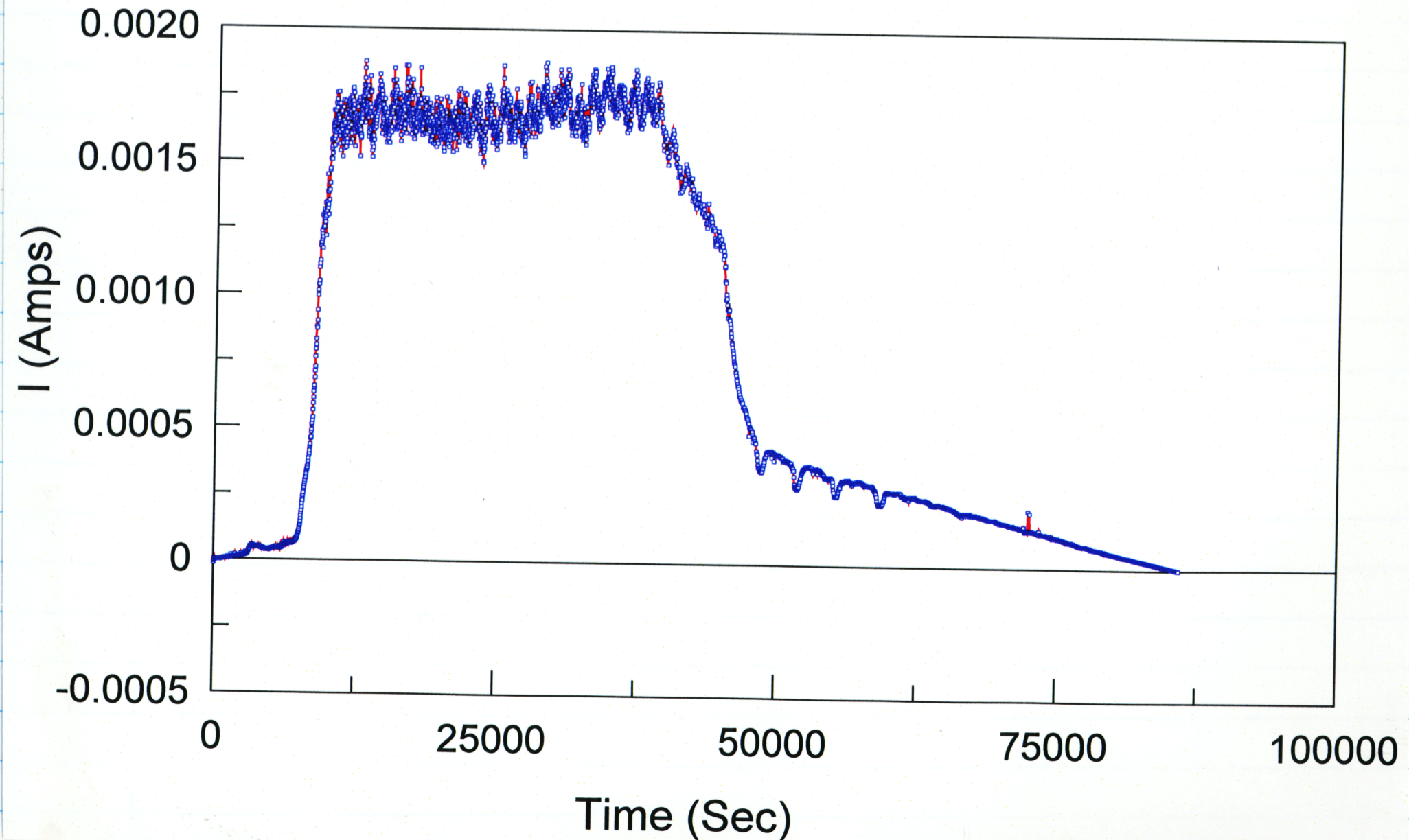
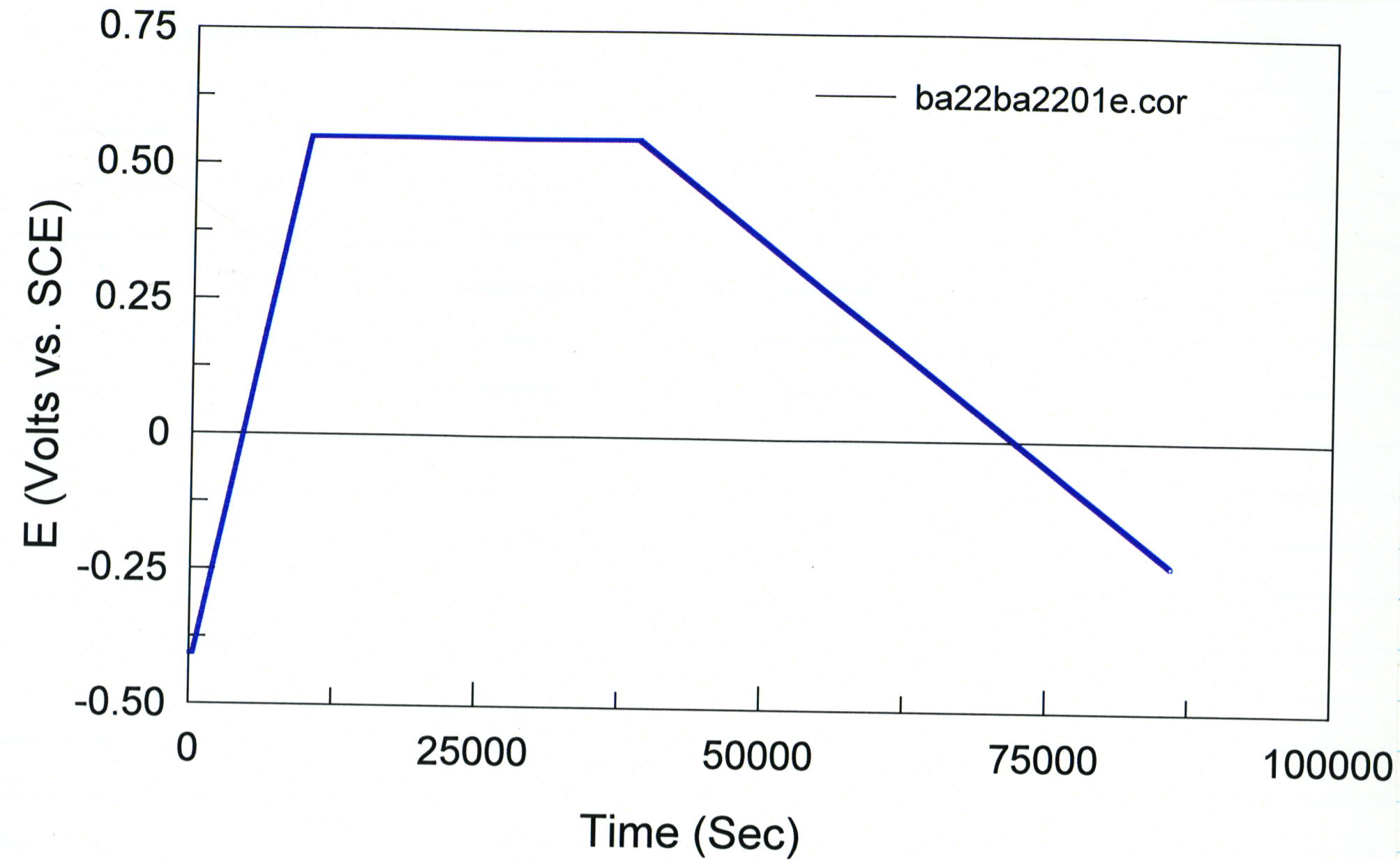
Potentiostat: Solartron 1287 SN: 00148500
Cal: 11/7/06 Due: 5/7/07

DATA FILE: C22C22SPA-600grit, C22C22SLA-600grit, C22C22SHA-600grit, C22C22SDA-600grit

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

C-22 No Crevice Corrosion 0/24 feet of crevice washers
C-22 crevice washers and hardware no corrosion

B. J. J.
2/7/07



3/2/07 Xelmarlo