

SSRT Data Summary SCW28 to SCW41

Slow Strain Rate Testing of MA Alloy 22											
At 95°C except where noted											
Test ID	Solution Composition	pH Initial	pH Adj'd	pH Final	Eapp(mV)	Max Stress (Mpa)	TTF(hrs)	RA(%)	% Elong	SCC?	
SSRMA22_SCW28	0.5M NaCl; 7.1M KCl 0.38M NaNO3; NaCO3 as in SCW	7.87	not adj'd	9.36	400	560	39	55.9	44.4	Y	
SSRMA22_SCW29	same as *28 except 3.3M KCl	7.41	not adj'd	9.44	400	590	50	50	55	Y	
SSRMA22_SCW30	same as *26 except no HCO3		not adj'd		400*	787	79	76.9	87.6	N	
SSRMA22_SCW31	SCW	7.73	8.31	9.03	200	730	74	77	85.2	N	
SSRMA22_SCW32	SCW	7.73	8.31	8.85	400	674	38	65.9	41.6	N	
SSRMA22_SCW33	1.05M NaHCO3; 0.5M NaCl 0.19M NaOH; 1.5M KCl	8.58	not adj'd	9.81	400	652	33	30	36.6	Y	
SSRMA22_SCW34	AIR - GMAW #12A	N/A	N/A	N/A	N/A	725	36	56.9	38.8	N/A	
SSRMA22_SCW35	AIR - GMAW #12B	N/A	N/A	N/A	N/A	753	45	48.2	50.4	N/A	
SSRMA22_SCW36	AIR - GTAW #10A	N/A	N/A	N/A	N/A	753	37	51.6	40.8	N/A	
SSRMA22_SCW37	AIR - GTAW #10B	N/A	N/A	N/A	N/A	809	52	49.3	59.8	N/A	
SSRMA22_SCW38	AIR - GMAW #13A Thermally Aged 1125°C / 20 min	N/A	N/A	N/A	N/A	725	47	50.4	53.2	N/A	
SSRMA22_SCW39	AIR - GMAW #13B Thermally Aged 1125°C / 20 min	N/A	N/A	N/A	N/A	770	56	54.8	62.4	N	
SSRMA22_SCW40 #14B 1125°C/20 min	1.05M NaHCO3; 0.5M NaCl 0.19M NaOH; 1.5M KCl	8.58	not adj'd	9.73	400	612	41	53.7	45.2	Y	
SSRMA22_SCW41 #14A 1125°C/20 min	SCW	7.79	8.69	10.5	400	669	50	58	57	N	

K. J. Chirif 9/8/05

SIRT Data Summary SIRT SCW42 to SCW55

SSRMA22_SCW42	AIR - GTAW #14B	N/A	N/A	N/A	N/A	747		49	53.7	54.4	N
	Thermally Aged 1125°C / 20 min										
SSRMA22_SCW43	AIR - GTAW #14C	N/A	N/A	N/A	N/A	719		46	53.7	50.2	N
	Thermally Aged 1125°C / 20 min										
SSRMA22_SCW44	SCW - GTAW #15B	8.46	8.93	10.03	400	not det'd		not det'd	49.3	not det'd	N
	Thermally Aged 1125°C / 20 min										
SSRMA22_SW45	GTAW #15C	8.72	not adj'd	9.98	400	657		56	44.6	63.4	N
	1.05M NaHCO ₃ ; 0.5M NaCl 0.19M NaOH; 1.5M KCl										
	Thermally Aged 1125°C / 20 min										
SSRMA22_SCW46	AIR - Mill Annealed	N/A	N/A	N/A	N/A	758		59	73.8	75.8	N/A
SSRMA22_SCW47	AIR - Mill Annealed	N/A	N/A	N/A	N/A	775		70	75.9	84	N/A
	Thermally Aged 870°C / 30 min										
SSRMA22_SCW48	Mill Annealed	8.74	not adj'd	10.31	400	652		45	57	54	Y
	Solution as in SCW33										
SSRMA22_SCW49	Mill Annealed	8.74	not adj'd	10.4	400	607		43	45	52.4	Y?
	Thermally Aged 870°C / 30 min Solution as in SCW 33										
SSRMA22_SCW50	SCW - GTAW #15A	7.9	not adj'd	10.28	400	595		51	52.7	56	Y - N ?
	Thermally Aged 1125°C / 20 min										
SSRMA22_SCW51	Mill Annealed	8.71	not adj'd	10.21	300	646		62	51.5	69.4	Y-N?
	Solution as in SCW33										
SSRMA22_SCW52	Mill Annealed	8.68	not adj'd	9.23	400	669	@75°C	54	52.6	56.4	Y
	Solution as SCW33										
SSRMA22_SCW53	Mill Annealed	8.68	not adj'd	9.31	400	714	@55°C	66	61.1	76.2	N
	Solution as in SCW33										
SSRMA22_SCW54	Mill Annealed	8.72	not adj'd	9.15	400	758	@RT	65	72.1	75	N
	Solution as in SCW33										
SSRMA22_SCW55	Mill Annealed	8.68	not adj'd	9.4	200	632		69	78.2	62.1	N
	Solution as in SCW33										

K. J. Chiswick
9/8/05

Ken Chiang
 SwRI-CNWRA
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 Fax: (210) 522-5184
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Procedure 105-WI-821
 Project # _____ J.C. # 81498
 TOTAL PCS. INSPECTED 12
 TOTAL PCS. ACCEPTED 12
 TOTAL PCS. REJECTED 0
 "NR #" IF REJECTS NA

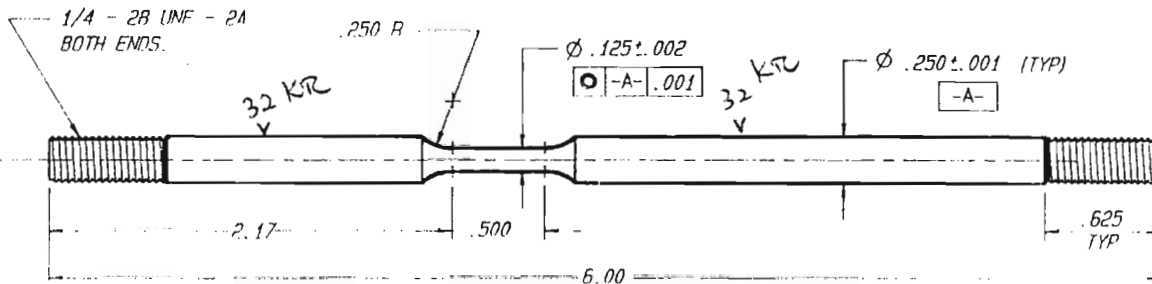
EQUIPMENT
 Mfg. 009976 Due 1-13-06
 Td. Cap. 002176 Due 11-19-07
 Comp. 002185 Due 1-18-06

INSPECTOR

DATE MAY 25 2005

No Special Operations

SwRI DRAWING # 20-03704-042-001



NOTE: 1. DO NOT UNDERCUT RADII
 2. USE LOW STRESS MACHINING PROCEDURE

ITEM NO.	QTY	REQ.	SIZE	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST						
BASIC DIMENSIONS		DECIMAL		TOLERANCE		CONTRACT
UNDER 8		± .01	± .003	± 1/32	OKD	4-10-1992 A. NAGY
8-64 INCL		± .03	± .010	± 1/16	MECH	
OVER 64		± .06	± .015	± 1/8	ELECT	
ANGLES		± 0°30'		± 1°0'		
SOUTHWEST RESEARCH INSTITUTE						
SLOW STRAIN RATE SPECIMEN						
DRAWING NO. 20-3704-042-1						
SCALE 2 = 1						
SHEET						

K.J. Chiang 1-13-04
 Initiator: K. Chiang Date

Praveen Jain for V. Jain
 Reviewer: V. Jain Date 1/13/04

Mark R. Shusterman
 QA Approval: R. Brient Date 1/13/04

C-22 H# 2277-3-3266

Procedure 105-WI-821
 Project # _____ J.C. # _____
 TOTAL PCS. INSPECTED 6
 TOTAL PCS. ACCEPTED 6
 TOTAL PCS. REJECTED 0
 "NR #" IF REJECTS NA
 CP 22 HT # 2277-3-3266
 INSPECTOR

LOCATION QC 31 M/S
 EQUIPMENT Mfg. 009976 Due 1-13-06
 Td. Cap. 002176 Due 11-19-07
 Comp. 002185 Due 1-18-06
 DATE AUG 31 2005

Procedure 105-WI-821
 Project # _____ J.C. # 81344
 TOTAL PCS. INSPECTED 6
 TOTAL PCS. ACCEPTED 6
 TOTAL PCS. REJECTED 0
 "NR #" IF REJECTS NA
 Thum Dey and S700
 INSPECTOR
 DATE JUN - 7 2005
 EQUIPMENT Mfg. 009976 Due 1-13-06
 Td. Cap. 002176 Due 11-19-07
 Comp. 002185 Due 1-18-06

OLI Speciation calculation using Stream Analyzer 2.0.17

Calculation Summary

Survey4 Calculation for Work2

Unit Set: Default

Automatic Chemistry Model

Aqueous (H+ ion) Databanks:

Public

Composition survey:

KCl	
Range	0.0 to 10.0000 mol
Step size	1.00000 mol
No. steps	10
No. points	11

No secondary survey selected

Isothermal Calculation

Calc. elapsed time: 2.891 sec

Stream Inflows

	Input	Calculated		% Diff
H2O	55.5080	55.5080	mol	
NaCl	0.500000	0.500000	mol	
NaHCO3	1.05000	1.05000	mol	
KCl	7.10000	0.0	mol	-100.000
NaOH	0.190000	0.190000	mol	

Survey Inflows

KCl	H2O	NaCl	NaHCO3	NaOH
mol	mol	mol	mol	mol
0.0	55.5080	0.500000	1.05000	0.190000
1.00000	55.5080	0.500000	1.05000	0.190000
2.00000	55.5080	0.500000	1.05000	0.190000
3.00000	55.5080	0.500000	1.05000	0.190000
4.00000	55.5080	0.500000	1.05000	0.190000
5.00000	55.5080	0.500000	1.05000	0.190000
6.00000	55.5080	0.500000	1.05000	0.190000
7.00000	55.5080	0.500000	1.05000	0.190000
8.00000	55.5080	0.500000	1.05000	0.190000
9.00000	55.5080	0.500000	1.05000	0.190000
10.0000	55.5080	0.500000	1.05000	0.190000

K. T. Chiang
9/9/05

Element Balance

KCl mol	H(+1) Total tot mol	K(+1) Total tot mol	NA(+1) Total tot mol	O(-2) Total tot mol	CL(-1) Total tot mol mol
0.0	112.256	0.0	1.74000	58.8480	0.500000
1.00000	112.256	1.00000	1.74000	58.8480	1.50000 1.05000
2.00000	112.256	2.00000	1.74000	58.8480	2.50000 1.05000
3.00000	112.256	3.00000	1.74000	58.8480	3.50000 1.05000
4.00000	112.256	4.00000	1.74000	58.8480	4.50000 1.05000
5.00000	112.256	5.00000	1.74000	58.8480	5.50000 1.05000
6.00000	112.256	6.00000	1.74000	58.8480	6.50000 1.05000
7.00000	112.256	7.00000	1.74000	58.8480	7.50000 1.05000
8.00000	112.256	8.00000	1.74000	58.8480	8.50000 1.05000
9.00000	112.256	9.00000	1.74000	58.8480	9.50000 1.05000
10.0000	112.256	10.0000	1.74000	58.8480	10.5000 1.05000

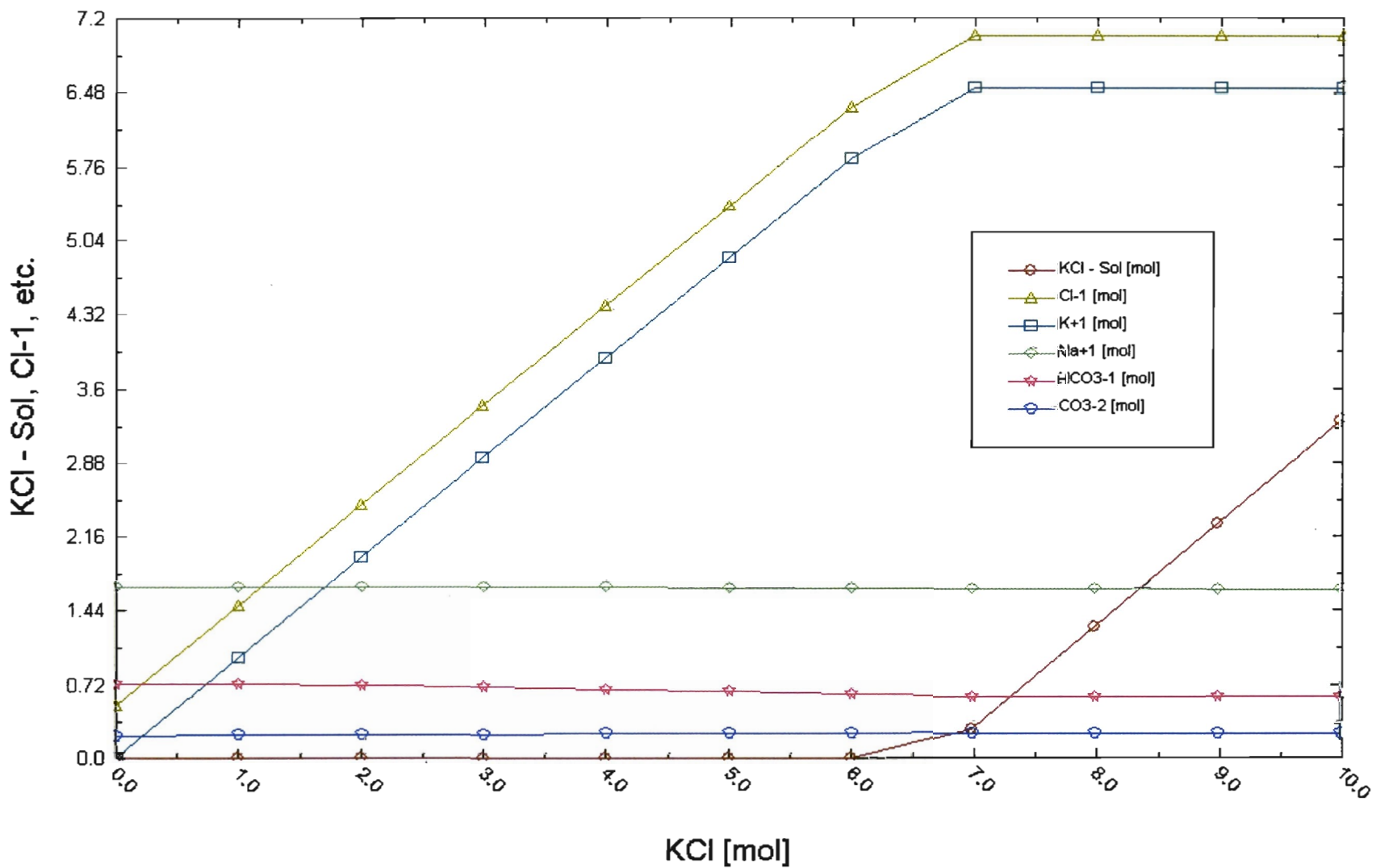
KCl mol	H(+1) Aq tot mol	K(+1) Aq tot mol	NA(+1) Aq tot mol	O(-2) Aq tot mol	CL(-1) Aq tot mol mol
0.0	111.876	0.0	1.74000	58.5628	0.500000
1.00000	111.923	1.00000	1.74000	58.5789	1.50000 0.998719
2.00000	111.934	2.00000	1.74000	58.5699	2.50000 0.991422
3.00000	111.936	3.00000	1.74000	58.5534	3.50000 0.982655
4.00000	111.934	4.00000	1.74000	58.5329	4.50000 0.972914
5.00000	111.930	5.00000	1.74000	58.5097	5.50000 0.962365
6.00000	111.924	6.00000	1.74000	58.4842	6.50000 0.951095
7.00000	111.919	6.70212	1.74000	58.4650	7.20212 0.942789
8.00000	111.919	6.70212	1.74000	58.4650	7.20212 0.942789
9.00000	111.919	6.70212	1.74000	58.4650	7.20212 0.942789
10.0000	111.919	6.70212	1.74000	58.4650	7.20212 0.942789

KCl mol	H(+1) Vap tot mol	K(+1) Vap tot mol	NA(+1) Vap tot mol	O(-2) Vap tot mol	CL(-1) Vap tot mol mol
0.0	0.380304	0.0	0.0	0.285173	5.49597e-14
1.00000	0.333163	0.0	0.0	0.269143	1.64625e-13
2.00000	0.321799	0.0	0.0	0.278055	2.92389e-13
3.00000	0.319867	0.0	0.0	0.294624	4.37459e-13
4.00000	0.321835	0.0	0.0	0.315090	5.95117e-13
5.00000	0.326105	0.0	0.0	0.338322	7.60316e-13
6.00000	0.332079	0.0	0.0	0.363849	9.28244e-13
7.00000	0.337136	0.0	0.0	0.382990	1.04542e-12
8.00000	0.337136	0.0	0.0	0.382990	1.04542e-12
9.00000	0.337136	0.0	0.0	0.382990	1.04542e-12
10.0000	0.337136	0.0	0.0	0.382990	1.04542e-12

Analysis performed by V. Jain shows saturation Cl^- concentration 7.2 molal .

K. T. Chinnif
9/9/05

R. T. Chianf
9/9/05



Notebook No. 695

OLI Speciation calculation with 0.5 Mole NaCl, 7.1 mole KCl, 1.1 mole NaHCO₃

Calculation Summary

OLI Systems, Inc. Stream Analyzer Version

SinglePoint1 Calculation for Work2

1.2

Unit Set: Default

Automatic Chemistry Model

Aqueous (H+ ion) Databanks:
Public

Isothermal Calculation

Temperature 95 °C
Pressure 1 atm

Stream Inflows

Water	55.508 mol
Sodium chloride	0.5 mol
Potassium chloride	7.1 mol
Sodium bicarbonate	1.1 mol

Stream Parameters

Mixture Properties

Stream Amt - Total Inflow	64.208 mol
Temperature	95 °C
Pressure	1 atm

Aqueous Properties

pH	8.45496 pH
Ionic Strength	0.115451 mol/mol
Osmotic Pressure	510.535 atm
Electrical Cond, specific	0.887064 1/(ohm-cm)
Electrical Cond, molar	131.803 cm ² /ohm-mol
Viscosity, absolute	0.638578 cP
Viscosity, relative	2.14937 cP/cP H ₂ O

	Total	Aqueous	Vapor	Solid	2nd Liquid
Density	--	g/ml	g/ml	g/ml	g/ml
	--	1.23934	9.35E-04	1.98697	0
Enthalpy	Total cal	Aqueous cal	Vapor cal	Solid cal	2nd Liquid cal
	-4.73E+06	-4.64E+06	-46682.5	-42301.8	0
Heat Capacity	Total cal/g K	Aqueous cal/g K	Vapor cal/g K	Solid cal/g K	2nd Liquid cal/g K
	0	0	0	0	0

K. J. Chiu
9/9/05

Total and Phase Flows (Amounts)

	Total mol	Aqueous mol	Vapor mol	Solid mol	2nd Liquid mol
Mole (True)	71.9476	71.4333	0.65538		0
Mole (App)	64.208	63.6937	0.65538		0
	Total g	Aqueous g	Vapor g	Solid g	2nd Liquid g
Mass	1650.94	1602.06	18.3936		0
	Total L	Aqueous L	Vapor L	Solid L	2nd Liquid L
Volume	20.9906	1.29267	19.6826		0

Scaling Tendencies

solids within temperature range	Temperature Range
Potassium chloride	1 0 200.000 °C inside range
Sodium bicarbonate	0.533106 0 200.000 °C inside range
Potassium bicarbonate	0.25717 data valid thro inside range
Sodium chloride	0.170767 0 350.000 °C inside range
Sodium carbonate monohydrate	0.0271622 34.76 112.500 °C inside range
Sodium bicarbonate carbonate dii	0.0267795 21.26 150.000 °C inside range
Potassium carbonate 1.5 hydrate	2.70E-04 data valid thro inside range
Potassium sesquicarbonate sesq	2.77E-05 data valid thro inside range
Potassium carbonate	9.67E-07 data valid thro inside range
Potassium hydroxide monohydrat	1.05E-08 33 143.000 °C inside range
Potassium hydroxide	8.52E-13 data valid thro inside range

Species Output (True Species)

	Total mol	Aqueous mol	Vapor mol	Solid mol	2nd Liquid n/a
Water	55.7634	55.3614	0.401992		0
Potassium chloride	0.58894	0.180053	0		0.408887
Sodium bicarbonate	0.034468	0.034468	0		0
Carbon dioxide	0.255456	2.07E-03	0.253388		0
Hydrogen chloride	2.77E-12	1.49E-13	2.63E-12		0
Bicarbonate ion(-1)	0.554687	0.554687	0		0
Carbonate ion(-2)	0.212926	0.212926	0		0
Chloride ion(-1)	7.01106	7.01106	0		0
Hydrogen ion(+1)	1.40E-09	1.40E-09	0		0
Hydroxide ion(-1)	6.62E-05	6.62E-05	0		0
Potassium ion(+1)	6.51106	6.51106	0		0
Sodium carbonate ion(-1)	0.0424637	0.0424637	0		0
Sodium ion(+1)	1.52307	1.52307	0		0
Total (by phase)	72.4976	71.4333	0.65538		0.408887

K. J. Chiao
9/10/05

Molecular Output (Apparent Species)

	Total mol	Aqueous mol	Vapor mol	Solid mol	2nd Liquid n/a	
Water	56.058	55.656	0.401992		0	0
Sodium chloride	1.6	1.6	0		0	0
Potassium chloride	6	5.59111	0		0.408887	0
Carbon dioxide	0.55	0.296612	0.253388		0	0
Hydrogen chloride	2.63E-12	0	2.63E-12		0	0
Potassium carbonate	0.55	0.55	0		0	0
Total (by phase)	64.758	63.6937	0.65538		0.408887	0

Element Balance

	Total mol	Aqueous mol	Vapor mol	Solid mol	2nd Liquid n/a	
H(+1)	112.116	111.312	0.803983		0	0
K(+1)	7.1	6.69111	0		0.408887	0
NA(+1)	1.6	1.6	0		0	0
O(-2)	58.808	57.8992	0.908768		0	0
CL(-1)	7.6	7.19111	2.63E-12		0.408887	0
C(+4)	1.1	0.846612	0.253388		0	0

Analysis performed independently by L. Yang

Cl⁻ in liquid 7.2 molal, 0.4 mol in solid.

K. J. Chouf 9/10/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-06002-01-321-001

Solution: x 1/2 L

mill annealed - not welded
 HIT # 2277-3-3266 ^{8/27/06}

2.10M NaHCO ₃	88.18g	Lot # 050282	pH _i 8.61
0.5M NaCl	14.65g	Lot # 051510	pH _f 10.50
0.19M NaOH	3.81g	Lot # 033972	
1.5M KCl	55.91g	Lot # 044597	

Reagents measured with

Model: OHAUS
 Cal: 7/12/05

SN: 2883
 Due: 1/12/06

Counter Electrode: Pt flag Reference Electrode: Ag/AgCl w/3M KCl
in home

Gas: N₂ (99.999%)
 E_{corr}: -276 mV

** Applied: +415 mV Potentiostat: ESC 440-2 SN: 9209138

Specimen Visual:

*some staining - severe brittle failure
 cracking very evident*

$E^0 = 3.2 \times 10^{-6} \text{ s}^{-1}$ $T = 95^\circ\text{C}$ TC S/N 0003
 cal 5/19/05 - 1/18/05
 * fluke 159 S/N 010857 cal 5/11/05 - 5/11/06
 ** correction for temp ($\Delta 13 \text{ mV @ } 95^\circ\text{C}$)
 pH meter orion EA 940 S/N 2330 cal 7/25/05 - 7/25/06
 pH electrode 13-620-296 S/N 14065196P

^{Bled}
 4/27/06 Test SSRMA22-SCW57

*Walter J. Machowski
 9/19/05*

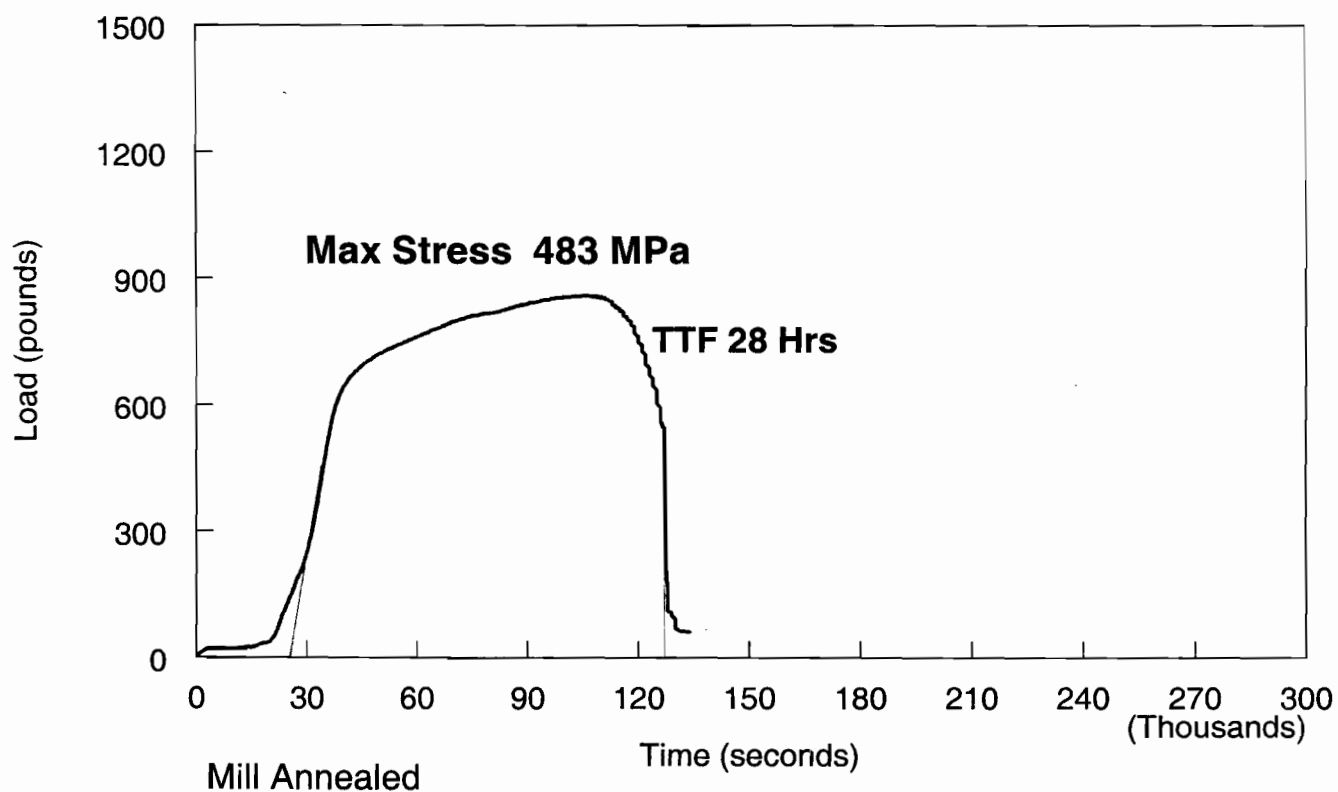
Slow Strain Rate Test

2.10~~5~~M NaHCO₃; 0.5M NaCl; 1.5M KCl; 0.19M NaOH

WJM 9/19/05

+400 mV

Test SSRMA22_SCW57



$$14.5 \text{ cm} = 300 \text{ ks}$$

$$4.9 \text{ cm} = 1013795 = 28.2 \text{ h}$$

$$t_f / t_{f \text{ ani}} = 28.2 / 71.5 = 0.39$$

$$P_{\text{max}} / P_{\text{max}}^{\text{ani}} = 483 / 727 = 0.66$$

Walter J. Machowski
9/19/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-06002-01-321-001

Solution: $\times 1/2 L$ *mill annealed - not welded*
 HT# 2277-3-3266 *9/27/04*

0.55M NaHCO ₃	23.16g	Lot# 044998	pH _i 9.38
0.5M NaCl	14.62g	Lot# 051510	pH _f 9.71
1.5M KCl	55.90g	Lot# 044597	
0.19M NaOH	3.80g	Lot# 033972	

Reagents measured with Model: OHAUS SN: 2883
 Cal: 7/12/05 Due: 1/12/06

Counter Electrode: Pt flag Reference Electrode: Ag/AgCl w/3M KCl
in house

Gas: N₂ (99.999%) *E_{corr}: -227mV

** Applied: +415mV Potentiostat: ESC 440-2 SN: 9209138

Specimen Visual:

*some slight staining - looks like
 brittle fracture; crack visible*

$E^{\circ} = 3.2 \times 10^{-6} s^{-1}$ T=95°C TC S/N 0003 cal 5/14/05 - 11/18/05
 * fluke 179 S/N 010857 cal 5/11/05 - 5/11/06
 ** correction for temp (0.13mV @ 95°C)
 pH meter Orion EA 940 S/N 2330 cal 7/25/05 - 7/25/06
 pH electrode 13-620-296 S/N 14065196P

9/27/04
 Test SSRMA22 - SCW58

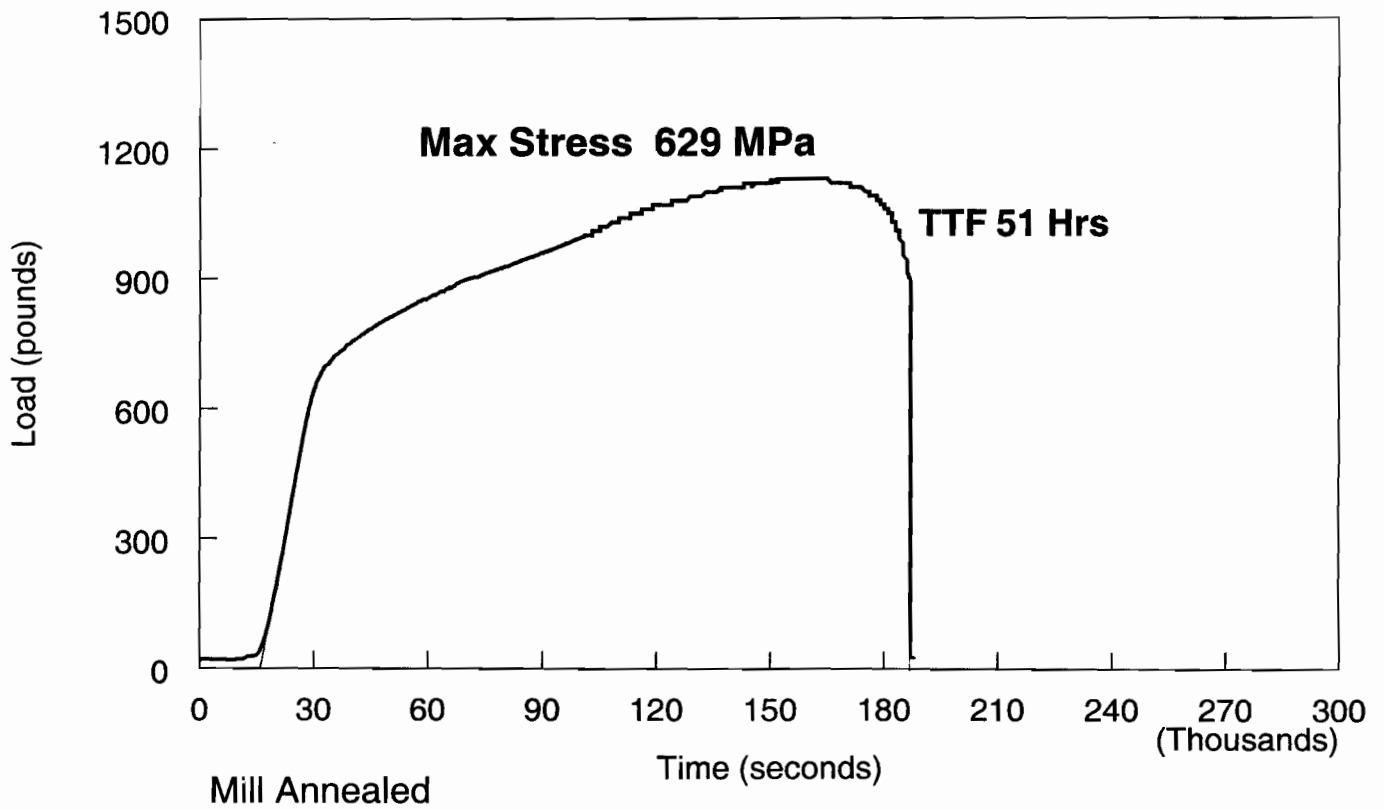
Walter J. Machrowski
 9/23/05

Slow Strain Rate Test

0.55M NaHCO₃; 0.5M NaCl; 1.5M KCl; 0.19M NaOH

+400 mV

Test SSRMA22_SCW58



14.9cm = 300 ks

8.5cm = 171141s = 47.5h

Walter J. Machowski
9/23/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

mill annealed - not welded

Hf# 2277-3-3266 ^{ISO} 6/27/06

Solution: $\approx 1/2$ L

0.19 M NaOH 3.85g Lot# 033972
 0.5 M NaCl 14.56g Lot# 051510
 2.1 M NaHCO₃ 88.41g Lot# 050282

Reagents measured with

Model: OHAUS

SN: 2883

Cal: 7/12/05

Due: 1/12/06

Counter Electrode: Pt flag

Reference Electrode: Ag/AgCl 43M KCl

Cal Check v SCE: $\Delta 35$ mV

DVM: SN: 73980493 Cal: 2/18/05 Due: 2/9/06

Initial pH: 8.45

pH Meter: ORION 940

SN: 2330

Cal: 7/24/05

Due: 7/25/04

Final pH: 8.30

pH electrode: 13-620-296

SN: 14065196P

Gas: N₂ (99.999%)

Ecorr: + 104 mV

Eapplied: +415 mV

Potentiostat: FSC440-2

SN: 9209138

DVM: SN:

FLUKE 73980493

Cal: 2/9/05

Due: 2/9/06

T/C or Thermometer:

SN 0003

Cal: 5/19/05

Due: 11/18/05

Specimen Visual:

failure look brittle

*10/22/05
w/pen*

*E⁰ = 3.2 x 10⁻⁶ S⁻¹
~~7.6 x~~*

3/12/06 Test SSRMA22-SCW59

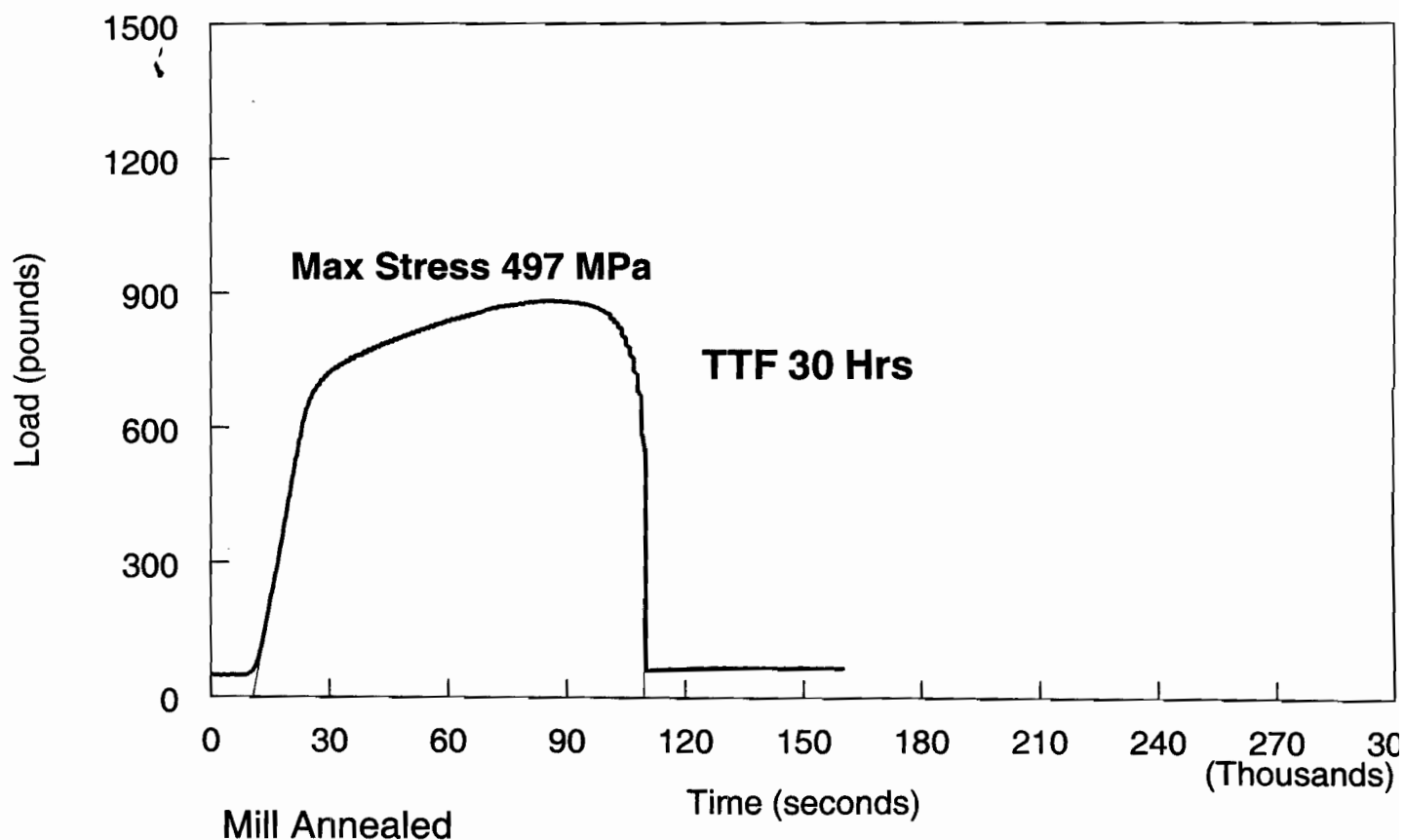
*Walter J. Macbratner
10/22/05*

Slow Strain Rate Test

2.10M NaHCO₃; 0.5M NaCl; 0.19M NaOH

+400 mV

Test SSRMA22_SCW59



$$300 \text{ ks} = 15.9 \text{ cm}$$

$$1 \text{ cm} = 18.87 \text{ ks}$$

$$120,000 - 18868 = 101132 \text{ S} = 28.1 \text{ h}$$

$$t_f / t_{f, \text{air}} = 28.1 / 71.5 = 0.393$$

$$P_{\text{max}} / P_{\text{max, air}} = 497 / 727 =$$

Walter J. Macintosh
10/22/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: $\approx 1/2$ L

0.19M NaOH 3.85g Lot # 033972
 0.5M NaCl 14.60g Lot # 051510
 2.1M NaHCO₃ 88.22g Lot # 050282

mill annealed - not welded
 HT# 2277-3-3266 ⁸² 4/27/06

Reagents measured with

Model: OHAUS
Cal: 7/12/05SN: 2883
Due: 1/12/04

Counter Electrode: Pt flag

Reference Electrode: As/AsC 2M KCl
Cal Check v SCE: $\Delta 34$ mV
DVM: SN: 73980493 Cal: 2/9/05 Due: 2/9/06Initial pH: 8.88 pH Meter: ORION SN: 2330 Cal: 7/25/05 Due: 7/25/06
Final pH: 8.96 pH electrode: 13-620-296 SN: 14065196PGas: N₂ (99.999%) Ecorr: -290 mV

Eapplied: +100 mV Potentiostat: ESC 440-2 SN: 9209138

DVM: SN: FLUKE 73980493 Cal: 2/9/05 Due: 2/9/06

T/C or Thermometer:

SN 0003
Cal: 5/19/05

Due: 11/18/05

Specimen Visual:

looks more like ductile fracture

$$\epsilon^0 = 3.2 \times 10^{-6} \text{ s}^{-1}$$

4/27/06 Test SSRMA22 - SCW b1

Walter J. Machowski
10/31/05

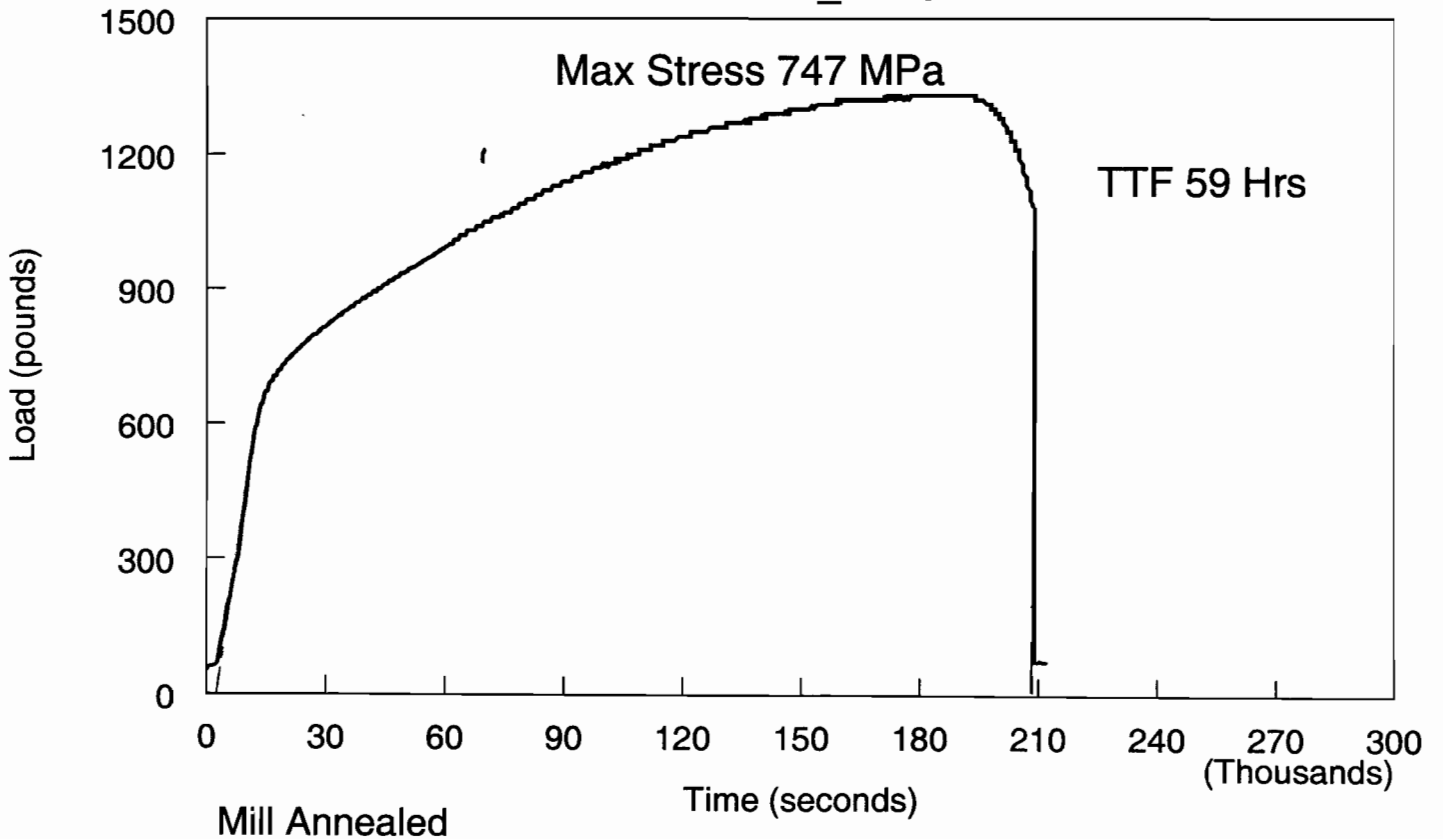
Slow Strain Rate Test

2.10M NaHCO₃; 0.5M NaCl; 0.19M NaOH

+100 mV v Ag/AgCl

SSRMA22_SCW60

11/1/05
WJM



14 cm = 270 ks

10.68 cm = 129686 s = 36.0 h

205971 s = 57.2 h

KR 10/31/05

Walter J. MacKowshi
10/31/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

mill annealed - not welded
HT# 2277-3-3266 ^{BK} 6/27/06

Solution: x 1/2 L

0.1M NaCl 2.92g Lot # 051510
2.10M NaHCO₃ 88.81g Lot # 050282
0.19M NaOH 3.80g Lot # 033972

Reagents measured with Model: OHAUS SN: 2883
Cal: 7/12/05 Due: 1/12/06

Counter Electrode: Pt flag Reference Electrode: Ag/AgCl 5M KCl
Cal Check v SCE: Δ 33mV
DVM: SN: 73980493 Cal: 2/9/05 Due: 2/9/06

Initial pH: 8.58 pH Meter: ORION SN: 2330 Cal: 7/25/05 Due: 7/25/06
Final pH: 8.44 pH electrode: 13620-29 SN: 14065196P

Gas: N₂ (99.999%) Ecorr: -297mV

Applied: +415mV Potentiostat: FSC 440-2 SN: 9209138

DVM: SN: FLUKE 73850992 Cal: 1/7/05 Due: 2/9/06

T/C or Thermometer: SN 0003 Cal: 5/19/05 Due: 11/18/05

Specimen Visual:

looks like ductile fracture

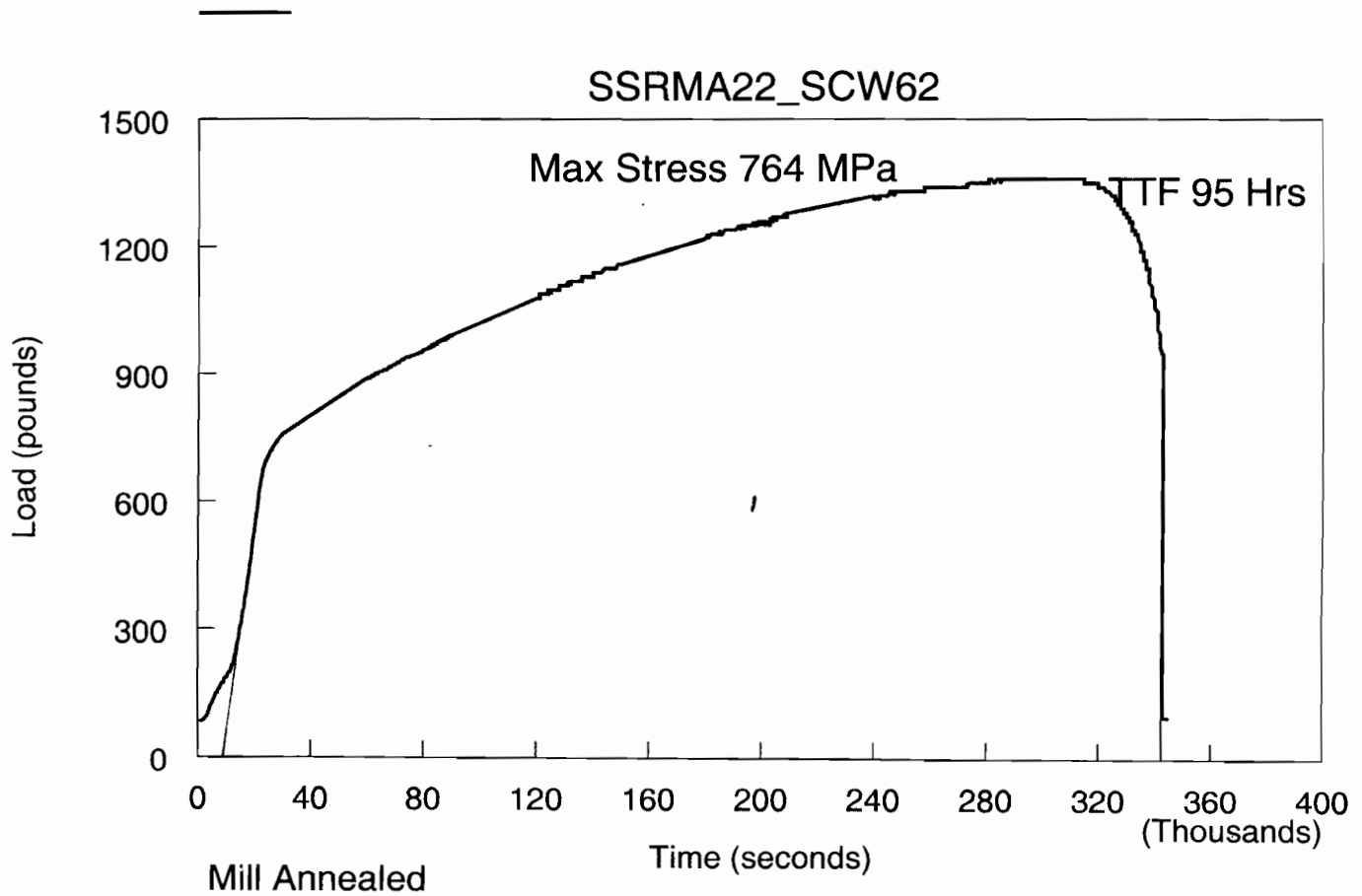
$$\epsilon^0 = 3.2 \times 10^{-6} \text{ s}^{-1}$$

^{BK} 6/27/06 Test SSRMA22 SCW62

Walter J. Marchowski
11/2/05

Slow Strain Rate Test

2.10M NaHCO₃; 0.1M NaCl; 0.19M NaOH



14.92cm = 400 Ks

12.42cm = 332976 s = 92.5 h

Walter J. Machowski
11/2/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: $\frac{1}{2}$ Lmill annealed - not welded
HT# 2277-3-3266 ^{SP} 6/27/04

0.25M NaCl	7.30g	Lot# 051510
0.19M NaOH	3.80g	Lot# 033972
2.10M NaHCO ₃	88.27g	Lot# 050282

Reagents measured with

Model: OHAUS SN: 2883
Cal: 7/12/05 Due: 1/12/06Counter Electrode: Pt flag Reference Electrode: Ag/AgCl 3M KCl
Cal Check v SCE: $\Delta 31$ mV
DVM: SN: 7380443 Cal: 2/9/05 Due: 2/9/06Initial pH: 8.75 pH Meter: ORION SN: 2330 Cal: 7/25/05 Due: 7/25/06
Final pH: 8.58 pH electrode: 13-620-296 SN: 14065196 PGas: N₂ (99.999%) Ecorr: -309 mV

Eapplied: 4415 mV Potentiostat: ESC 440-2 SN: 9209138

DVM: SN: FLUKE 73850992 Cal: 1/7/05 Due: 2/9/06

T/C or Thermometer: SN 0003
Cal: 5/19/05 Due: 11/18/05

Specimen Visual:

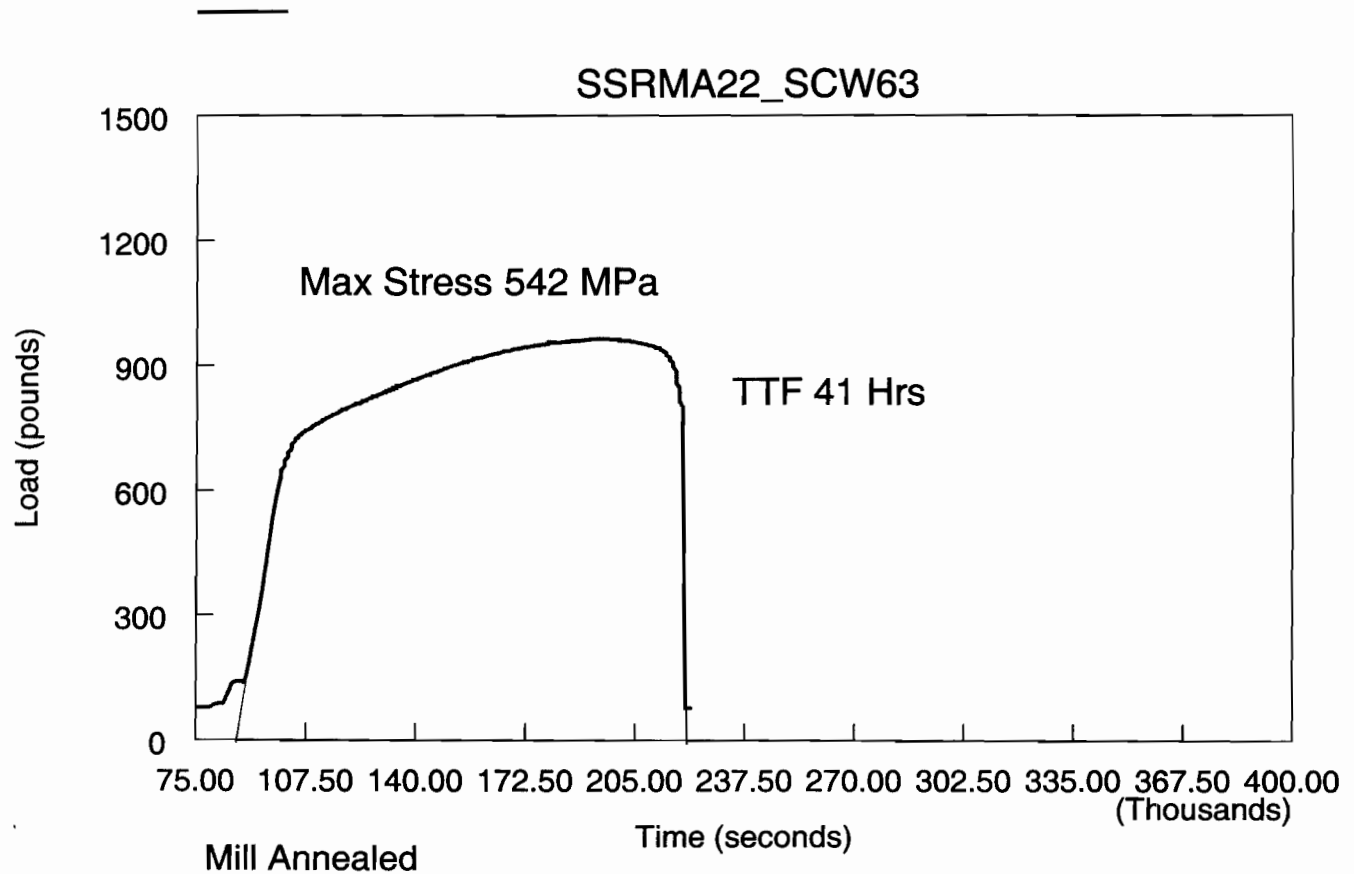
much secondary cracking; brittle failure

$$\epsilon^0 = 3.2 \times 10^{-6} \text{ s}^{-1}$$

BKD
6/27/06 Test SSRMA22_SCW63Walter J. MacKowski
11/15/05

Slow Strain Rate Test

2.10M NaHCO₃; 0.25M NaCl; 0.19M NaOH



$$11.5 \text{ cm} = 335 \text{ ks} - 75 \text{ ks} = 260 \text{ ks}$$

$$5.9 \text{ cm} = \frac{171870}{5} = 1333915 = 37.1 \text{ h}$$

$$t_f / t_{f \text{ air}} = 37.1 / 71.5 =$$

$$P_{\text{max}} / P_{\text{max air}} = 542 / 727 =$$

Walter J. MacKowski
11/15/05

SLOW STRAIN RATE TEST

Objective: see page # 70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: x 1/2 L *mill annealed - not welded*
HT# 2277-3-3266 ⁸⁴⁰ 6/27/06

1.25 M NaCl 36.48g Lot # 051510
0.19 M NaOH 3.85g Lot # 033972
2.10 M NaHCO₃ 88.50 Lot # 050282

Reagents measured with Model: OHAUS SN: 2883
Cal: 7/12/05 Due: 1/12/06

Counter Electrode: Pt flag Reference Electrode: Ag/AgCl 3M KCl
Cal Check v SCE: Δ 32 mV
DVM: SN: 33980493 Cal: 2/19/05 Due: 2/19/06

Initial pH: 8.84 pH Meter: ORION SN: 2330 Cal: 1/25/05 Due: 1/25/06
Final pH: 9.65 pH electrode: 13-620-296 SN: 14065196P

Gas: N₂ (99.999%) Ecorr: -302 mV

Applied: +415 mV Potentiostat: FSC 440-2 SN: 9209138

DVM: SN: RUKC Cal: 1/7/05 Due: 2/9/06
33850992

T/C or Thermometer: SN 0003 Due: 11/18/05
Cal: 5/19/05

Specimen Visual:

only slight secondary cracks - failure looks between ductile and brittle

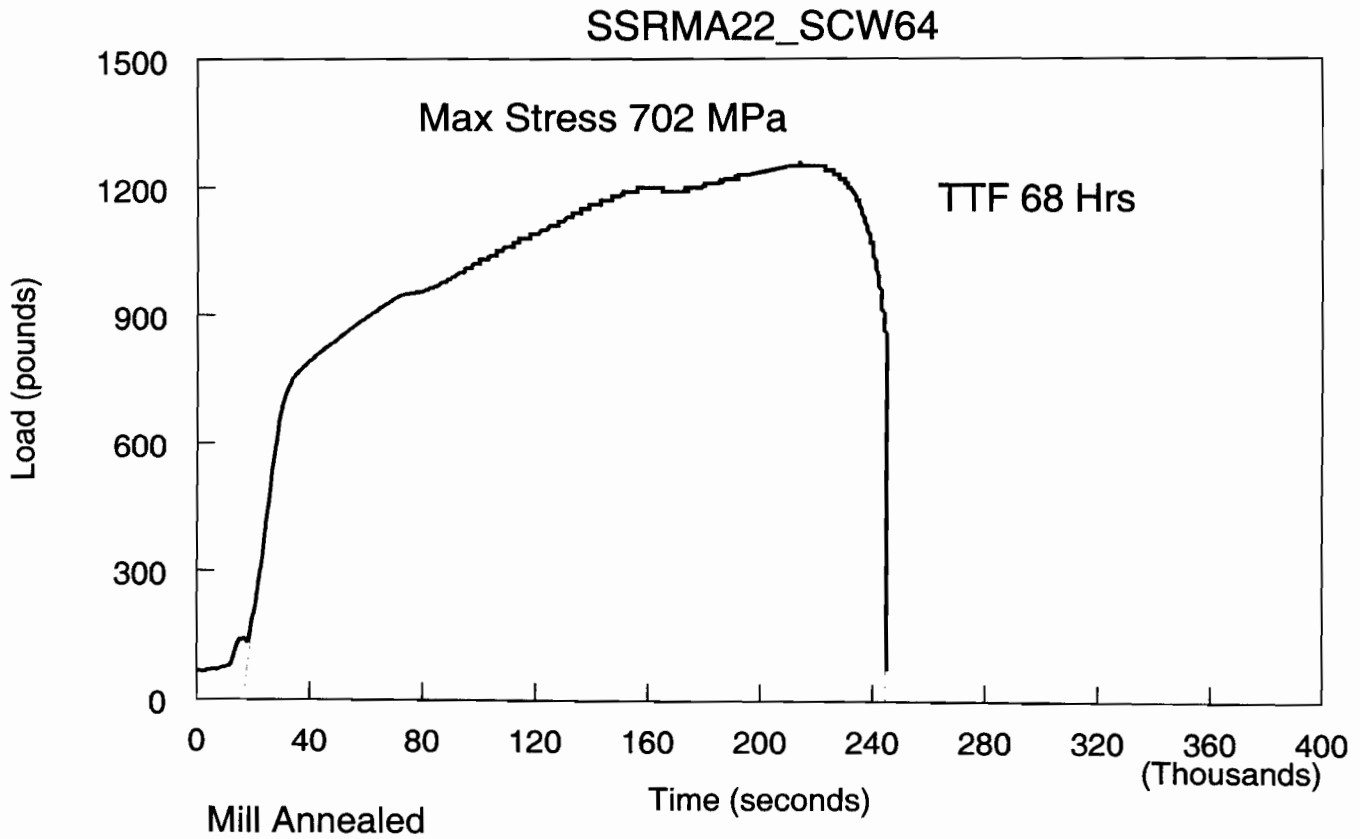
$$\dot{\epsilon} = 3.2 \times 10^{-6} \text{ s}^{-1}$$

⁸⁴⁰ 6/27/06 Test SSRMA22 - SCW64

Walter J. MacKowski
11/17/05

Slow Strain Rate Test

2.10M NaHCO₃; 1.25M NaCl; 0.19M NaOH



$$14.75 \text{ cm} = 400 \text{ ks}$$

$$8.4 \text{ cm} = 227797 \text{ s} = 63.3 \text{ h}$$

Walter J. MacKintosh
11/17/05

SLOW STRAIN RATE TEST

Objective: see page # 20

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: $\times \frac{1}{2} L$ *mill annealed - not welded*
w/m 11/21/05 MT # 2277-3-3266 ⁸¹² 6/27/06

0.1M NaCl *24* 2.92g Lot # 051510
 0.2M NaOH 4.02g Lot # 033972
 2.1M NaHCO₃ 88.30g Lot # 050282
 6.1M KCl 257.25 Lot # 044597

Reagents measured with Model: OHAUS SN: 2883
 Cal: 7/12/05 Due: 1/12/06

Counter Electrode: Pt flag Reference Electrode: Ag/AgCl 3M KCl
 Cal Check v SCE: $\Delta 30mV$
 DVM: SN: 73980493 Cal: 2/9/06 Due: 2/9/06
 7/25/05

Initial pH: 8.78 pH Meter: ORION SN: 2330 Cal: 7/25/05 Due: 7/25/06
 Final pH: 9.94 pH electrode: 13-620-296 SN: 14065196P

Gas: N₂ (99.999%) Ecorr: -357mV

Eapplied: +415mV Potentiostat: K3C 440-2 SN: 9209138

DVM: SN: FLUKE 73850992 Cal: 1/17/05 Due: 2/9/06

T/C or Thermometer: SN 0003 Cal: 5/19/05 Due: 11/18/05

Specimen Visual:

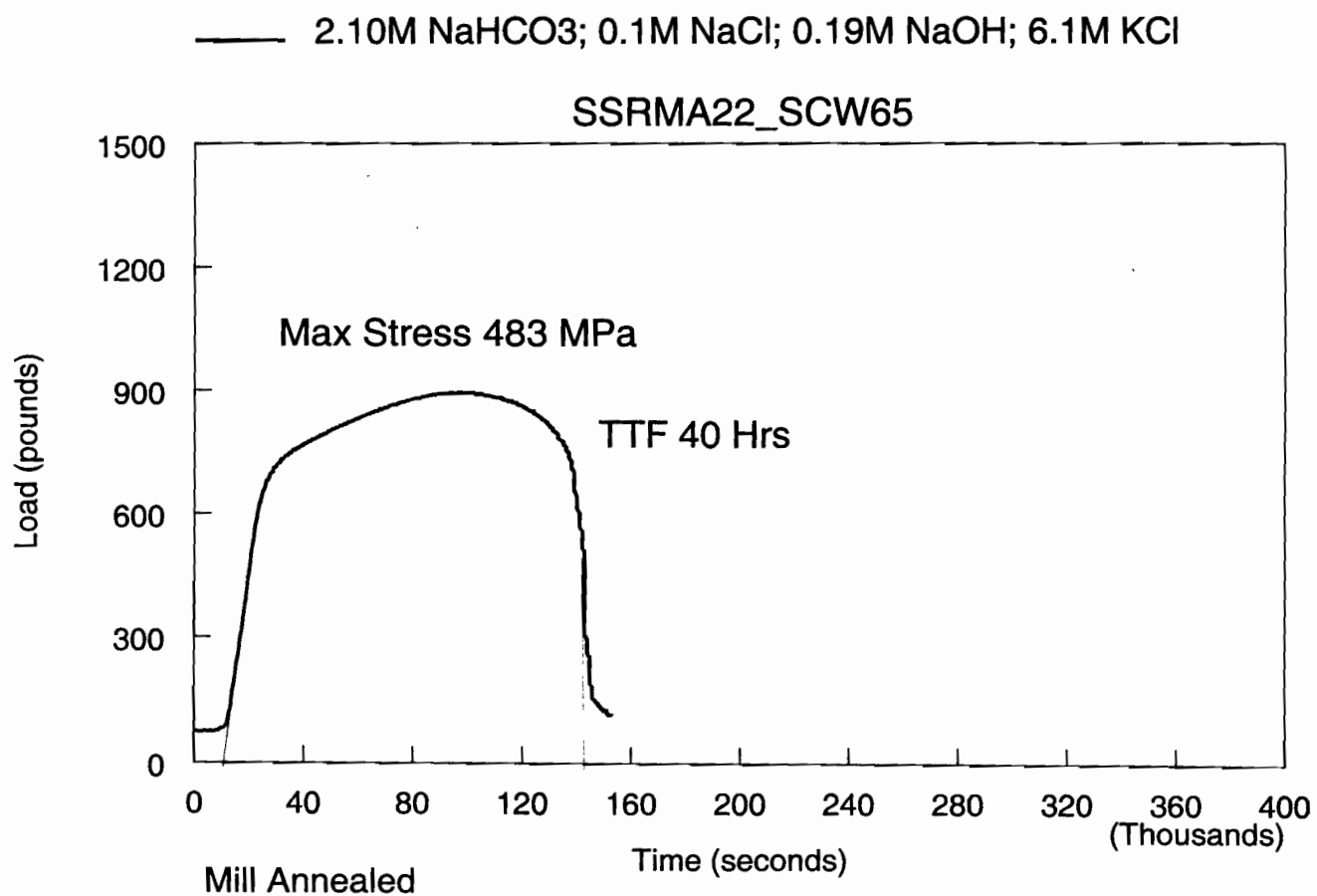
severe secondary cracking - brittle failure

$$E^0 = 3.2 \times 10^{-6} S^{-1}$$

370 6/27/06 Test SEMA 22-SCW65

Walter J. Maschowski
 11/21/05

Slow Strain Rate Test



$$12.9 \text{ cm} = 360 \text{ kg}$$

$$4.75 \text{ cm} = 27907 \times 4.75 = 36.8 \text{ h}$$

$$t_f / t_{f \text{ air}} = 0.51$$

$$P_{\text{max}} / P_{\text{max air}} = 483 / 727 = 0.66$$

Walter J. MacKowski
11/21/05

SLOW STRAIN RATE TEST

Objective: see page # 20

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

mill annealed - not welded
TIT # 2277-3-3266 ^{BK} 6/27/06

Solution:

ambient air

Reagents measured with	Model:	SN:
	Cal:	Due:
Counter Electrode:	Reference Electrode:	
	Cal Check v SCE :	
	DVM: SN: Cal: Due:	
Initial pH:	pH Meter: SN: Cal: Due:	
Final pH:	pH electrode: SN:	
Gas:	Ecorr:	
Eapplied:	Potentiostat: SN:	
DVM: SN:	Cal: Due:	
T/C or Thermometer:	SN: Cal: Due:	

Specimen Visual:

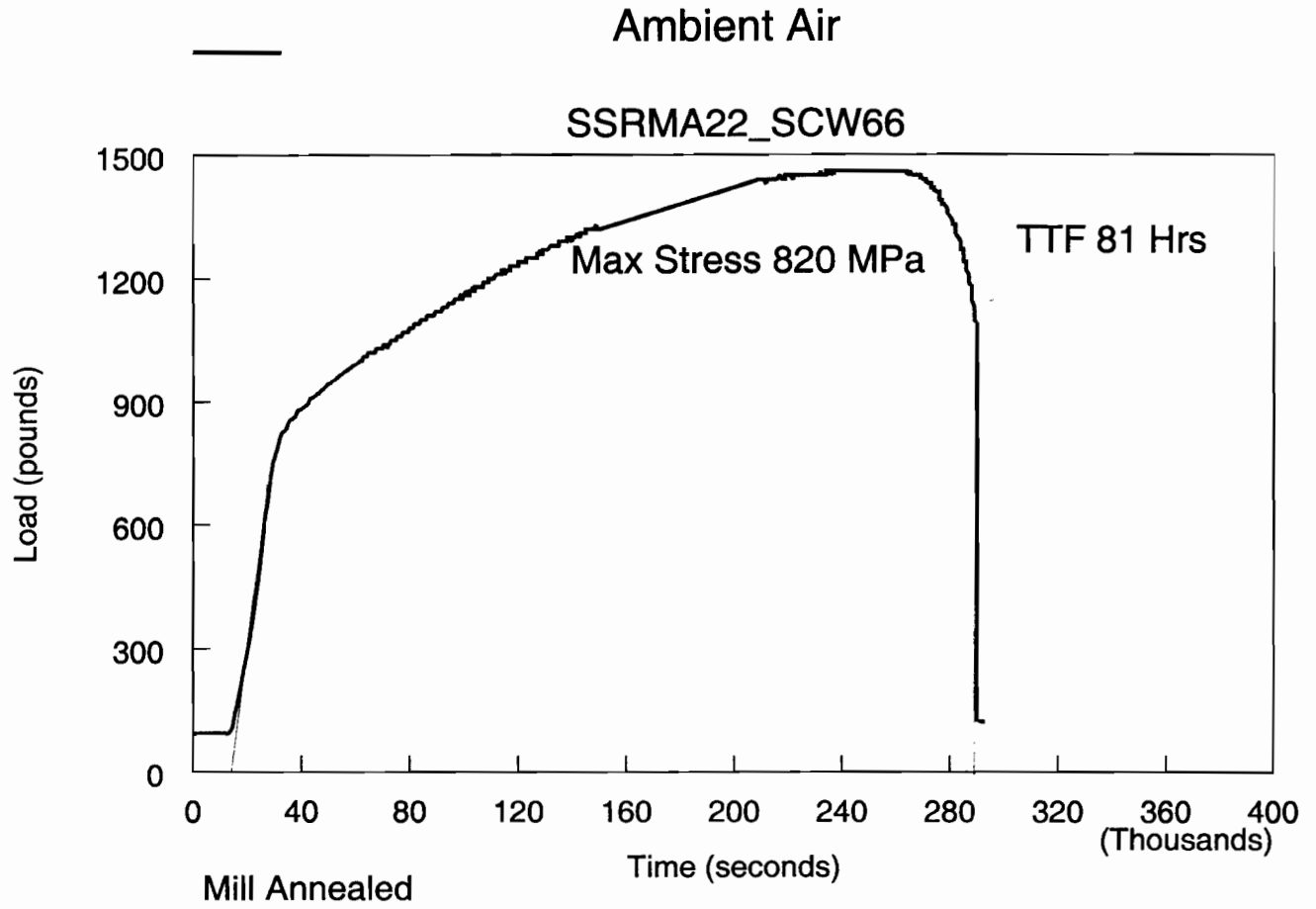
ductile failure

$E^0 = 3.2 \times 10^{-6} S^{-1}$

DMA
6/7/06 Test SSRMA22-SCW66

Walter J. Machowski
11/28/05

Slow Strain Rate Test



14.3 cm = 400 ks

9.8 cm = 2741265 = 76.1 h

Walter J. Marchinski
11/28/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution:

mill annealed - not welded
 HT# 2277-3-3266 BMO 6/27/01

ambient air

Reagents measured with	Model:	SN:
	Cal:	Due:
Counter Electrode:	Reference Electrode:	
	Cal Check v SCE :	
	DVM: SN:	Cal: Due:
Initial pH:	pH Meter:	SN: Cal: Due:
Final pH:	pH electrode:	SN:
Gas:	Ecorr:	
Eapplied:	Potentiostat:	SN:
DVM: SN:	Cal:	Due:
T/C or Thermometer:	SN	
	Cal:	Due:

Specimen Visual:

ductile failure
computer glitch - lost all data
for ~ 1/2 of test

$\epsilon^0 = 3.2 \times 10^{-6} \text{ s}^{-1}$

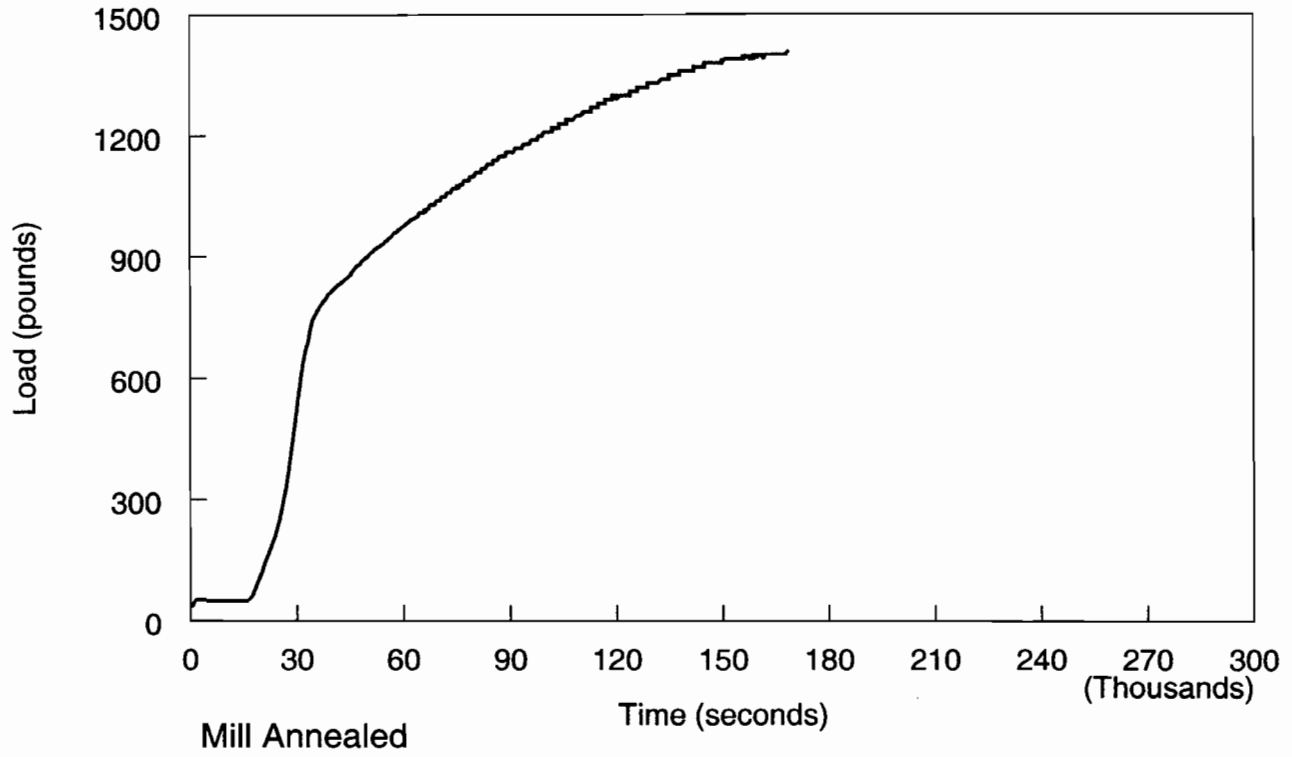
PKP 6/27/01 Test SSRMA 22 - SCW 60

Walter J. Marchowski
11/28/05

Slow Strain Rate Test

Ambient Air

SSRMA22_SCW60



Walter J. MacKowski
11/28/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: $\times \frac{1}{2}$ L *mill annealed - not welded*
 HIT # 2277-3-3266 ^{Bko} 6/27/06

0.5M NaCl 14.66g Lot # 051510
 0.38M NaNO₃ 16.14g Lot # 020809
 NaHCO₃ 48.13g Lot # 050282

Reagents measured with Model: ORION 5 SN: 2883
 Cal: 7/12/05 Due: 1/12/06

Counter Electrode: Pt flag Reference Electrode: Ag/AgCl 3M KCl
 Cal Check v SCE: $\Delta 3.2$ mV
 DVM: SN: 73850993 Cal: 1/17/05 Due: 2/9/06

Initial pH: 8.32 pH Meter: ORION SN: 2330 Cal: 7/15/05 Due: 7/25/06
 Final pH: 9.81 pH electrode: 15-620-296 SN: 14065196P

Gas: N₂ (99.999%) Ecorr: ~~-2~~ -260mV
 3/22/06

Eapplied: +415mV Potentiostat: ESC 440-2 SN: 9209138

DVM: SN: 73850992 Cal: 1/17/05 Due: 2/9/06

T/C or Thermometer: SN 0003
 Cal: 5/19/05 Due: 1/18/05

Specimen Visual:

much secondary cracking - brittle failure

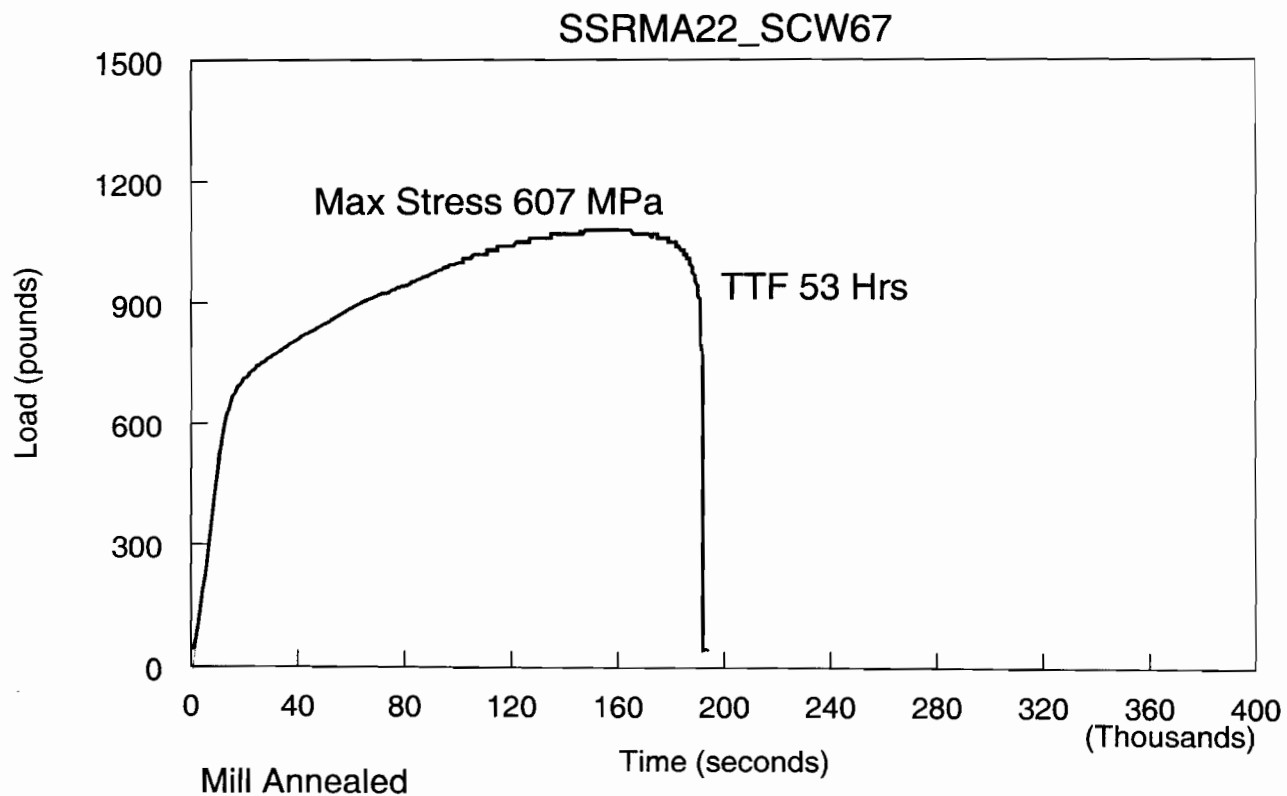
$$E^0 = 3.2 \times 10^{-6} S^{-1}$$

^{Bko} 6/27/06 Test SSRMA22 - SW67

Walter J. Machowski
 12/8/05

Slow Strain Rate Test

— 0.5M NaCl; 0.38M NaNO₃; NaHCO₃ as in SCW



$$13.95 \text{ cm} = 400 \text{ ks}$$

$$6.68 \text{ cm} = 191541 \text{ s} = 53.2 \text{ h}$$

Walter J. Machowski
12/8/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: x 1/2 L

mill annealed - not welded
 HT# 2277-3-3266 ^{B10} 6/21/06

0.5M NaCl 14.61g Lot # 051510
 0.19M NaNO₃ 8.07g Lot # 020809
 NaHCO₃ 48.20g Lot # 050282

Reagents measured with

Model: OHAUS SN: 2883
 Cal: 7/12/05 Due: 1/12/06

Counter Electrode:

Pt flag

Reference Electrode: Ag/AgCl 3M Cl
 Cal Check v SCE: $\Delta 30$ mV
 DVM: SN: 73980493 Cal: 2/11/05 Due: 2/19/06

Initial pH: 7.62 pH Meter: ORION SN: 2930 Cal: 7/25/05 Due: 7/25/06
 Final pH: 9.97 pH electrode: 13-620-296 SN: 14065196 P

Gas: N₂ (99.999%) Ecorr: -235 mV

Eapplied: +415 mV Potentiostat: ESC 440-2 SN: 9209138

DVM: SN: 73850993 Cal: 1/17/05 Due: 2/19/06

T/C or Thermometer: SN 0003
 Cal: 5/19/05 Due: 1/18/05

Specimen Visual:

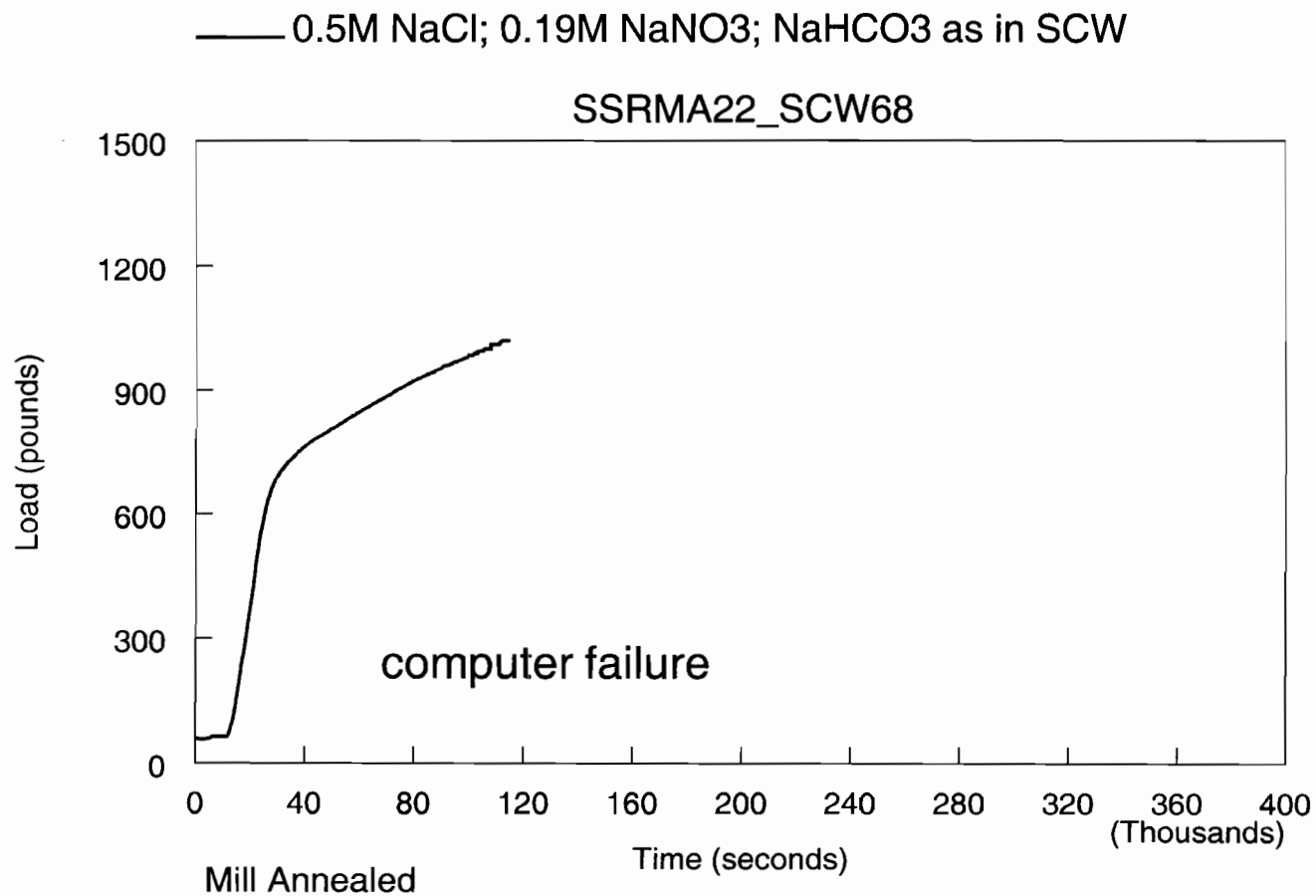
secondary cracking - brittle failure

$$\epsilon^0 = 3.2 \times 10^{-6} \text{ s}^{-1}$$

^{B10} 4/27/06 Test SSRMA22-SCW68

Walter J. Machowski
 12/12/05

Slow Strain Rate Test



Walter J. Markowski
12/12/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: $\approx 1/2$ L *mill annealed - not welded*
 HT# 2277-3-3266 ^{BL} 6/27/06

0.5M NaCl 14.58g Lot # 051570
 NaHCO₃ 48.22g Lot # 050282

Reagents measured with Model: *ORION* SN: 2883
 Cal: 7/12/05 Due: 1/12/06

Counter Electrode: *Pt flag* Reference Electrode: *Ag/AgCl 3mCl*
 Cal Check v SCE: $\Delta 36mV$
 DVM: SN: *73980193* Cal: *2/19/05* Due: *2/19/06*

Initial pH: *7.05* pH Meter: *ORION* SN: *2330* Cal: *7/24/05* Due: *7/24/06*
 Final pH: *10.10* pH electrode: *13-650-290* SN: *14005196 P*

Gas: *N₂ (99.999%)* Ecorr: *-347mV*

Eapplied: *+250mV* Potentiostat: *FSC 440-2* SN: *9209138*

DVM: SN: *73850992* Cal: *1/17/05* Due: *2/9/06*

T/C or Thermometer: SN *003* Cal: *5/19/05* Due: *1/18/05* ^{BL} 6/27/06

Specimen Visual:

looks like ductile failure

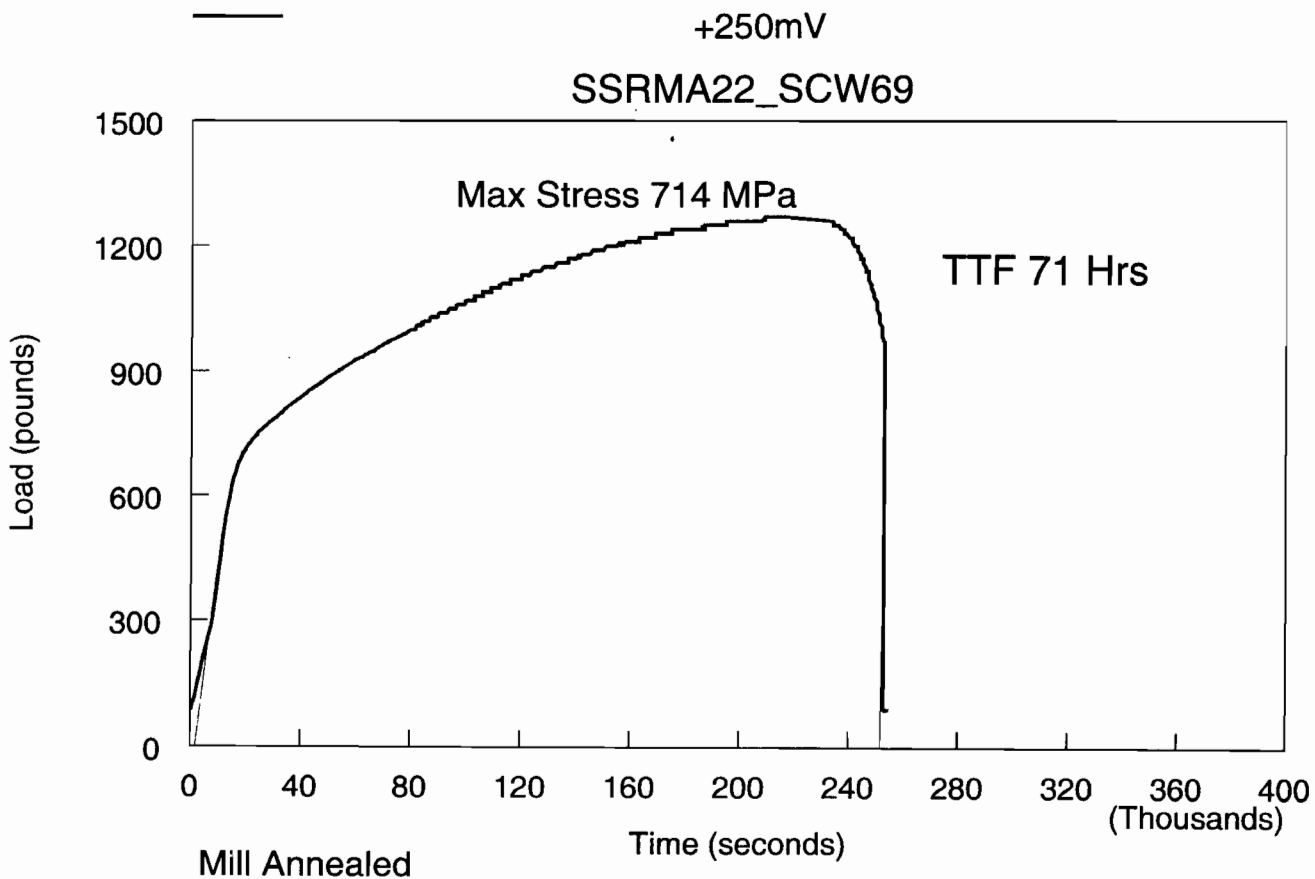
$$\epsilon^0 = 3.2 \times 10^{-6} \text{ s}^{-1}$$

^{BL} 6/27/06 Test SSRMA22 - SCW69

Walter J. MacKowski
12/19/05

Slow Strain Rate Test

0.5M NaCl; NaHCO₃ as in SCW



$$14.3 \text{ cm} = 400 \text{ ks}$$

$$9.0 \text{ cm} = 251748 \text{ s} = 69.9 \text{ h}$$

Walter J. MacKowski
12/19/05

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: $\approx \frac{1}{2} L$ mill annealed - not welded
 HT# 2277-3-3266 ⁸¹⁰ 6/27/04

0.5M NaCl 14.61g Lot # 051510
 0.19M NaNO₃ 8.06g Lot # 020809
 NaHCO₃ 48.20g Lot # 050282

Reagents measured with Model: OHAUS SN: 2883
 Cal: 7/12/05 Due: 1/12/06

Counter Electrode: Pt flag Reference Electrode: Ag/AgCl 3M Cl
 Cal Check v SCE: $\Delta 36 mV$
 DVM: SN: 73850493 Cal: 2/9/05 Due: 2/9/06

Initial pH: 7.74 pH Meter: ORION SN: 2330 Cal: 7/25/05 Due: 7/26/06
 Final pH: 9.39 pH electrode: 13-620-296 SN: 14065196 P

Gas: N₂ (99.999%) Ecorr: ~~+415mV~~ -243mV
 Applied: +415mV Potentiostat: WDM ⁸¹⁰ 6/27/04 SN: 9309138
 E5C 440-2
 DVM: SN: 73850592 Cal: 1/17/05 Due: 2/9/06

T/C or Thermometer: SN C98-106
 Cal: 4/27/05 Due: 4/27/06

Specimen Visual:
 secondary cracking - failure looks
 somewhat ductile - but probably brittle

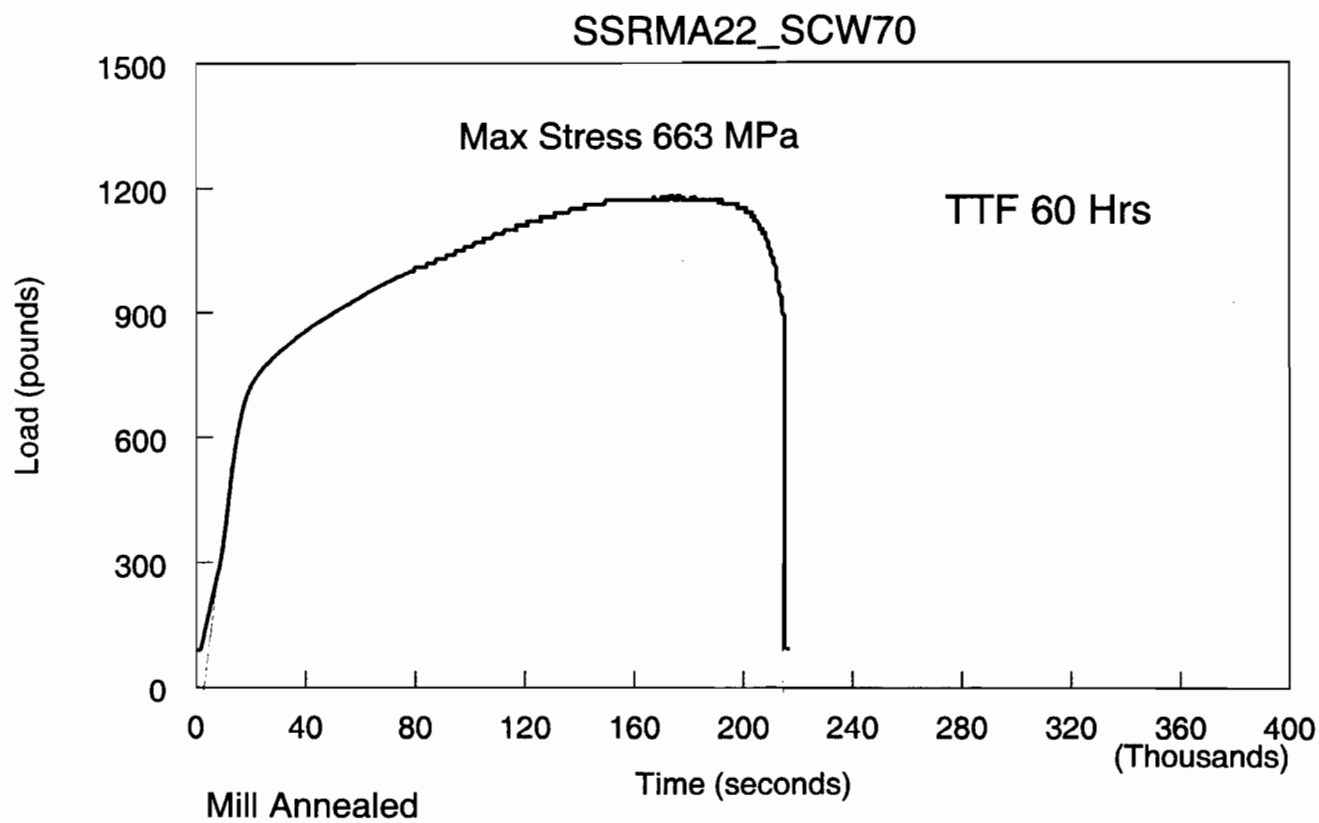
$$\epsilon^0 = 3.2 \times 10^{-6} s^{-1}$$

⁸¹⁰ 6/27/06 Test SSRMA22 - SCW70

Walter J. MacKowski
 12/19/05

Slow Strain Rate Test

0.5M NaCl; 0.19M NaNO₃; NaHCO₃ as in SCW



$$14.3 \text{ cm} = 400 \text{ kg}$$

$$7.6 \text{ cm} = 212587 \text{ sec} = 59.1 \text{ h}$$

Walter J. Machowski
12/19/05

SLOW STRAIN RATE TEST

Objective: see page # 70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: $\times \frac{1}{2} L$

0.125M NaCl 3.65g Lot# 052761
 0.19M NaOH 3.84g Lot# 033972
 2.10M NaHCO₃ 88.29g Lot# 050282

mill annealed - not welded
 HT# 2277-3-3266 6/27/06

Reagents measured with

Model: OXPHUS SN: 3883
 Cal: 7/12/05 Due: 1/12/06

Counter Electrode:

Pt flag

Reference Electrode: Ag/AgCl 3MCl
 Cal Check v SCE: $\Delta 35mV$
 DVM: SN: 79380493 Cal: 2/9/05 Due: 2/9/06

Initial pH: 8.65 pH Meter: ORION SN: 2330 Cal: 1/25/05 Due: 7/26/06
 Final pH: 10.04 pH electrode: 13-620-296 SN: 14065196 P

Gas: N₂ (99.999%) Ecorr: $-254mV$

Eapplied: $+415mV$ Potentiostat: ESC 440-2 SN: 9209138

DVM: SN: 73850992 Cal: 1/17/05 Due: 2/9/06

T/C or Thermometer: SN C98-106 Cal: 4/27/05 Due: 4/27/06

Specimen Visual:

secondary cracking
 looks like little fan

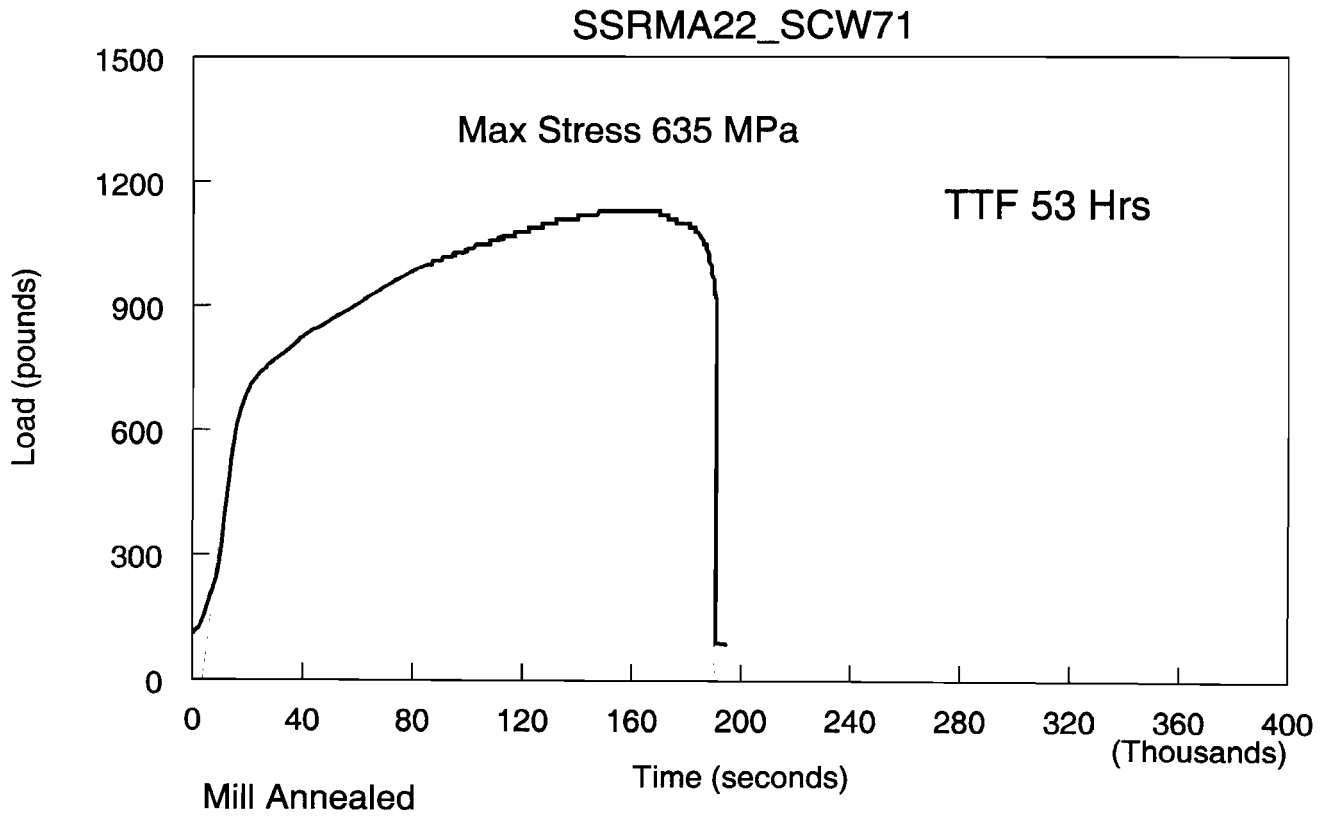
$$E^0 = 3.2 \times 10^{-6} S^{-1}$$

8/14
 6/27/06 Test SSRM A22-SCW71

Walter J. Mackowski
 1/4/06

Slow Strain Rate Test

0.125M NaCl; 0.19M NaNO₃; 2.10M NaHCO₃



$$14.3 \text{ cm} = 400 \text{ Ks}$$

$$6.7 \text{ cm} = 187413 \text{ s} = 52.1 \text{ h}$$

$$t_f / t_f^{\text{air}} = 52.1 / 71.5 = 0.73$$

Walter J. Macintosh
1/4/06

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: $\times \frac{1}{2} L$ mill annealed - not welded
HT# 2277-3-3266 ^{Eleo} 6/27/060.19M NaNO_3 8.08g Lot# 020809
2.10M NaHCO_3 88.50g Lot# 050282Reagents measured with Model: OHAUS SN: 2883
Cal: 7/12/05 Due: 1/12/06Counter Electrode: Pt flag Reference Electrode: Ag/AgCl 3mCl
Cal Check v SCE: $\Delta 36mV$
DVM: SN: 79380993 Cal: 2/9/05 Due: 2/9/06Initial pH: 7.69 pH Meter: ORION SN: 2330 Cal: 1/25/05 Due: 1/25/06
Final pH: 9.68 pH electrode: 13-620-296 SN: 14065196PGas: N_2 (99.999%) Ecorr: $-246mV$ Applied: $+415mV$ Potentiostat: ESC 440-2 SN: 9209138

DVM: SN: 73850992 Cal: 1/17/05 Due: 2/9/06

T/C or Thermometer: SN C98-106
Cal: 4/27/05 Due: 4/27/06

Specimen Visual:

some secondary cracking
looks somewhat brittle fracture

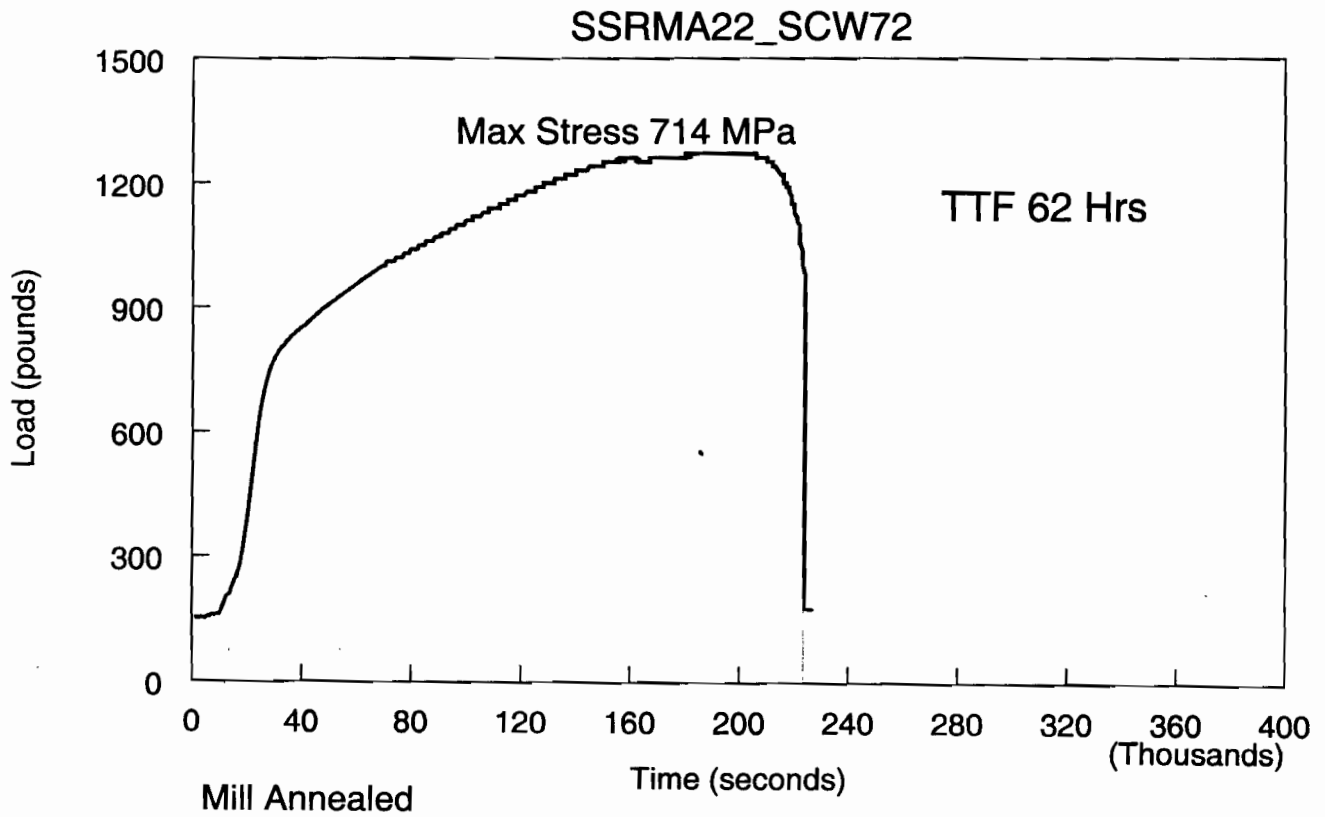
$$\dot{\epsilon}^0 = 3.2 \times 10^{-6} \text{ s}^{-1}$$

4/27/06 Test SSRMA22-SCW72

Walter J. Markowski
1/9/06

Slow Strain Rate Test

0.19M NaNO₃; 2.10M NaHCO₃



14.3cm = 400 Ks

7.6cm = 212587 s = 59.1h

Walter J. Macchieschi
1/9/06

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: X 1/2 L

mill annealed - not welded
HT # 2277-3-3266 ^{B10} 6/27/04

0.5M NaCl	14.61g	Lot # 052761
0.5M NaNO ₃	21.22g	Lot # 020809
2.10M NaHCO ₃	88.20g	Lot # 050282

Reagents measured with

Model: OHAUS SN: 2883
Cal: 7/12/05 Due: 1/12/06

Counter Electrode:

Pt flag

Reference Electrode: Ag/AgCl 3M Cl

Cal Check v SCE: Δ 37mV

DVM: SN: 79380493 Cal: 2/19/05 Due: 2/19/06

Initial pH: 7.66 pH Meter: ORION SN: 2330 Cal: 7/12/05 Due: 7/12/06

Final pH: 9.44 pH electrode: 13620296 SN: 14065796

Gas: N₂ (99.999%) Ecorr: -221mV

Applied: +415mV

Potentiostat: FSC 440-2 SN: 9209138

DVM: SN: 73850992

Cal: 1/17/05

Due: 2/19/06

T/C or Thermometer:

SN C98-106

Cal: 4/27/05

Due: 4/27/06

Specimen Visual:

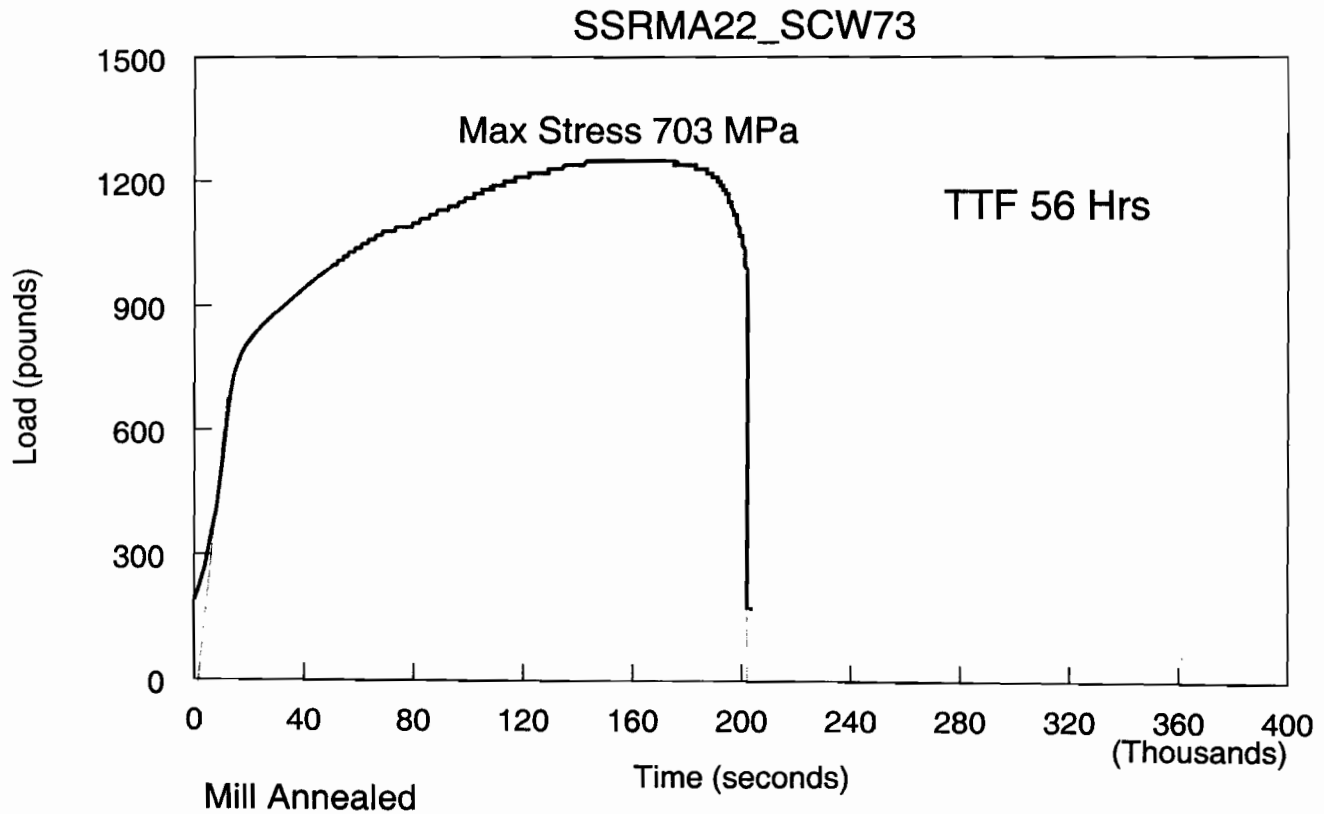
some secondary cracking
somewhat brittle failure

$$i^0 = 3.2 \times 10^{-6} \text{ s}^{-1}$$

B10
6/27/04 Test SSRMA22 - SCW73Walter J. MacKowski
1/11/06

Slow Strain Rate Test

2.10M NaHCO₃ ; 0.5 NaCl; 0.5M NaNO₃



14.3 cm = 400 MS

7.2 cm = 201399 s = 55.9 h

Walter J. MacKowicki
1/11/06

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: $\times \frac{1}{2} L$ *will annealed - not welded*
 HT# 2277-3-3266 ^{SKO} 6/27/06

0.5M NaCl 14.61g Lot # 052761
 2.10M NaHCO₃ 88.31g Lot # 057257

Reagents measured with Model: OHAUS SN: 2883
 Cal: 1/5/06 Due: 7/6/06

Counter Electrode: Pt flag Reference Electrode: Ag/AgCl 3M KCl
 Cal Check v SCE: $\Delta 38 mV$
 DVM: SN: 7935493 Cal: 2/9/05 Due: 2/9/06

Initial pH: 7.78 pH Meter: ORION SN: 2330 Cal: 1/25/05 Due: 1/25/06
 Final pH: 9.06 pH electrode: 13-620-296 SN: 14065196 P

Gas: N₂ (99.999%) Ecorr: -257mV

Eapplied: +415mV Potentiostat: ESC440-2 SN: 9209138

DVM: SN: 73850992 Cal: 1/17/05 Due: 2/9/06

T/C or Thermometer: SN C98-106
 Cal: 4/27/05 Due: 4/27/06

Specimen Visual:

*some secondary cracking
 failure was more brittle than ductile*

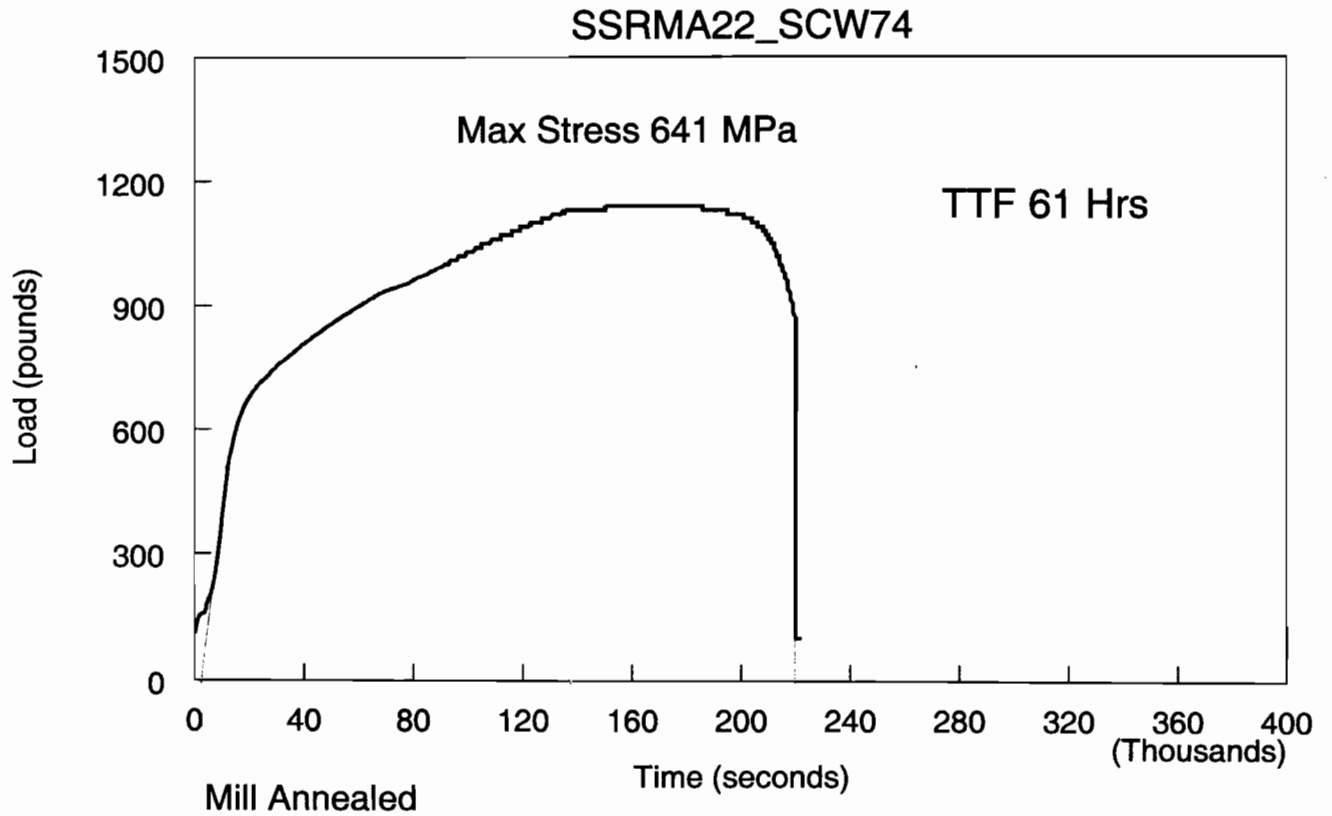
$$\epsilon^0 = 3.2 \times 10^{-6} s^{-1}$$

310
 6/27/06 Test SSMA22 - SCW74

*Walter J. Machrowski
 1/20/06*

Slow Strain Rate Test

2.10M NaHCO₃ ; 0.5 NaCl



$$14.3 \text{ cm} = 400 \text{ ks}$$

$$7.8 \text{ cm} = 218182 \text{ s} = 60.6 \text{ h}$$

Walter J. MacKintosh
1/20/06

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: $X \frac{1}{2} L$

mill annealed - not welded
HT # 2277-3-3266 ^{BIW} 6/27/06

2.10M NaHCO₃ 88.27g Lot # 052757

Reagents measured with Model: *ORION* SN: 2883
Cal: 1/5/06 Due: 7/6/06

Counter Electrode: *Pt flag* Reference Electrode: *Ag/AgCl 3M KCl*
Cal Check v SCE: *0.392V*
DVM: SN: 79380493 Cal: 7/25/05 Due: 7/25/06

Initial pH: 7.79 pH Meter: *ORION* SN: 2330 Cal: 7/25/05 Due: 7/25/06
Final pH: 9.03 pH electrode: *13-620-296* SN: 14065796 P

Gas: *N₂ (99.999%)* Ecorr: -310mV

Eapplied: *+415mV* Potentiostat: *FSC 440-2* SN: 9209138

DVM: SN: 73850992 Cal: 1/17/05 Due: 2/9/06

T/C or Thermometer: SN *C98-106* Due: 4/27/06
Cal: 4/27/05

Specimen Visual:

some secondary cracking - brittle failure

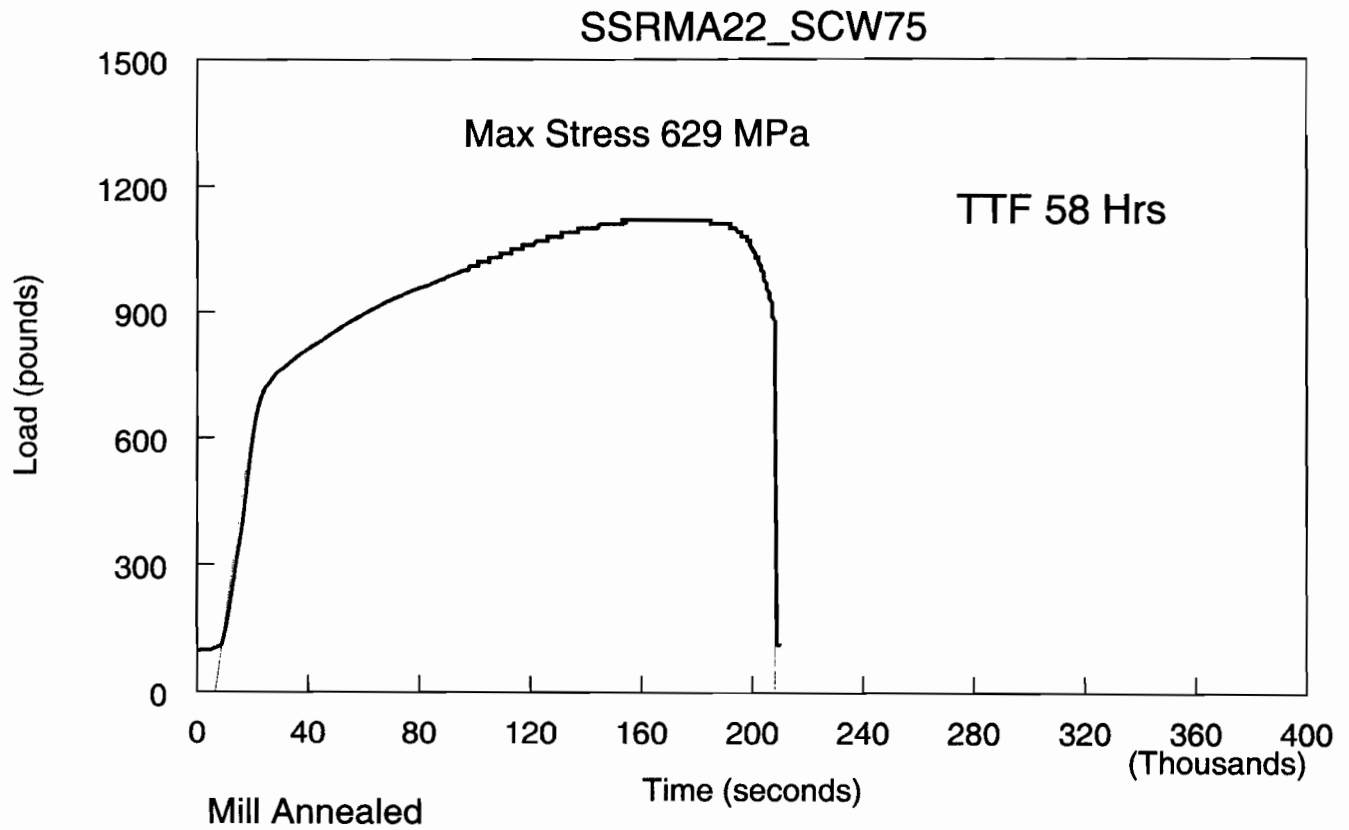
$$i^0 = 3.2 \times 10^{-6} \text{ S}^{-1}$$

^{BIW} 6/27/06 Test SSRMA 22_SCW75

Walter J. Marchinski
1/23/06

Slow Strain Rate Test

2.10M NaHCO₃



14.55cm = 400 ks

7.35cm = 202062s = 56.1h

Walter J. Machowski
1/23/06

SLOW STRAIN RATE TEST

Objective: see page #70

Specimen: MA Alloy 22 SwRI Drawing # 20-03704-042-001

Solution: X 1/2 L

mill annealed - not welded
HT # 2277-3-3266 ⁸⁴⁰ 6/27/06

0.3M NaHCO ₃	12.60g	Lot # 052757
0.5M NaCl	14.57g	Lot # 052761
1.5M KCl	55.70g	Lot # 043820
0.19M NaOH	3.78g	Lot # 033972

Reagents measured with

Model: OHAUS SN: 2883
Cal: 1/5/06 Due: 7/6/06

Counter Electrode:

Pt flag

Reference Electrode: Ag/AgCl 3mCl
Cal Check v SCE: Δ 29mV
DVM: SN: 7880493 Cal: 7/25/05 Due: 7/25/06

Initial pH: 9.62 pH Meter: ORION SN: 2330 Cal: 7/25/05 Due: 7/25/06
Final pH: 10.04 pH electrode: 13-620-296 SN: 14065796 P

Gas: N₂ (99.999%) Ecorr: -280mV

Applied: +415mV Potentiostat: ESC 440-2 SN: 9209138

DVM: SN: 73850992 Cal: 1/17/05 Due: 2/9/06

T/C or Thermometer: SN: C98-106 Cal: 4/27/05 Due: 4/27/06

Specimen Visual:

some secondary cracking

$$E^0 = 3.2 \times 10^{-6} \text{ s}^{-1}$$

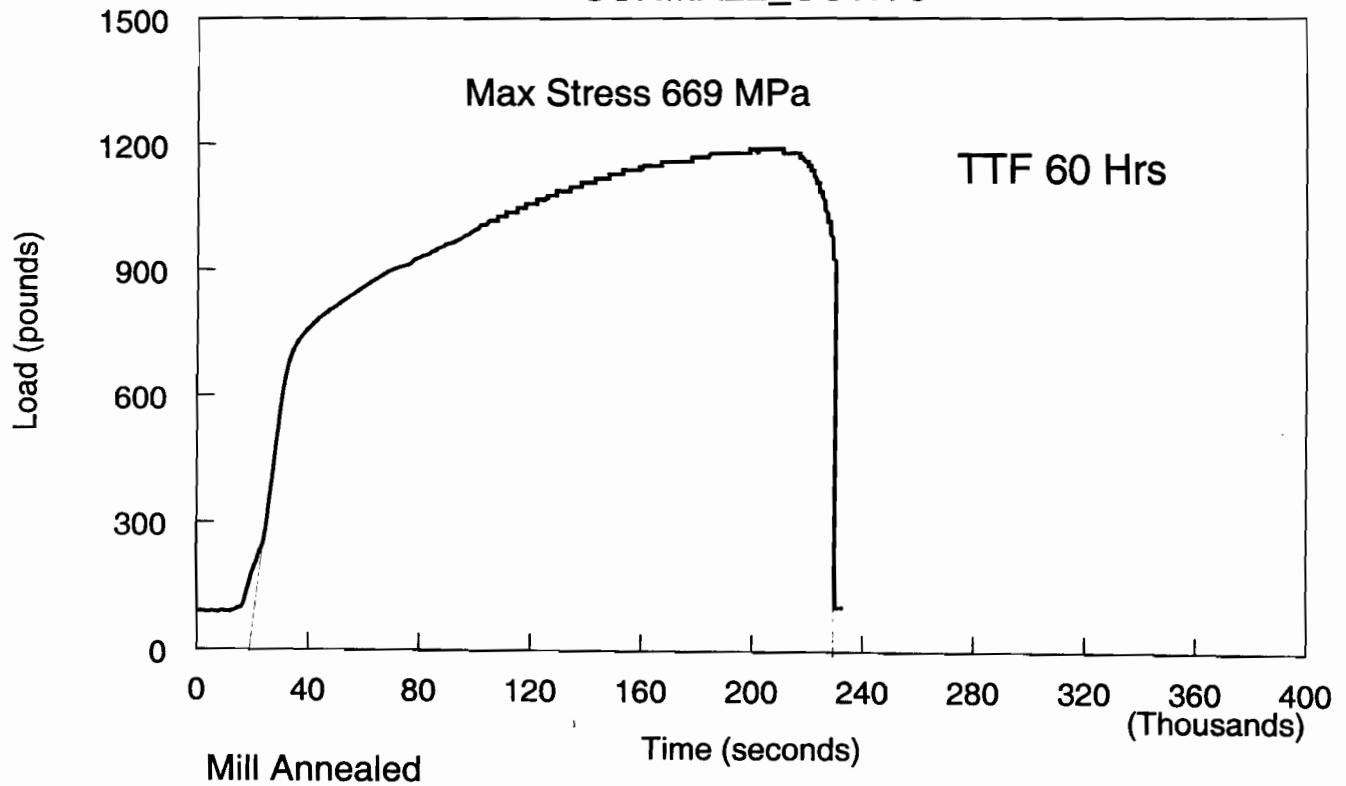
⁸⁴⁰ 6/27/06 Test SSRMA22-SCW76

Nathan J. Marchowski
1/30/06

Slow Strain Rate Test

0.3M NaHCO₃; 0.5M NaCl; 1.5M KCl; .19M NaOH

SSRMA22_SCW76



14.5 cm = 400 ks

7.65 cm = 211034 s = 58.6 h

Walter J. Maclewski
1/30/06

146

From: Bobby Pabalan [rpabalan@cnwra.swri.edu]
Sent: Wednesday, October 12, 2005 4:17 PM
To: 'Ken Chiang'
Cc: 'Yiming Pan'
Subject: solution composition for SCC tests

Ken,

The following is the optimum solution composition (maximum dissolved Cl and total carbonate at 95 C):

NaCl 0.1 mol/kg H₂O
KCl 6.25 mol/kg H₂O
NaHCO₃ 2.10 mol/kg H₂O
NaOH 0.20 mol/kg H₂O.

The calculated pH at 95 C is 8.63. The calculated dissolved concentrations are:

	aqueous mol/kg H ₂ O
K+	6.199
Na+	2.380
Cl-	6.298
Total C	1.648

-bobby

From: Bobby Pabalan [rpabalan@cnwra.swri.edu]
Sent: Friday, October 07, 2005 4:56 PM
To: 'Ken Chiang'
Cc: 'Yiming Pan'
Subject: carbonate concentration of evaporated YM porewaters

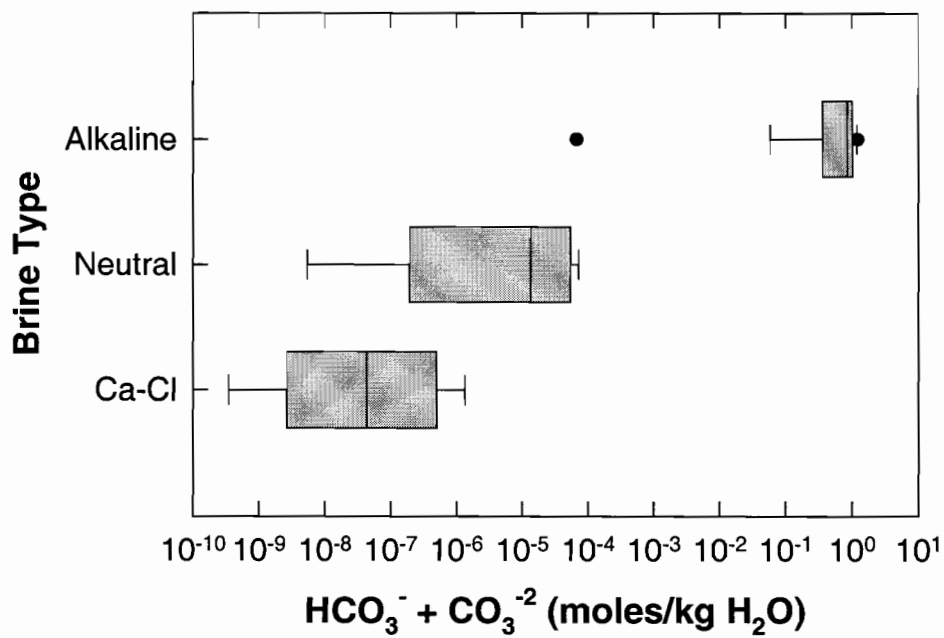
Ken,

Per your request, attached is a file showing the range in calculated carbonate concentrations for evaporated YM porewaters.

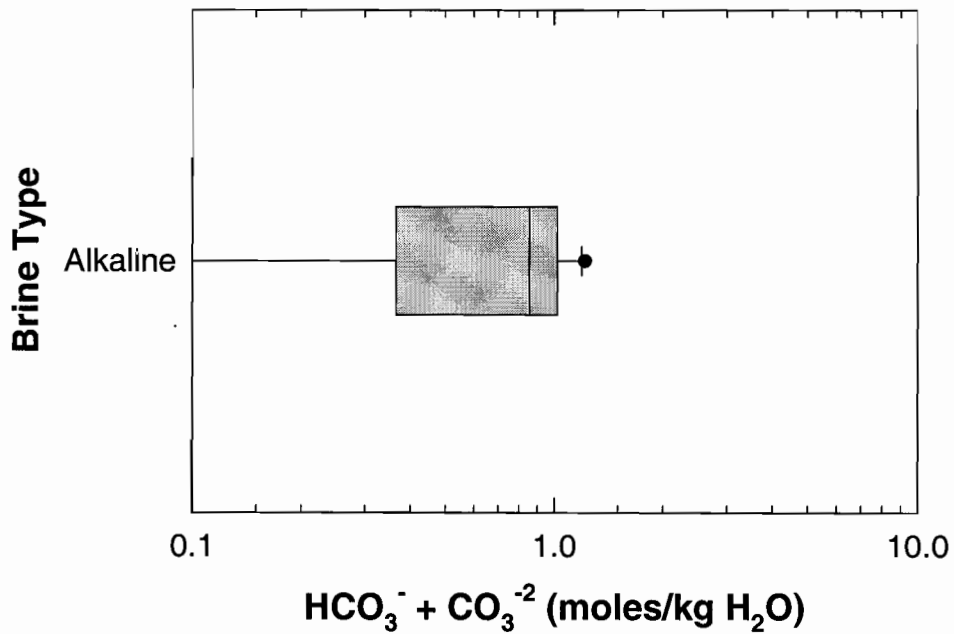
--bobby

Ken Chiang 6/1/06

Carbonate Conc. (at T=110 °C) of Evaporated YM Waters



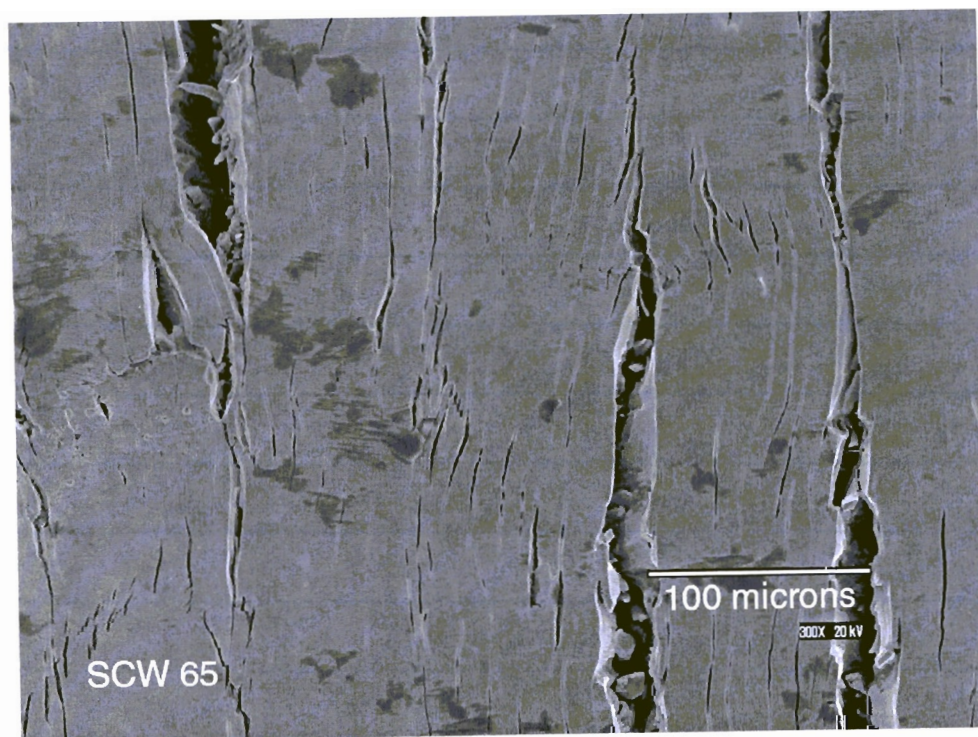
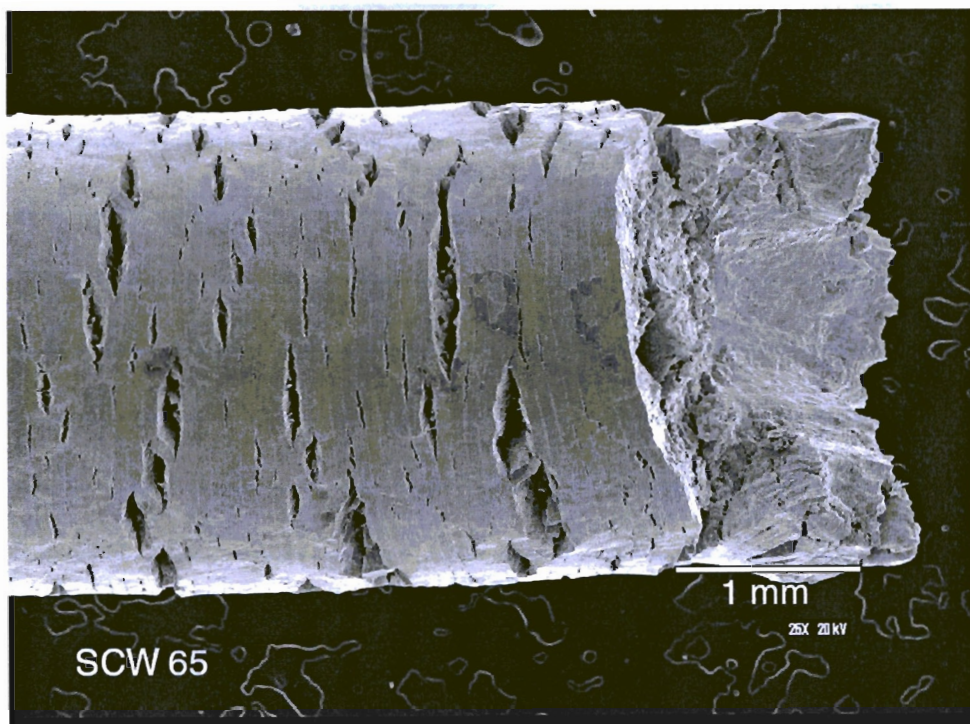
Carbonate Conc. (at T=110 °C) of Evaporated YM Waters



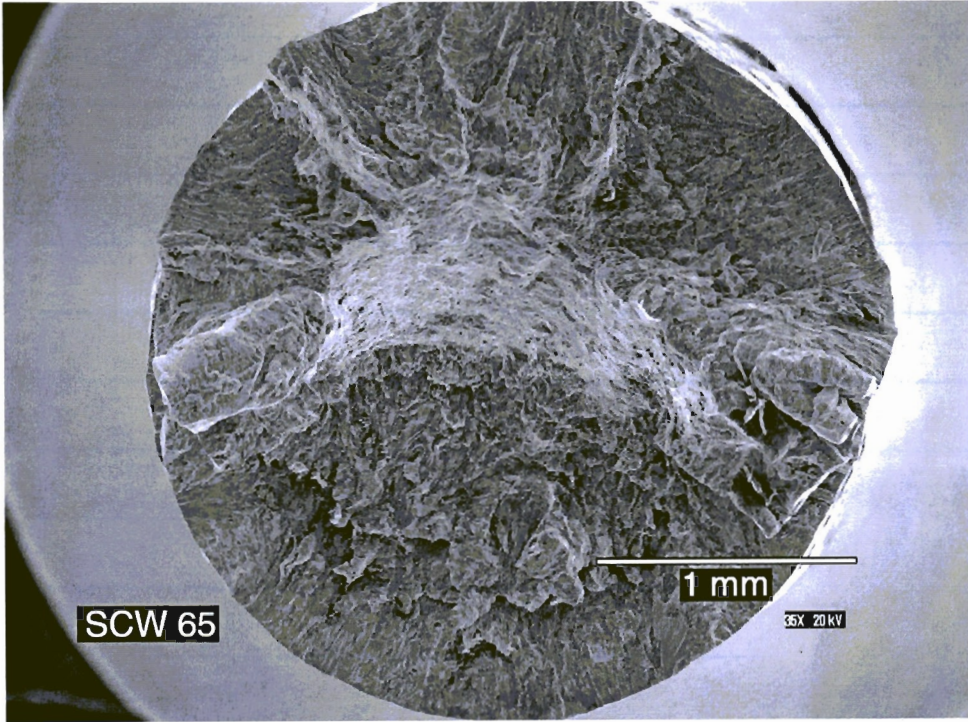
K. T. Chou
6/1/06

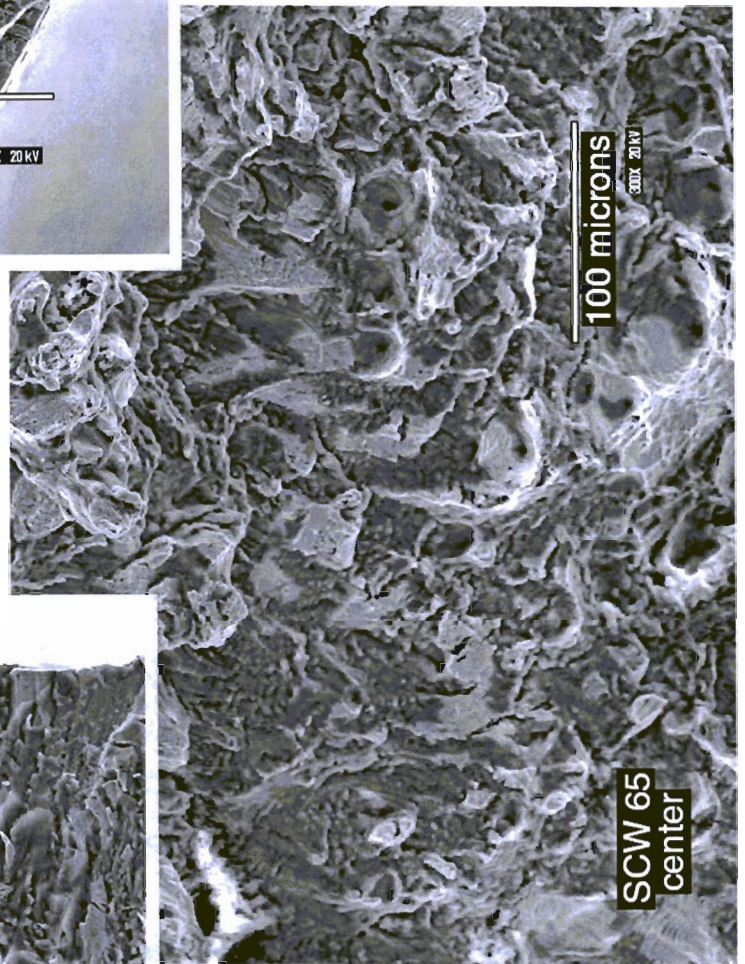
148

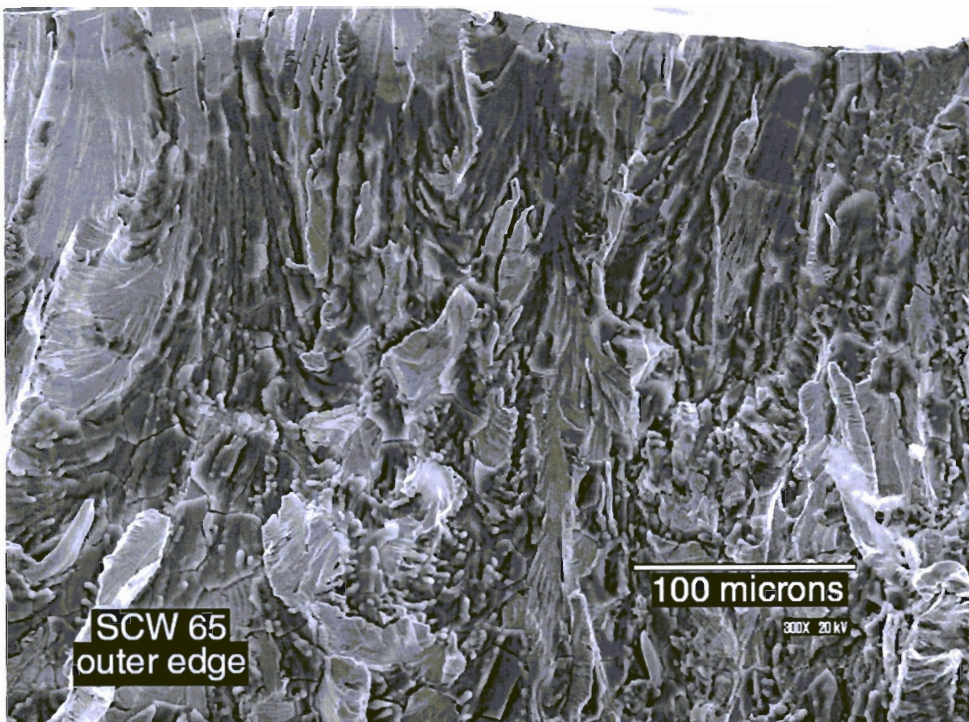
2.1 M HCO_3^- + 0.1 M NaCl + 0.1 M KCl, 400 MVsec T_f 36.8h



R. T. Chiang
6/1/06

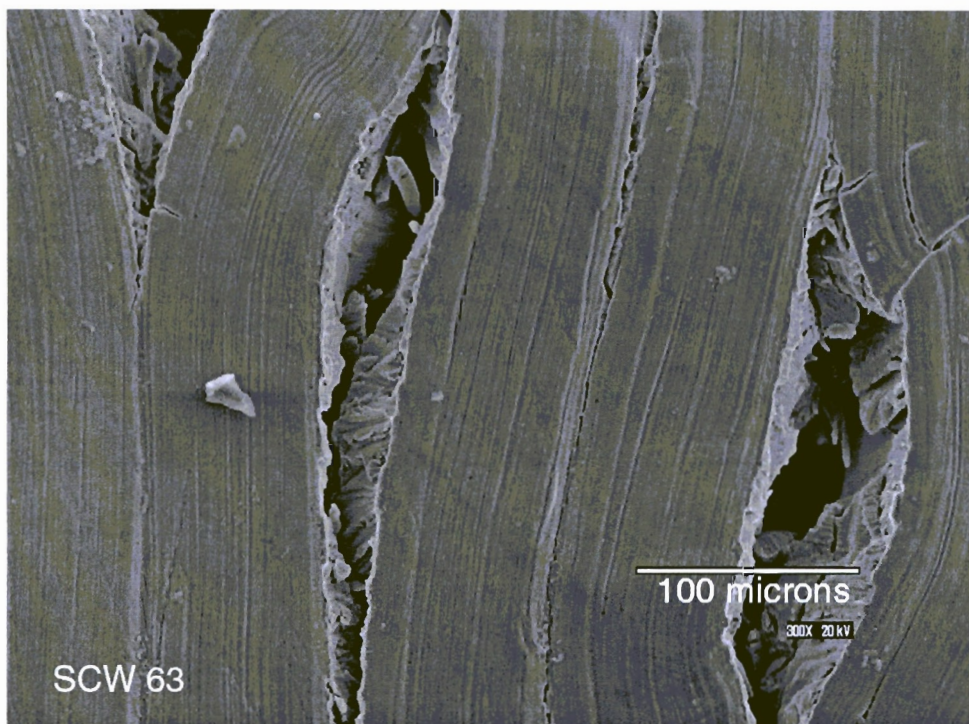
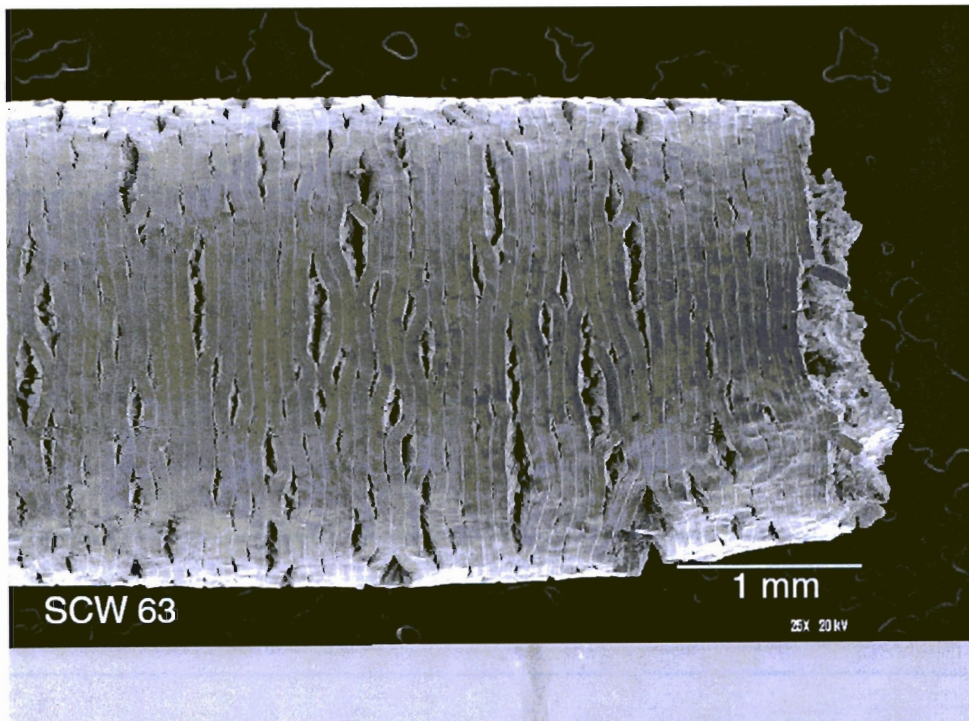




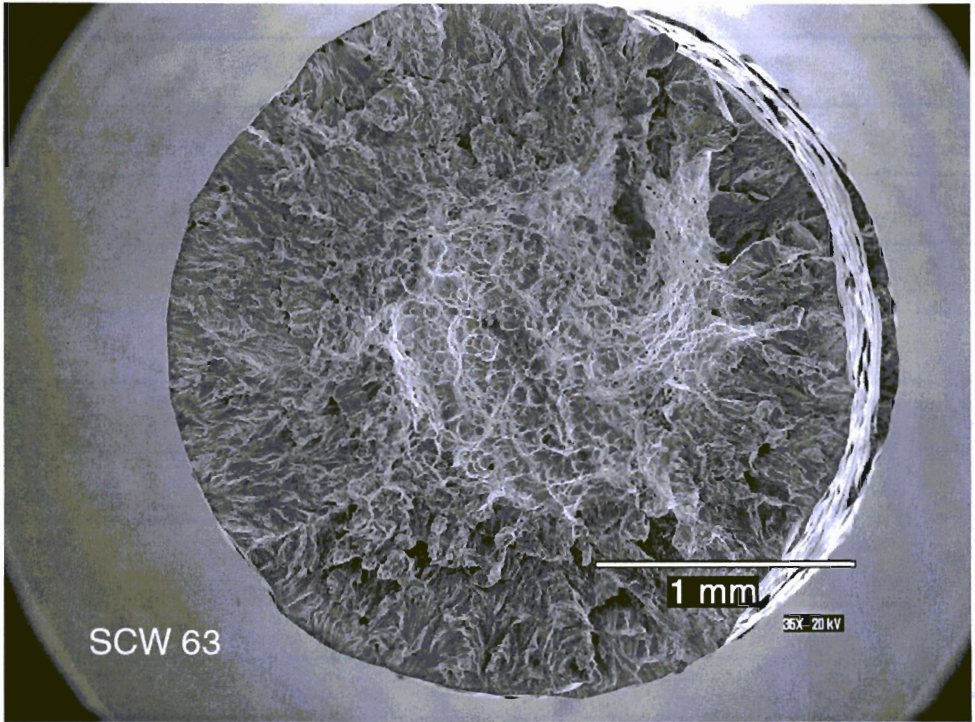


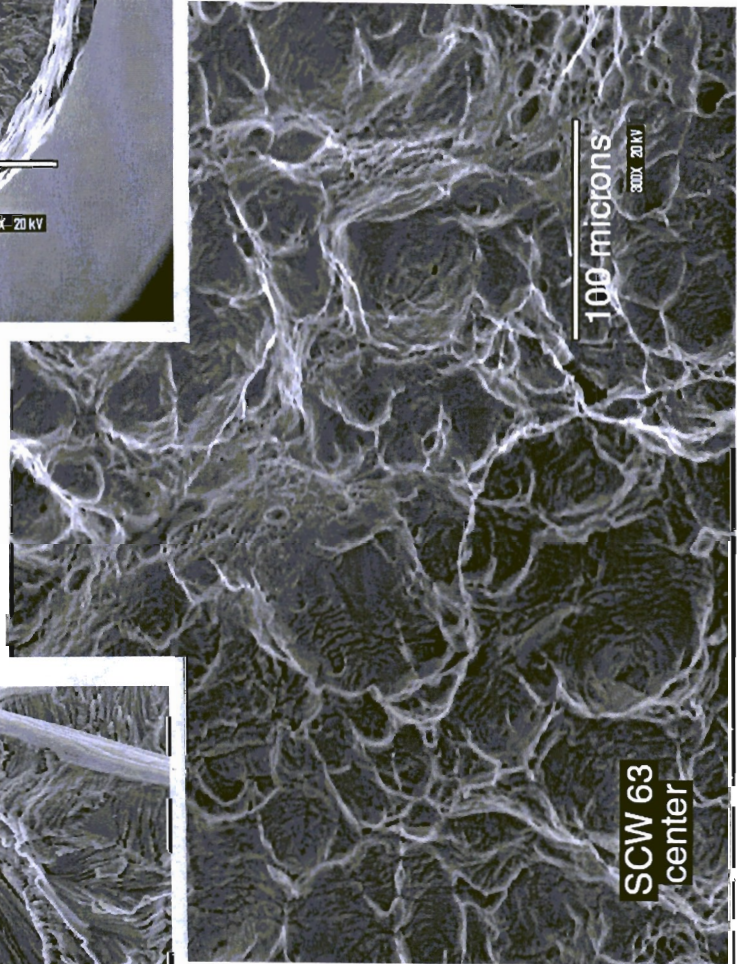
K. J. Chui 6/1/06

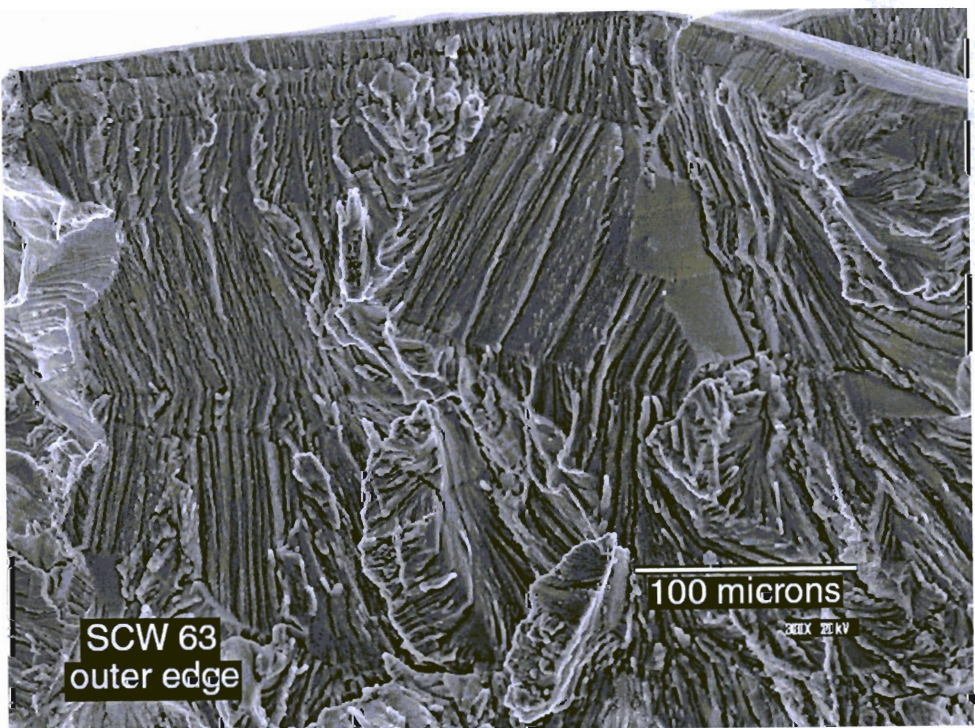
SCW 63 0.25M NaCl, 2.1M NaHCO₃



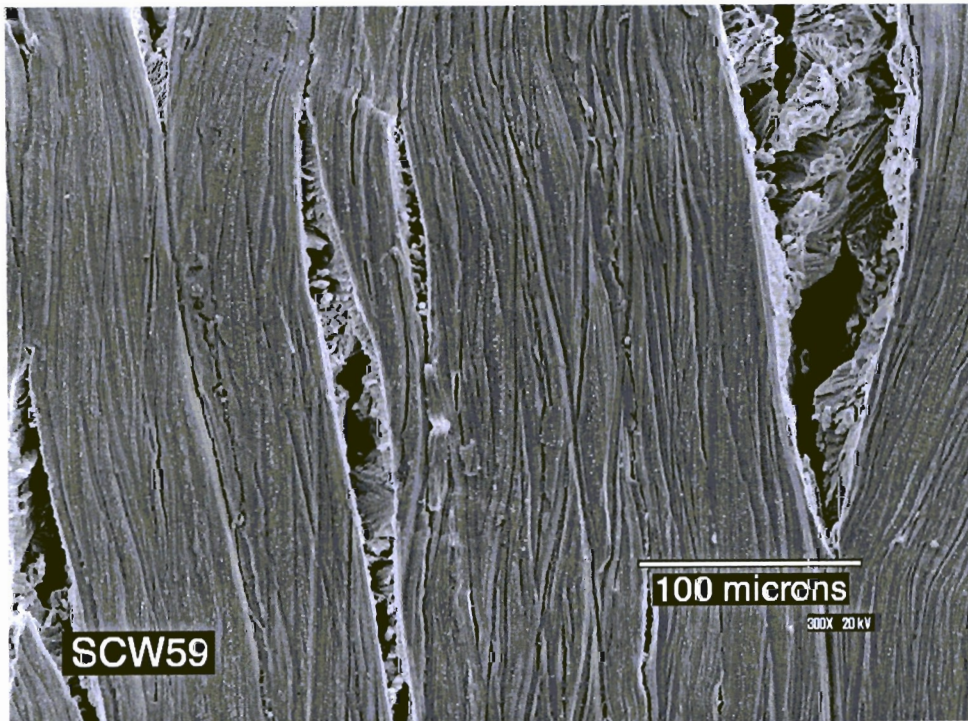
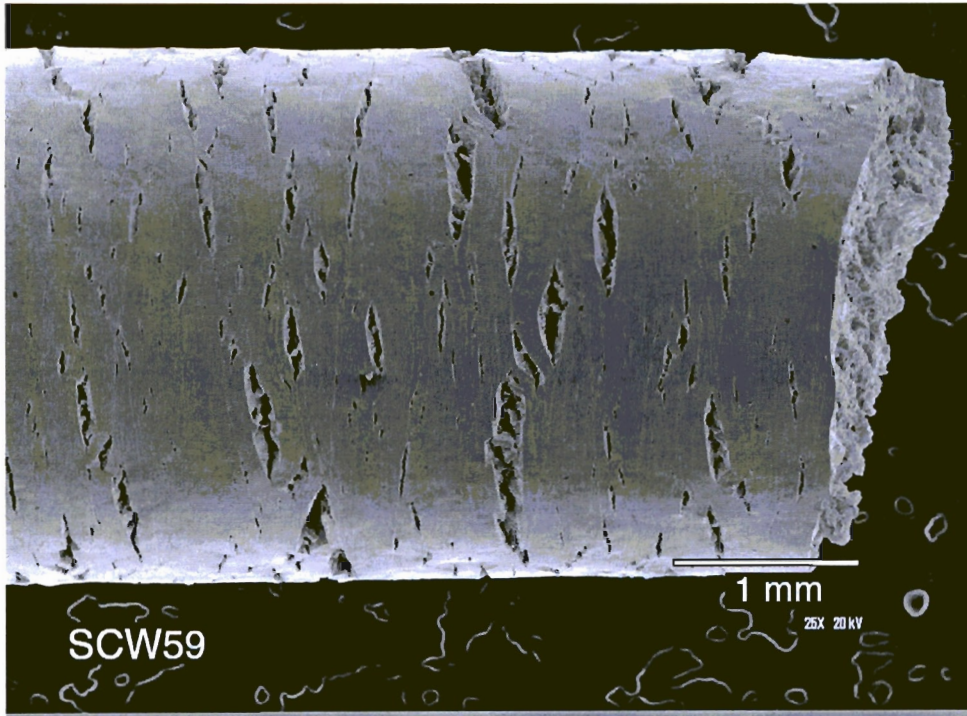
K-T. Ching
6/1/06



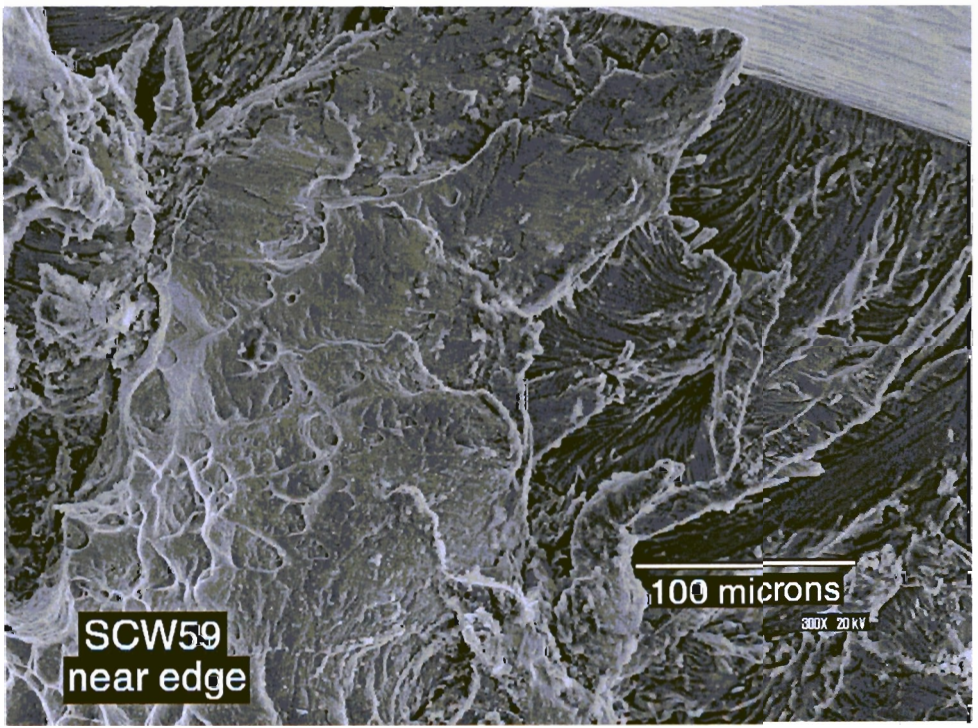
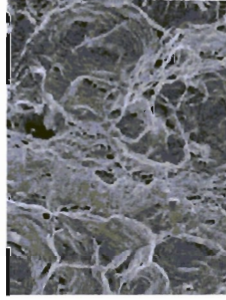
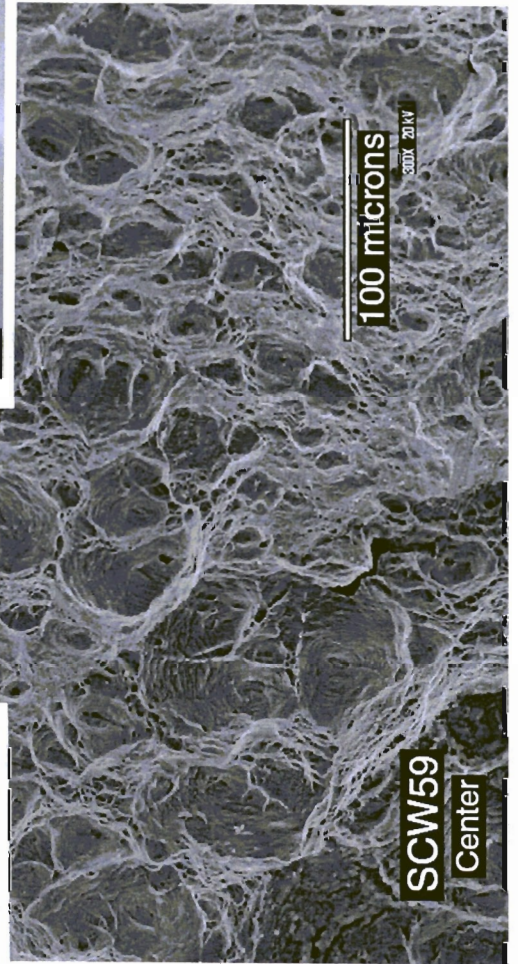
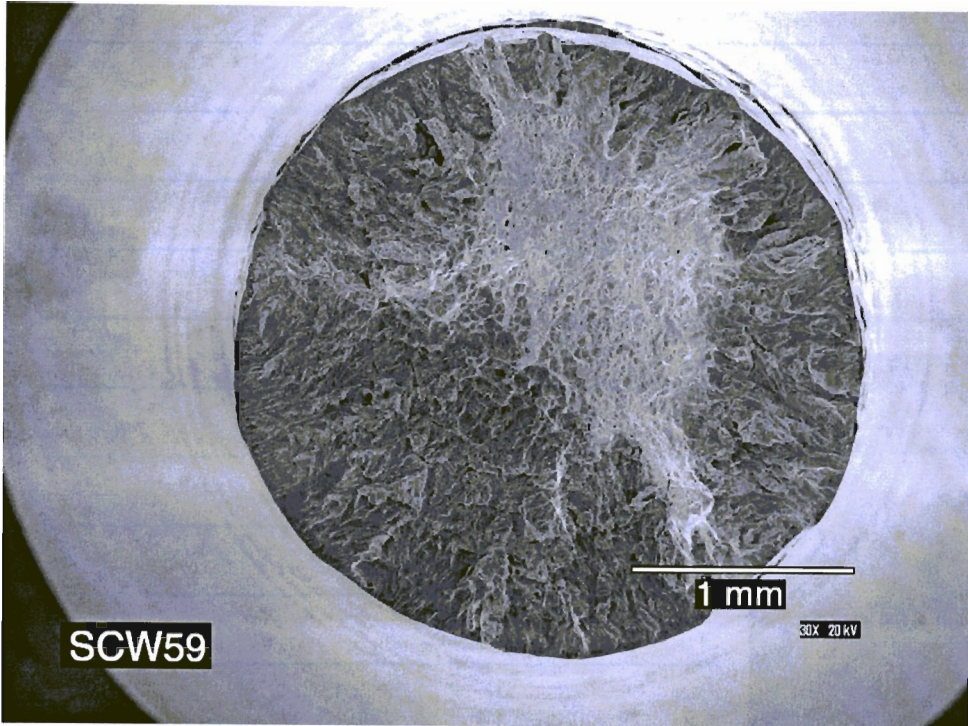




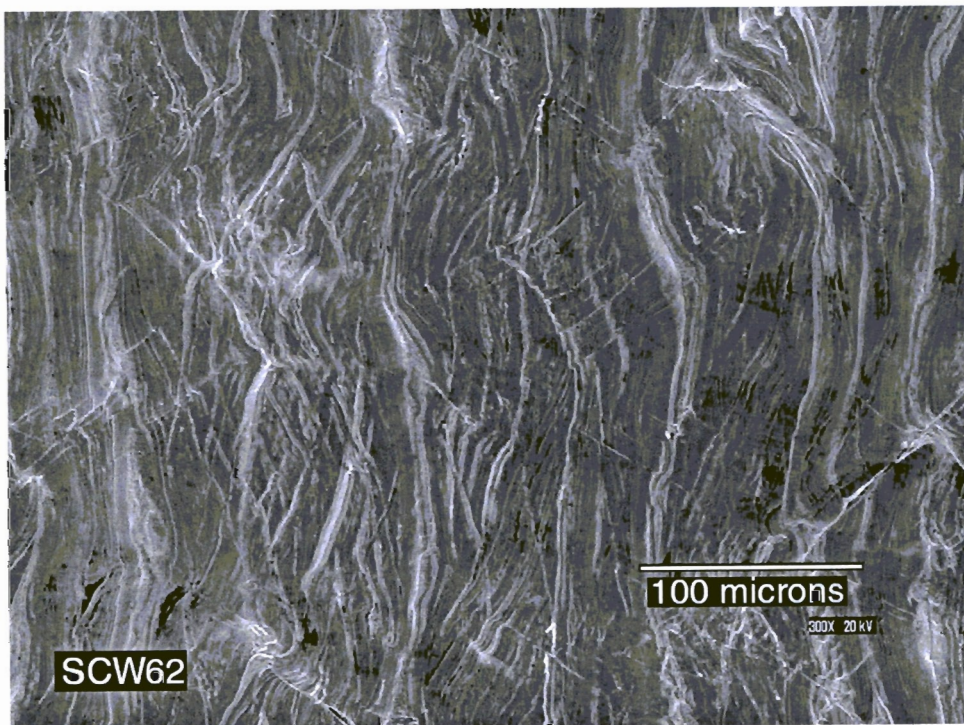
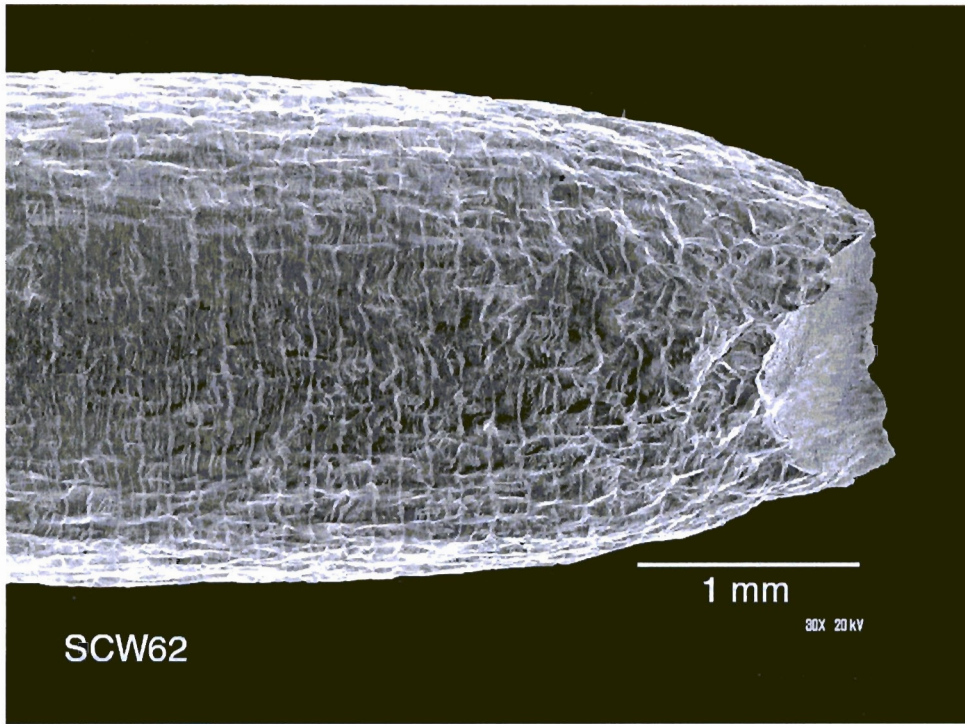
K-T. Chen 6/1/06



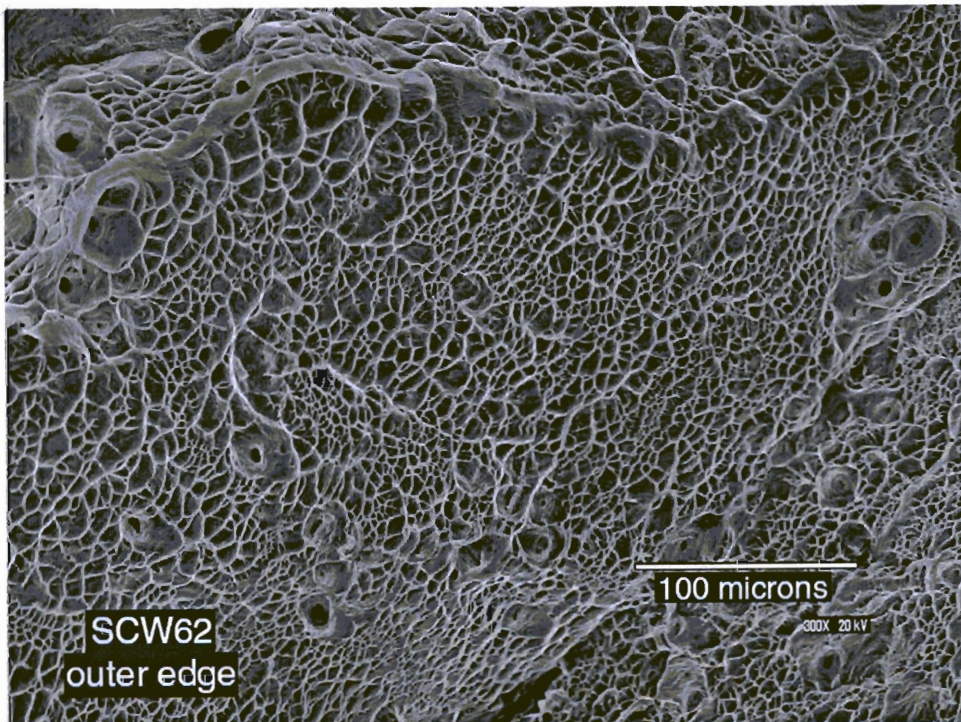
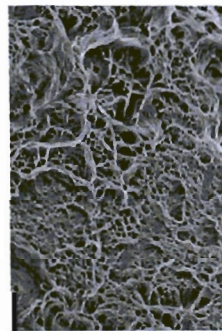
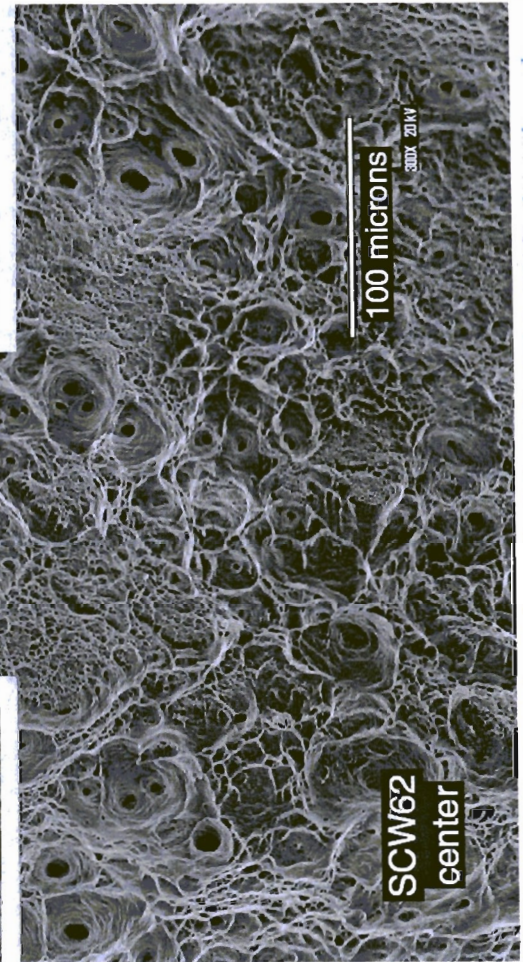
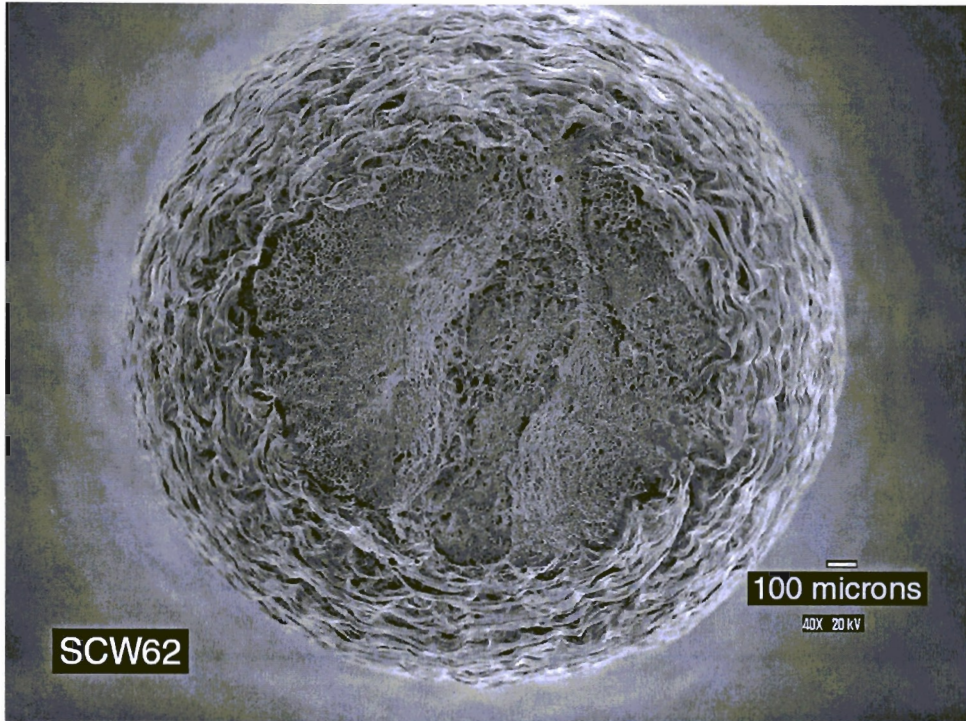
R. J. Chien 6/1/08



K. J. Chiang 6/1/06



K.T. Chiang
6/1/06



K. J. Chou 6/1/06

9-25-06 Test SSRMA22_SCW77 was scrapped due to computer malfunction (corrupted data). Found also that platinum flag glass tube on cell was broken inside of cell causing improper purging of cell and solution to evaporate. Will retest and label next test SSRMA22-SCW77A.

~~AA~~ 9-25-06

~~AA~~
9-25-06

Slow Strain Rate Test**Objective:** see page 70**Specimen:** MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001**Solution:**2.10M NaHCO₃ 176.4g in 1000 mls. of D.I. water lot# 054010

Reagents measured with	Model: OHAUS	SN: 2823
	Cal: July 05, 06	Due: Jan. 05, 06

Counter Electrode: PT flag**Reference Electrode on cell:** Silver/Silver Chloride with 3M KCL**Cal. Reference Electrode:** 13-620-52 **SN:** 5003013P**Cal Check v SCE:** Delta 35 mV**DVM:** Fluke **SN:** 73980493 **Cal:** Feb. 07, 06 **Due:** Jul, 06, 07**pH Meter:** Orion **SN:** 2330 **Cal:** Jul. 06, 06 **Due:** Jul. 06, 07**pH electrode:** 13-620-296 **SN:** 5003095p**Initial pH:** 8.41**Final pH:** n/a**Gas:** N₂ 99.9999%**Potentiostat:** ESC 440-2 **SN:** 9209138**Ecorr:** -73mV **Eapplied:** 415mV**DVM:** Fluke **SN:** 73980497 **Cal:** Jan. 06, 06 **Due:** Jan. 05, 07**Test Temperature:** 95 deg. C**Strain Rate:** 1.6×10^{-6} *kr 10/24/06***File name:** SSRMA22_ SCW77**T/C or Thermometer:** Fisher **SN:** 41523645 **Cal.:** 5/23/06 **Due:** 5/23/07**SN:** 334 **Cal:** 04/28/06 **Due:** 10/27/06**Specimen Visual:**

Secondary cracking, brittle failure

Measurement @ fracture: **Min.** = .1125
Max. = .1150

*Computer glitch, not
 able to use data.*

[Signature]
 10-11-06

Slow Strain Rate Test

Objective: see page 70

Specimen: MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001

Solution:

2.10M NaHCO₃ 176.4g in 1000 mls. of D.I. water lot# 054010

Reagents measured with **Model:** OHAUS **SN:** 2823
Cal: July 05, 06 **Due:** Jan. 05, 06

Counter Electrode: PT flag

Reference Electrode on cell: Silver/Silver Chloride with 3M KCL

Cal. Refrence Electrode: 13-620-52 **SN:** 5003013P

Cal Check v SCE: Delta 35 mV

DVM: Fluke **SN:** 73980493 **Cal:** Feb. 07, 06 **Due:** Jul, 06, 07

pH Meter: Orion **SN:** 2330 **Cal:** Jul. 06, 06 **Due:** Jul. 06, 07

pH electrode: 13-620-296 **SN:** 5003095p

Initial pH: 8.73

Final pH: 10.27

Gas: N₂ 99.9999%

Potentiostat: ESC 440-2 **SN:** 9209138

Ecorr: -226.3mV **Eapplied:** 415mV

Ept: -343.0 mV

DVM: Fluke **SN:** 73980497 **Cal:** Jan. 06, 06 **Due:** Jan. 05, 07

Test Temperature: 95 deg. C

Strain Rate: 1.6×10^{-6}

File name: SSRMA22_ SCW77A

T/C or Thermometer: Fisher **SN:** 41523645 **Cal.:** 5/23/06 **Due:** 5/23/07

SN: 334 **Cal:** 04 / 28 / 06 **Due:** 10 / 27 / 06

Specimen Visual:

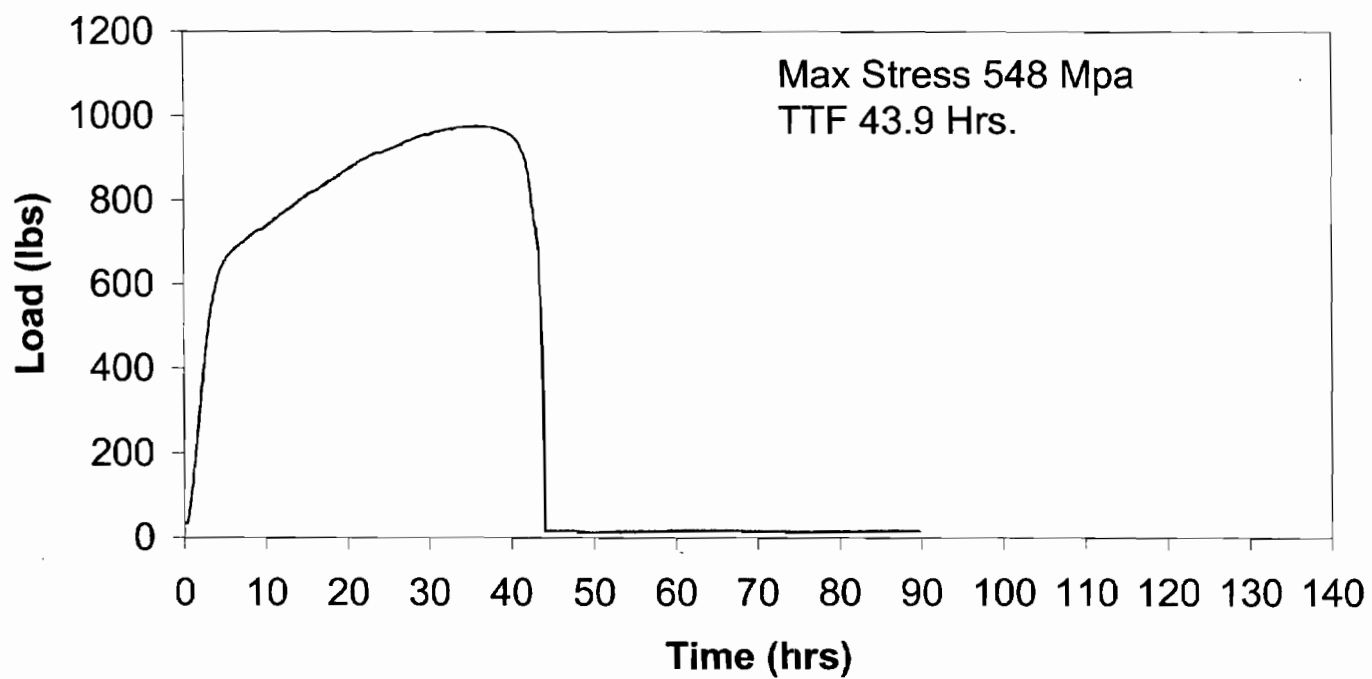
Secondary cracking, brittle failure

Measurement @ fracture: **Min.** = .1075

Max. = .1115


10-11-06

SSRMA22_SCW77A Test
2.10M NaHCO₃



[Handwritten Signature]
10-11-06

Slow Strain Rate Test

Objective: see page 70

Specimen: MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001

Solution:

2.10M NaHCO₃ 176.4g in 1000 mls. of D.I. water lot# 054010

Reagents measured with **Model:** OHAUS **SN:** 2823
 Cal: July 05, 06 **Due:** Jan. 05, 06

Counter Electrode: PT flag

Reference Electrode on cell: Silver/Silver Chloride with 3M KCL

Cal. Reference Electrode: 13-620-52 **SN:** 5003013P

Cal Check v SCE: Delta 35 mV

DVM: Fluke **SN:** 73980493 **Cal:** Feb. 07, 06 **Due:** Jul, 06, 07

pH Meter: Orion **SN:** 2330 **Cal:** Jul. 06, 06 **Due:** Jul. 06, 07

pH electrode: 13-620-296 **SN:** 5003095p

Initial pH: 8.88

Final pH: 10.43

Gas: N₂ 99.9999%

Potentiostat: ESC 440-2 **SN:** 9209138

Ecorr: -286.7 mV **Eapplied:** 415mV

Ept: -534.0 mV

DVM: Fluke **SN:** 73980497 **Cal:** Jan. 06, 06 **Due:** Jan. 05, 07

Test Temperature: 95 deg. C

Strain Rate: 8.33×10^{-7}

File name: SSRMA22_ SCW78


T/C or Thermometer: Fisher **SN:** 41523645 **Cal.:** 5/23/06 **Due:** 5/23/07

SN: 334 **Cal:** 04 / 28 / 06 **Due:** 10 / 27 / 06

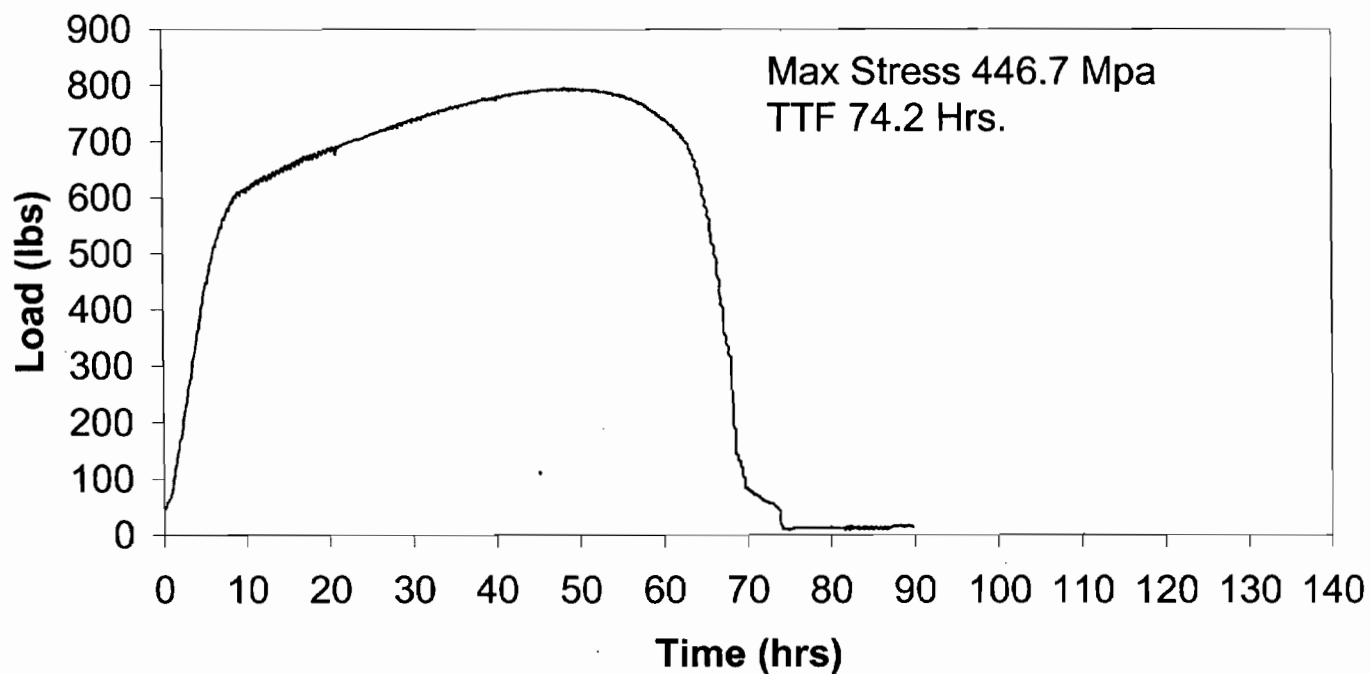
Specimen Visual:

Secondary cracking, brittle failure, specimen broke close to edge of weld, some discoloration noticed on one end of specimen.

Measurement @ fracture: **Min.** = .1135
Max. = .1150


10-18-06

SSRMA22_SCW78 Test
2.10M NaHCO₃



1.05M NaHCO₃
95°C
400MV_{SSC}
1/2 strain rate
next Test
SCW79

[Signature]
10-18-04

Slow Strain Rate Test**Objective:** see page 70**Specimen:** MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001**Solution:**1.05 M NaHCO₃ 88.2 g in 1000 mls. of D.I. water lot# 054010

Reagents measured with	Model: OHAUS	SN: 2823
	Cal: July 05, 06	Due: Jan. 05, 06

Counter Electrode: PT flag**Reference Electrode on cell:** Silver/Silver Chloride with 3M KCL**Cal. Refrence Electrode:** 13-620-52 **SN:** 5003013P**Cal Check v SCE:** Delta 26.5 mV**DVM:** Fluke **SN:** 73980493 **Cal:** Feb. 07, 06 **Due:** Jul, 06, 07**pH Meter:** Orion **SN:** 2330 **Cal:** Jul. 06, 06 **Due:** Jul. 06, 07**pH electrode:** 13-620-296 **SN:** 5003095p**Initial pH:** 8.03**Final pH:** 9.88**Gas:** N₂ 99.9999%

Potentiostat: ESC 440-2	SN: 9209138
Ecorr: -371.9 mV	Eapplied: 415mV
Ept: 71.2 mV	

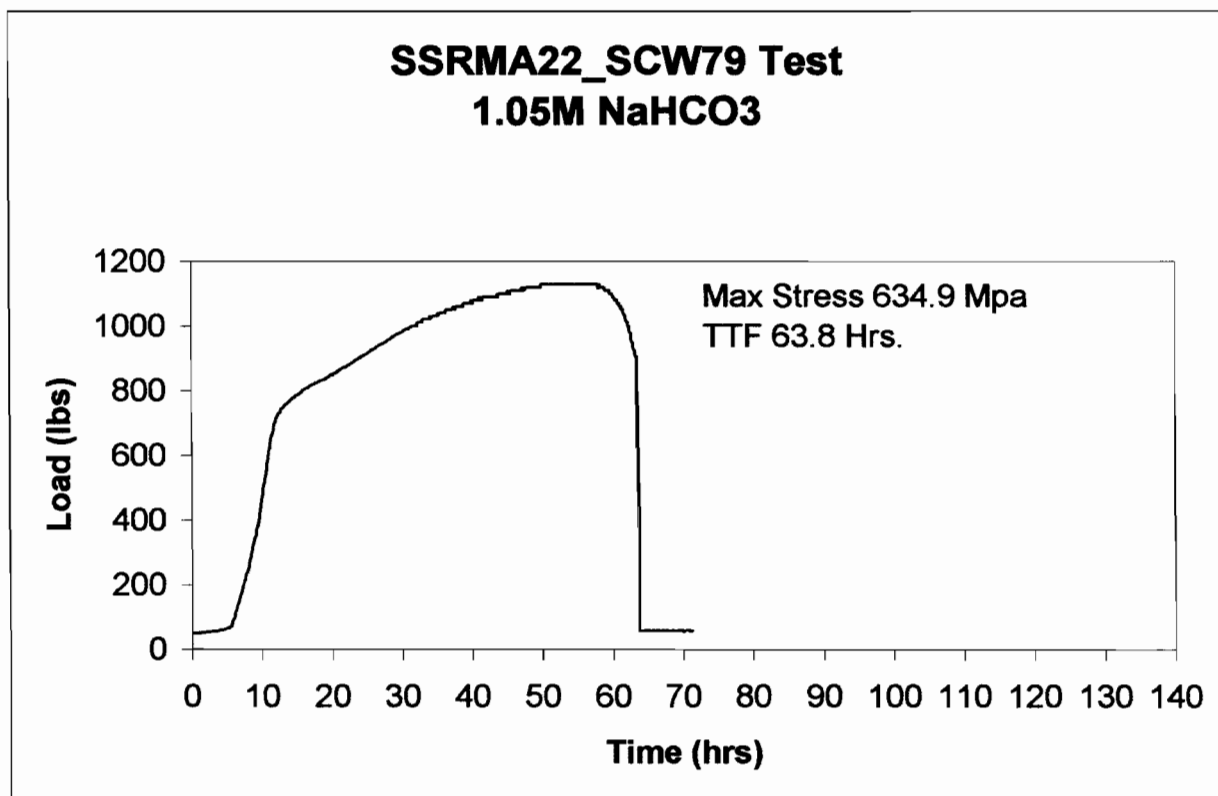
DVM: Fluke **SN:** 73980497 **Cal:** Jan. 06, 06 **Due:** Jan. 05, 07**Test Temperature:** 95 deg. C**Strain Rate:** 8.33×10^{-7} **File name:** SSRMA22_ SCW79**T/C or Thermometer:** Fisher **SN:** 41523645 **Cal.:** 5/23/06 **Due:** 5/23/07**SN:** 334 **Cal:** 04 / 28 / 06 **Due:** 10 / 27 / 06**Specimen Visual:**

Secondary cracking, brittle failure, some discoloration noticed on one end of specimen.

Measurement @ fracture:	Min. = .0990
	Max. = .1040



Handwritten signature and date: 11-13-06



At about 0755 on 11-13-06 noticed frame gear speed, slightly faster. Timed gear speed with a stopwatch and frame gear speed was at 9.34sec. As opposed to the 12 sec original time set at beginning of test for gear speed.

At about 0820 on 11-13-06 timed frame gear speed again with a stopwatch and frame gear speed was 6.25sec. At about this point, specimen was at point of failure, stretched to its limits and broke. This may be probable cause for gear speed to be slightly faster.

[Handwritten signature]

BAR BOX RATIO = 1000:1 335 397
 DRUM GEAR BOX RATIO 100 TURNS = 1" DISPLACEMENT

ALL SEC PER TURN RATES ARE LOOKING AT FAST END
 1000:1 GEAR BOX, NOT MOTOR

SEC/TURN	HEAD RATE (INCHES/SEC)
1.000000	0.0000000
1.500000	1.9999999E-05
2.000000	9.9999997E-06
2.500000	6.6666666E-06
3.000000	4.9999999E-06
3.500000	4.0000000E-06
4.000000	3.3333333E-06
4.500000	2.8571428E-06
5.000000	2.4999999E-06
5.500000	2.2222223E-06
6.000000	2.0000000E-06
6.500000	1.8181818E-06
7.000000	1.6666667E-06
7.500000	1.5384616E-06
8.000000	1.4285714E-06
8.500000	1.3333333E-06
9.000000	1.2500000E-06
9.500000	1.1764706E-06
10.000000	1.1111111E-06
10.500000	1.0526315E-06
11.000000	1.0000000E-06
11.500000	9.5238096E-07
12.000000	9.0909089E-07
12.500000	8.6956521E-07
13.000000	8.3333333E-07
13.500000	8.0000001E-07
14.000000	7.6923078E-07
14.500000	7.4074075E-07
15.000000	7.1428570E-07
15.500000	6.8965517E-07
16.000000	6.6666666E-07
16.500000	6.4516126E-07
17.000000	6.2499998E-07
17.500000	6.0606061E-07
18.000000	5.8823531E-07
18.500000	5.7142859E-07
19.000000	5.5555557E-07
19.500000	5.4054055E-07
20.000000	5.2631577E-07
20.500000	5.1282052E-07
21.000000	5.0000000E-07
21.500000	4.8780487E-07
22.000000	4.7619048E-07
22.500000	4.6511627E-07
23.000000	4.5454544E-07
23.500000	4.4444445E-07
24.000000	4.3478261E-07
24.500000	4.2553191E-07
25.000000	4.1666667E-07
25.500000	4.0816326E-07
26.000000	4.0000000E-07
26.500000	3.9215686E-07
27.000000	3.8461539E-07
27.500000	3.7735850E-07
28.000000	3.7037037E-07

$$T_{\text{Sec/Rev}} = \frac{1}{(1000 \times 1000) \times \text{Rate (in/sec)}}$$

$$= \frac{1}{100000 \times \text{Rate (in/sec)}}$$

$$= 1.67 \times 10^{-6}$$

Handwritten signature
 11-17-06

27. 50000	3. 6363636E-07
28. 00000	3. 5714285E-07
28. 50000	3. 5087720E-07
29. 00000	3. 4482758E-07
29. 50000	3. 3898306E-07
30. 00000	3. 3333333E-07
30. 50000	3. 2786886E-07
31. 00000	3. 2258063E-07
31. 50000	3. 1746032E-07
32. 00000	3. 1249999E-07
32. 50000	3. 0769232E-07
33. 00000	3. 0303030E-07
33. 50000	2. 9850747E-07
34. 00000	2. 9411765E-07
34. 50000	2. 8985508E-07
35. 00000	2. 8571429E-07
35. 50000	2. 8169015E-07
36. 00000	2. 7777779E-07
36. 50000	2. 7397260E-07
37. 00000	2. 7027028E-07
37. 50000	2. 6666666E-07
38. 00000	2. 6315789E-07
38. 50000	2. 5974026E-07
39. 00000	2. 5641026E-07
39. 50000	2. 5316456E-07
40. 00000	2. 5000000E-07
40. 50000	2. 4691357E-07
41. 00000	2. 4390243E-07
41. 50000	2. 4096386E-07
42. 00000	2. 3809524E-07
42. 50000	2. 3529412E-07
43. 00000	2. 3255814E-07
43. 50000	2. 2988506E-07
44. 00000	2. 2727272E-07
44. 50000	2. 2471910E-07
45. 00000	2. 2222223E-07
45. 50000	2. 1978022E-07
46. 00000	2. 1739130E-07
46. 50000	2. 1505376E-07
47. 00000	2. 1276595E-07
47. 50000	2. 1052631E-07
48. 00000	2. 0833333E-07
48. 50000	2. 0618556E-07
49. 00000	2. 0408163E-07
49. 50000	2. 0202020E-07
50. 00000	2. 0000000E-07
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51. 50000	1. 9417476E-07
52. 00000	1. 9230770E-07
52. 50000	1. 9047619E-07
53. 00000	1. 8867925E-07
53. 50000	1. 8691588E-07
54. 00000	1. 8518519E-07
54. 50000	1. 8348624E-07
55. 00000	1. 8181818E-07
55. 50000	1. 8018018E-07
56. 00000	1. 7857143E-07
56. 50000	1. 7699115E-07
57. 00000	1. 7543860E-07
57. 50000	1. 7391304E-07
58. 00000	1. 7241379E-07


 11-17-04

58. 50000
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89. 00000

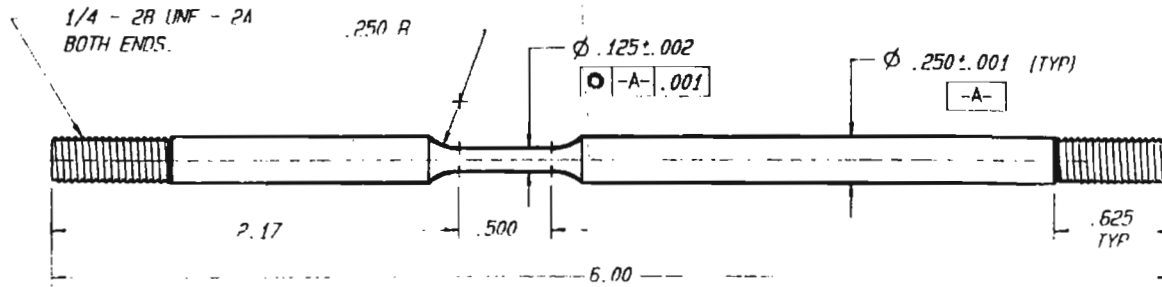
1. 7094017E-07
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1. 6129032E-07
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1. 5873016E-07
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1. 5384616E-07
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1. 3698630E-07
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1. 2903226E-07
1. 2820513E-07
1. 2738853E-07
1. 2658228E-07
1. 2578616E-07
1. 2500000E-07
1. 2422360E-07
1. 2345679E-07
1. 2269939E-07
1. 2195122E-07
1. 2121212E-07
1. 2048193E-07
1. 1976049E-07
1. 1904762E-07
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1. 1494253E-07
1. 1428571E-07
1. 1363636E-07
1. 1299435E-07
1. 1235955E-07

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11-17-04

Ken Chiang
 SwRI-CNWRA
 Phone: (210) 522-2308
 Fax: (210) 522-5184
 e-mail: Kchiang@swri.org

Rolling

SwRI DRAWING # 20-03704-042-001



- NOTE:
- DO NOT UNDERCUT RADII
 - USE LOW STRESS MACHINING PROCEDURE

ITEM NO.	QTY	SIZE	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST					
MATERIAL		0.5 THICK PLATE SUPPLIED			
FINISH		16 RMS			
MATERIAL		SLOW STRAIN RATE SPECIMEN			
FINISH		16 RMS			
MATERIAL		SLOW STRAIN RATE SPECIMEN			
FINISH		16 RMS			
MATERIAL		SLOW STRAIN RATE SPECIMEN			
FINISH		16 RMS			
MATERIAL		SLOW STRAIN RATE SPECIMEN			
FINISH		16 RMS			

LOCATION: 83932
 EQUIPMENT: T.M. Bags 002176
 Cellipin 00256

J.C. # 25
 25
 0

DATE: 12/19/06

INSPECTOR: [Redacted]

Procedure: [Redacted]

Project # [Redacted]

TOTAL POS. INSPECTED [Redacted]

TOTAL POS. ACCEPTED [Redacted]

TOTAL POS. REJECTED [Redacted]

"NR #" IF REJECTS [Redacted]

K.J. Chiang 1-13-04
 Initiator: K. Chiang Date

Parul Datta for V. Jain
 Reviewer: V. Jain Date 1/13/04

Mark R. Shuster for R. Brient
 QA Approval: R. Brient Date 1/13/04

K.J. Chiang 12/19/06


On Dec. 19th Sensotec LVDT was sticking and not working properly. Removed and replaced Sensotec LVDT. Below are the new LVDT calibration results.

**SSR Frame 1/ Div. 20
LVDT Calibration**

Sensotec
Model: VL7A
Part #: 060-3618-01
SN #: L4904500
Range: +/- 0.500 inches

Gage ID	Gage Value (inches)	1st Computer Reading	2nd Computer Reading	3rd Computer Reading
-----	0	1.00	1.00	1.00
X369A	0.0625	0.93	0.93	0.93
Y242A	0.1251	0.87	0.87	0.87
Y455A	0.2500	0.74	0.74	0.74
Y649A	0.5001	0.50	0.49	0.49
Y189B	1.0000	0.00	0.00	0.00

Calibration Gage Blocks: Pratt & Whitney


12-20-06

Slow Strain Rate Test

169

Objective: see page 167

Specimen: MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001
Heated to 870 deg. C

Solution:
Open Air

Reagents measured with **Model:** n/a **SN:** n/a
Cal: **Due:**

Counter Electrode: n/a

Reference Electrode on cell: n/a

Cal. Reference Electrode: n/a **SN:** n/a

Cal Check v SCE: n/a

DVM: n/a **SN:** n/a **Cal:** n/a **Due:** n/a

pH Meter: n/a **SN:** n/a **Cal:** n/a **Due:** n/a

pH electrode: n/a **SN:** n/a

Initial pH: n/a

Final pH: n/a

Gas: n/a

Potentiostat: n/a **SN:** n/a

Ecorr: n/a **Applied:** n/a

DVM: n/a **SN:** n/a **Cal:** n/a **Due:** n/a

Test Temperature: ambient

Strain Rate: 1.6×10^{-6}

File name: Baselinest80HT

T/C or Thermometer: n/a **SN:** n/a **Cal.:** n/a **Due:** n/a

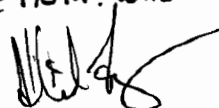
SN: n/a **Cal:** n/a **Due:** n/a

Specimen Visual:

N/A

Measurement @ fracture: **Min.** = .0955 in.
Max. = .0980 in.

Test was scrapped due to LVDT being at full extension of 1.00 in., should have been set @ .15 in. Was unable to collect data for LVDT (in. of Travel) for the Baseline Test of the specimen.


1-8-07

Slow Strain Rate Test

Objective: see page 167

Specimen: MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001
Heated to 870 deg. CSolution:
Open AirReagents measured with Model: n/a SN: n/a
Cal: Due:

Counter Electrode: n/a

Reference Electrode on cell: n/a

Cal. Reference Electrode: n/a SN: n/a

Cal Check v SCE: n/a

DVM: n/a SN: n/a Cal: n/a Due: n/a

pH Meter: n/a SN: n/a Cal: n/a Due: n/a

pH electrode: n/a SN: n/a

Initial pH: n/a

Final pH: n/a

Gas: n/a

Potentiostat: n/a SN: n/a

Ecorr: n/a Eapplied: n/a

DVM: n/a SN: n/a Cal: n/a Due: n/a

Test Temperature: ambient

Strain Rate: 1.6×10^{-6}

File name: Baselinest81HT

T/C or Thermometer: n/a SN: n/a Cal.: n/a Due: n/a

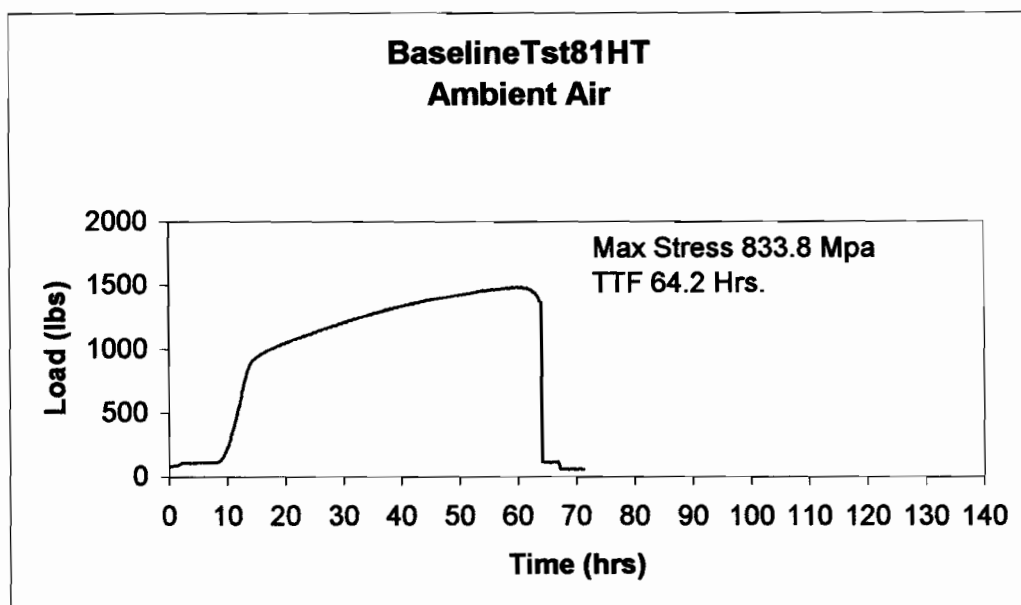
SN: n/a Cal: n/a Due: n/a

Specimen Visual:

N/A

Measurement @ fracture: Min. = .0960 in.
Max. = .1000 in.


Handwritten signature and date: 1-8-07



On 1-5-06 the LVDT channel factors were changed to correct LVDT readings. "Multiplier" was corrected from -.1 to .1 and "Offset" was corrected from \emptyset to -1.0. LVDT is now reading correctly.

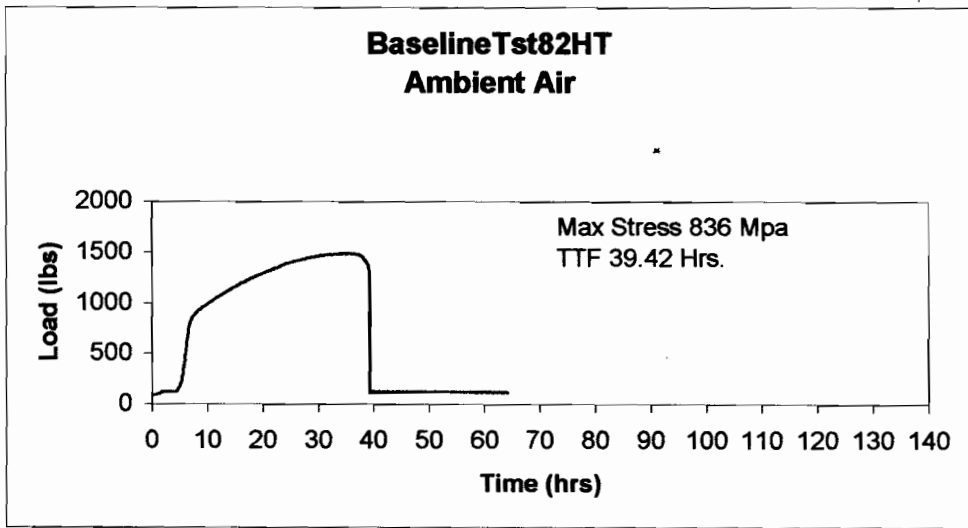
[Handwritten Signature]
1-8-07

Slow Strain Rate Test**Objective:** see page 167**Specimen:** MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001
Heated to 870 deg. C**Solution:**
Open Air**Reagents measured with** **Model:** n/a **SN:** n/a
Cal: **Due:****Counter Electrode:** n/a**Reference Electrode on cell:** n/a**Cal. Refrence Electrode:** n/a **SN:** n/a**Cal Check v SCE:** n/a**DVM:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**pH Meter:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**pH electrode:** n/a **SN:** n/a**Initial pH:** n/a**Final pH:** n/a**Gas:** n/a**Potentiostat:** n/a **SN:** n/a**Ecorr:** n/a **Eapplied:** n/a**DVM:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**Test Temperature:** ambient**Strain Rate:** 3.33×10^{-6} **File name:** Baselinetst82HT**T/C or Thermometer:** n/a **SN:** n/a **Cal.:** n/a **Due:** n/a**SN:** n/a **Cal:** n/a **Due:** n/a**Specimen Visual:**

N/A

Measurement @ fracture: **Min.** = 0.0840 in.**Max.** = 0.0885 in.


Handwritten signature and date: 1-15-07

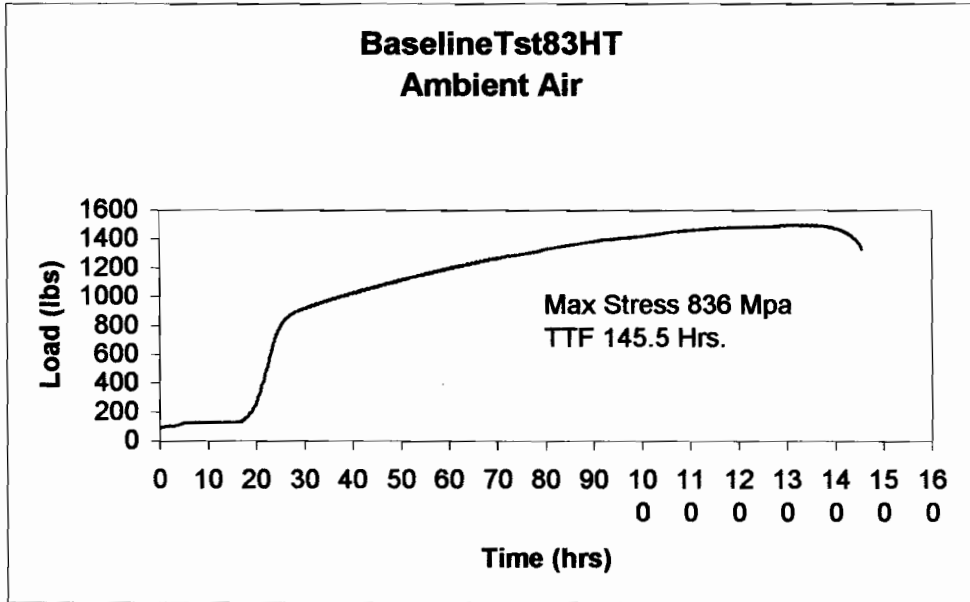


[Handwritten signature]
1-15-07

Slow Strain Rate Test**Objective:** see page 167**Specimen:** MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001
Heated to 870 deg. C**Solution:**
Open Air**Reagents measured with** **Model:** n/a **SN:** n/a
Cal: **Due:****Counter Electrode:** n/a**Reference Electrode on cell:** n/a**Cal. Refrence Electrode:** n/a **SN:** n/a**Cal Check v SCE:** n/a**DVM:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**pH Meter:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**pH electrode:** n/a **SN:** n/a**Initial pH:** n/a**Final pH:** n/a**Gas:** n/a**Potentiostat:** n/a **SN:** n/a**Ecorr:** n/a **Eapplied:** n/a**DVM:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**Test Temperature:** ambient**Strain Rate:** 8.33×10^{-7} **File name:** Baselinetst83HT**T/C or Thermometer:** n/a **SN:** n/a **Cal.:** n/a **Due:** n/a**SN:** n/a **Cal:** n/a **Due:** n/a**Specimen Visual:**

N/A

Measurement @ fracture: **Min.** = .0865 in.
Max. = .0960 in.
1-29-07

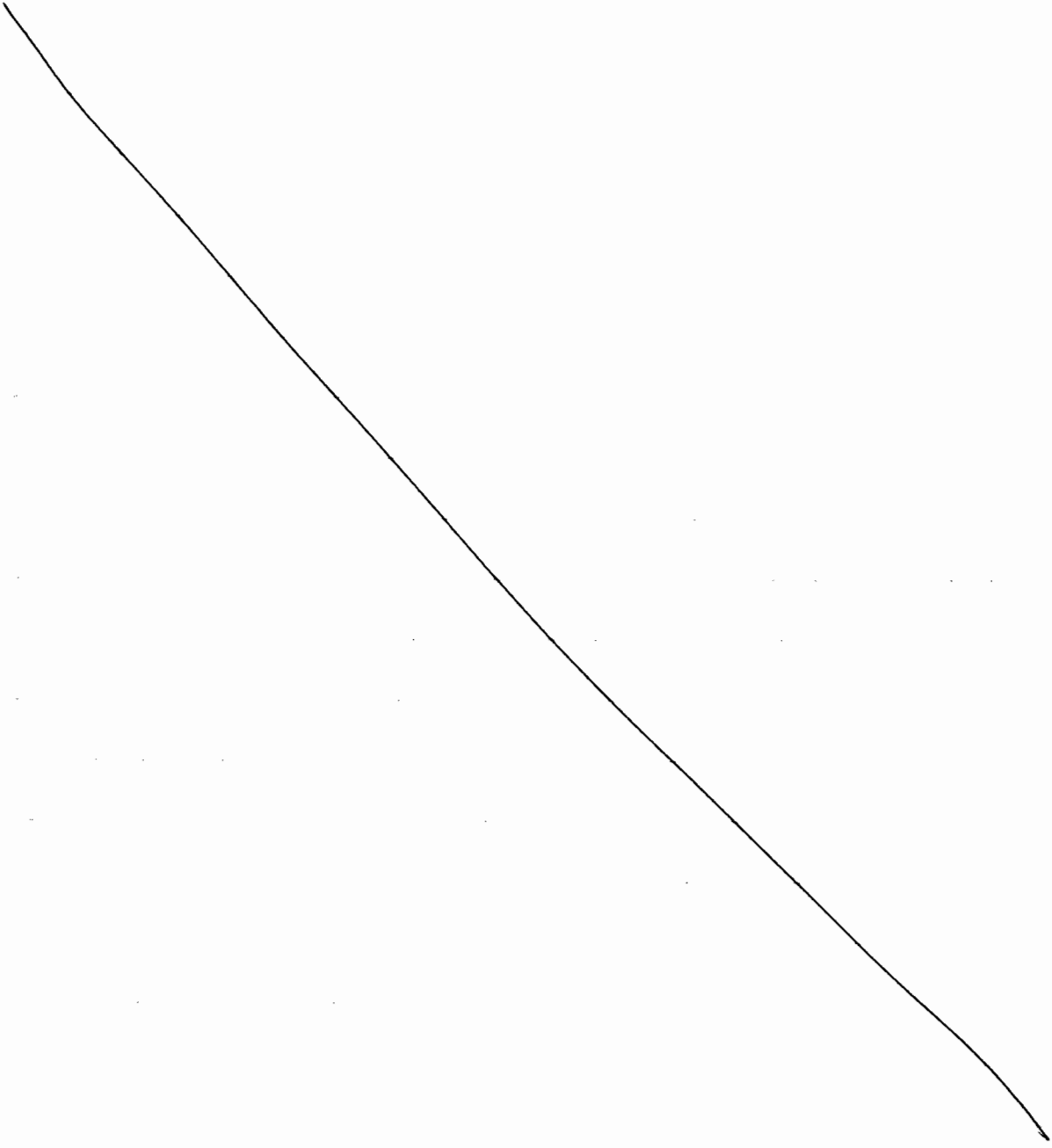


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1-29-07

Slow Strain Rate Test**Objective:** see page 167**Specimen:** MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001
Heated to 870 deg. C**Solution:**
Open Air**Reagents measured with** **Model:** n/a **SN:** n/a
Cal: **Due:****Counter Electrode:** n/a**Reference Electrode on cell:** n/a
Cal. Refrence Electrode: n/a **SN:** n/a
Cal Check v SCE: n/a
DVM: n/a **SN:** n/a **Cal:** n/a **Due:** n/a**pH Meter:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a
pH electrode: n/a **SN:** n/a
Initial pH: n/a
Final pH: n/a**Gas:** n/a**Potentiostat:** n/a **SN:** n/a
Ecorr: n/a **Eapplied:** n/a**DVM:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**Test Temperature:** ambient
Strain Rate: 8.33×10^{-7}
File name: BaselineTst84HT**T/C or Thermometer:** n/a **SN:** n/a **Cal.:** n/a **Due:** n/a
SN: n/a **Cal:** n/a **Due:** n/a**Specimen Visual:**
N/A**Measurement @ fracture:** **Min.** = .0885 in.
Max. = .0930 in.

Handwritten signature and date: 2-27-07

BaselineTst844T was scrapped. Computer stopped collecting data. Unable to determine breakpoint of specimen. System is currently being upgraded.



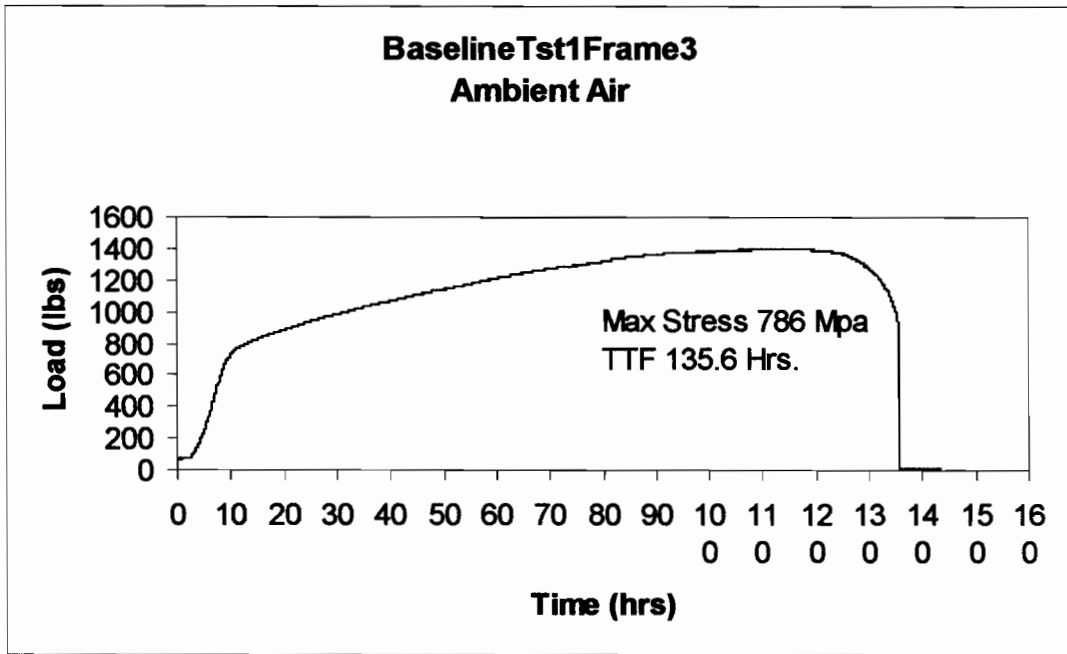
AKB
2-27-07

Slow Strain Rate Test**Objective:** see page 167**Specimen:** MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001**Solution:**
Open Air**Reagents measured with** **Model:** n/a **SN:** n/a
Cal: **Due:****Counter Electrode:** n/a**Reference Electrode on cell:** n/a**Cal. Reference Electrode:** n/a **SN:** n/a**Cal Check v SCE:** n/a**DVM:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**pH Meter:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**pH electrode:** n/a **SN:** n/a**Initial pH:** n/a**Final pH:** n/a**Gas:** n/a**Potentiostat:** n/a **SN:** n/a**Ecorr:** n/a **Eapplied:** n/a**DVM:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**Test Temperature:** ambient**Strain Rate:** 8.3×10^{-7} **File name:** BaselineTst1Frame3**T/C or Thermometer:** n/a **SN:** n/a **Cal.:** n/a **Due:** n/a**SN:** n/a **Cal:** n/a **Due:** n/a**Specimen Visual:**

N/A

Measurement @ fracture: **Min.** = .0860 in.**Max.** = .0915 in.

12-13-07



Albert J
12-13-07

11-5-07 *AF* Computer & monitor were upgraded, new system.

11-13-07
AF

SSR Frame 1/ Div. 20
LVDT Calibration

Sensotec
Model: VL7A
Part #: 060-3618-01
SN #: L4904500
Range: +/- 0.500 inches

Gage ID	Gage Value (inches)	1st Computer Reading	2nd Computer Reading	3rd Computer Reading
	0	1.00	1.00	1.00
X369A	0.0625	0.93	0.93	0.93
Y242A	0.1251	0.87	0.87	0.87
Y455A	0.2500	0.74	0.74	0.74
Y649A	0.5001	0.50	0.49	0.49
Y189B	1.0000	0.00	0.00	0.00

Calibration Gage Blocks: Pratt & Whitney

AF
11-13-07

SSR LoadCell Calibration

	Frame # 1		Cal'd By A. Faz			
	Cal Date 11-13-07		Cal Due Date 11-13-08			
	Model			Serial No.		
Display	Antec (Property of GED 3143)			pc121547		
LoadCell Display	Interface Inc. 9840			20096		
LoadCell	1610AJH-5K			263895		
Cal Due Date	15-May-08					
	Multiplier			Zero Offset		
Cal Factors	1172			69.00000		
	Cal'd Readout	PC Display	Cal'd Readout	PC Display	Cal'd Readout	PC Display
0	-0.25	-0.292	0.15	0.387	0.10	-0.614
500	499.75	499.56	500.95	499.689	500.65	499.974
1000	1000.05	998.125	1000.15	998.197	1000.70	999.713
1500	1500.05	1497.484	1500.20	1498.484	1500.25	1498.972
2000	2000.75	1998.467	2000.10	1997.823	2000.45	1999.089
2500	2500.25	2498.706	2500.35	2497.919	2500.35	2499.743
3000	3000.55	2999.038	3000.55	2997.929	3000.60	3000.103
3500	3500.55	3499.405	3500.45	3498.975	3500.35	3500.163

A. Faz
11-13-07

Slow Strain Rate Test**Objective:** see page 70**Specimen:** MA Alloy 22 HT#2277-3-3266 SwRI Drawing # 20-03704-042-001
Heated to 870 deg. C**Solution:**
Ambient Air**Reagents measured with** **Model:** n/a **SN:** n/a
Cal: **Due:****Counter Electrode:** n/a**Reference Electrode on cell:** n/a
Cal. Refrence Electrode: n/a **SN:** n/a
Cal Check v SCE: n/a
DVM: n/a **SN:** n/a **Cal:** n/a **Due:** n/a**pH Meter:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a
pH electrode: n/a **SN:** n/a
Initial pH: n/a
Final pH: n/a**Gas:** n/a**Potentiostat:** n/a **SN:** n/a
Ecorr: n/a **Eapplied:** n/a**DVM:** n/a **SN:** n/a **Cal:** n/a **Due:** n/a**Test Temperature:** ambient
Strain Rate: (60 sec.) 1.67×10^{-7}
File name: BaselineTst85HT**T/C or Thermometer:** n/a **SN:** n/a **Cal.:** n/a **Due:** n/a
SN: n/a **Cal:** n/a **Due:** n/a**Specimen Visual:**
N/A**Measurement @ fracture:** **Min.** = .0935 in.
Max. = .0975 in.*Albert J. ...*
12-13-07

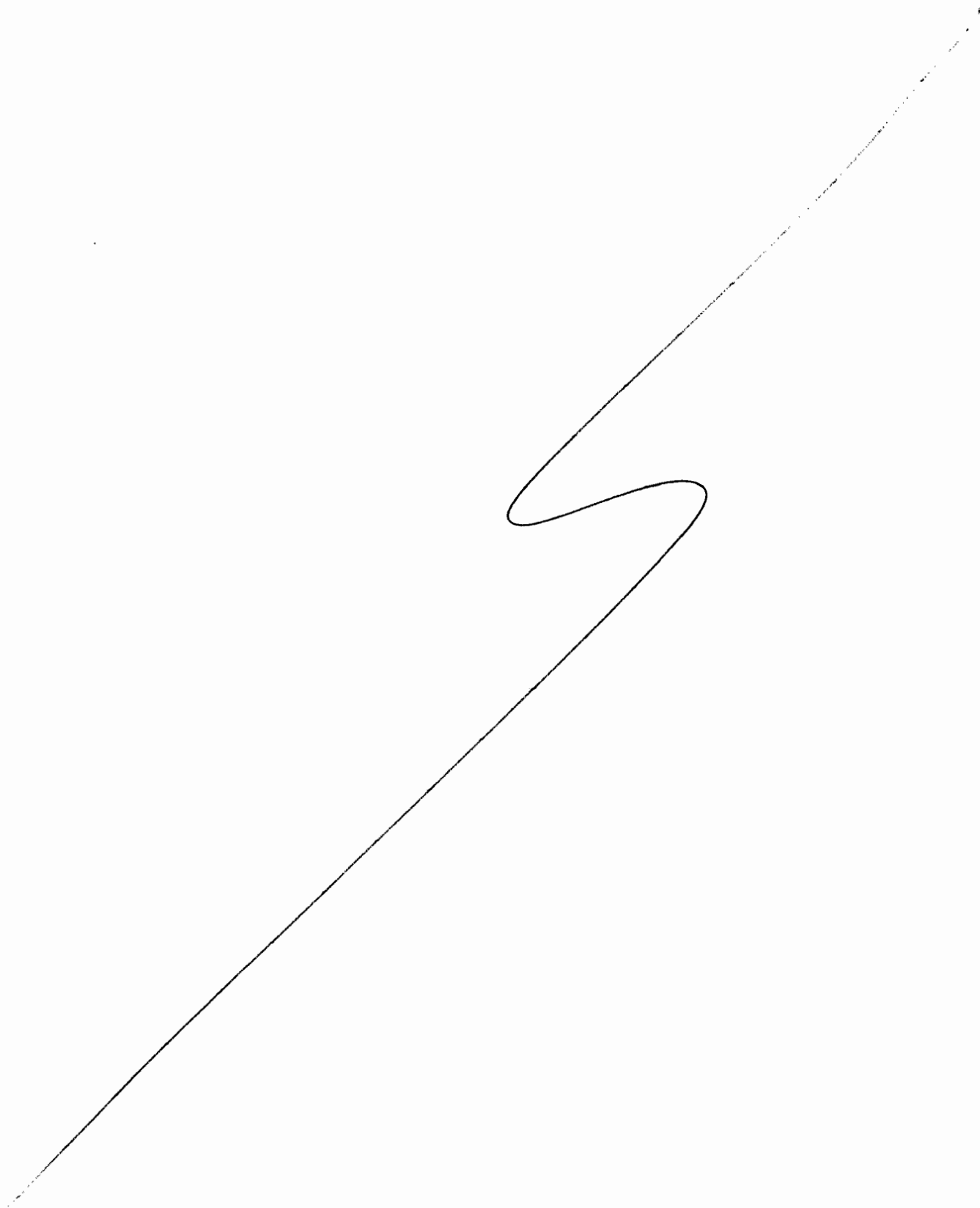
Slow Strain Rate Test**Objective:** see page 70**Specimen:** MA Alloy 22 SwRI Drawing # 20-03704-042-001**Heat #:** 2277-3-3266**Solution:** .5L DI H2O2.1M NaHCO₃ 88.18g Lot # 073814

0.5M NaCl 14.65g Lot # 062055

1.5M KCl 55.91g Lot # 035662

0.19M NaOH 3.81g Lot # 062634

Reagents measured with: **Model:** OHAUS **SN:** I2291125202189P**Cal:** Aug. 10, 2007 **Due:** Aug. 10, 2008**Counter Electrode:** PT flag**Reference Electrode on cell:** Silver/Silver Chloride with 3M**Reference Electrode:** KCL 13-620-52 **SN:** 5003013P**Cal Check v SCE:** Delta 35 mV**DVM:** Fluke **SN:** 85870565 **Cal:** Apr. 25, 2008 **Due:** Apr. 25, 2009**pH Meter:** Orion 720A **SN:** 003368 **Cal:** Jan. 24, 2008 **Due:** Jan. 24, 2009**pH electrode:** 13-620-296 **SN:** 6261198p**Initial pH:** 9.16**Final pH** 10.852**Gas:** N2 99.9999%**Potentiostat:** ESC 440-2 **SN:** 9209138**Ecorr:** 8mV **Ept:** -234mV **Eapplied:** 416mV**Test Temperature:** 94.2 deg. C**Gas:** N2 99.9999%**Strain Rate:** 1.6666667 x 10⁻⁷**Thermometer:** Fluke 2190A **Cal.:** Apr. 24, 2008 **Due:** Apr. 24, 2009**T/C SN:** 334 **Cal:** Apr. 25, 2008 **Due:** Oct. 25, 2008**Measurement @ Fracture:** **Min.:** .0935" **Max.:** .1005"**Specimen Visual:***6.13.08*



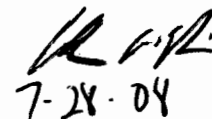
K. T. Chiang 3/19/09

Slow Strain Rate Test**Objective:** see page 70**Specimen:** MA Alloy 22 SwRI Drawing # 20-03704-042-001**Heat #:** 2277-3-3266**Solution:** .5L DI H₂O2.1M NaHCO₃ 88.18g Lot # 073814

0.5M NaCl 14.65g Lot # 062055

1.5M KCl 55.91g Lot # 035662

0.19M NaOH 3.81g Lot # 062634

Reagents measured with: **Model:** OHAUS **SN:** I2291125202189P**Cal:** Aug. 10, 2007 **Due:** Aug. 10, 2008**Counter Electrode:** PT flag**Reference Electrode on cell:** Silver/Silver Chloride**Reference Electrode:** KCL 13-620-52 **SN:** 5003013P**Cal Check v SCE:** Delta 27 mV**DVM:** Fluke **SN:** 85870565 **Cal:** Apr. 25, 2008 **Due:** Apr. 25, 2009**pH Meter:** Orion 720A **SN:** 003368 **Cal:** Jan. 24, 2008 **Due:** Jan. 24, 2009**pH electrode:** 13-620-296 **SN:** 6261198p**Initial pH:** 8.695**Final pH:** 9.897**Potentiostat:** ESC 440-2 **SN:** 9209138**Ecorr:** -254mV **Ept:** -115mV **Eapplied:** 301mV**Test Temperature:** 94.4° C**Gas:** N₂ 99.999%**Strain Rate:** 1.6666667 x 10⁻⁷**File Name:** SsrMA22_SCW 87HT300mV**Thermometer:** Fluke 2190A **Cal.:** Apr. 24, 2008 **Due:** Apr. 24, 2009**T/C SN:** 334 **Cal:** Apr. 25, 2008 **Due:** Oct. 25, 2008**Measurement @ Fracture:** **Min.:** .0810" **Max.:** .0880"**Specimen Visual:**


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Slow Strain Rate Test**Objective:** see page 70**Specimen:** MA Alloy 22 SwRI Drawing # 20-03704-042-001**Heat #:** 2277-3-3266**Solution:** .5L DI H₂O

2.1M NaHCO ₃	88.18g	Lot # 075559
0.5M NaCl	14.65g	Lot # B0113819A
1.5M KCl	55.91g	Lot # 035662
0.19M NaOH	3.81g	Lot # 062634

Reagents measured with: **Model:** OHAUS **SN:** I2291125202189P
Cal: Aug. 11, 2008 **Due:** Aug. 11, 2009

Counter Electrode: PT flag**Reference Electrode on cell:** Silver/Silver Chloride**Reference Electrode:** KCL 13-620-52 **SN:** 5003013P**Cal Check v SCE:** Delta 16 mV**DVM:** Fluke **SN:** 85870565 **Cal:** Apr. 25, 2008 **Due:** Apr. 25, 2009**pH Meter:** Orion 720A **SN:** 003368 **Cal:** Jan. 24, 2008 **Due:** Jan. 24, 2009**pH electrode:** 13-620-296 **SN:** 6261198p**Initial pH:** 8.672**Final pH:** 10.576**Potentiostat:** ESC 440-2 **SN:** 9209138**Ecorr:** -342.7mV **Ept:** -79.2mV **Eapplied:** 201mV**Test Temperature:** 94.7° C**Gas:** N₂ 99.999%**Strain Rate:** 1.6666667 x 10⁻⁷**File Name:** SsrMA22_SCW 88HT200mV**Thermometer:** Fluke 2190A **Cal.:** Apr. 24, 2008 **Due:** Apr. 24, 2009**T/C SN:** 334 **Cal:** Apr. 25, 2008 **Due:** Oct. 25, 2008**Measurement @ Fracture:** **Min.:** .1035" **Max.:** .1070"**Specimen Visual:**

U.A.R.
9.3.08

Slow Strain Rate Test**Objective:** see page 70**Specimen:** MA Alloy 22 SwRI Drawing # 20-03704-042-001**Heat #:** 2277-3-3266**Solution:** .5L DI H₂O

2.1M NaHCO ₃	88.18g	Lot # 075559
0.5M NaCl	14.65g	Lot # B0113819A
1.5M KCl	55.91g	Lot # 035662
0.19M NaOH	3.81g	Lot # 062634

Reagents measured with: **Model:** OHAUS **SN:** I2291125202189P
Cal: Aug. 11, 2008 **Due:** Aug. 11, 2009

Counter Electrode: PT flag**Reference Electrode on cell:** Silver/Silver Chloride**Reference Electrode:** KCL 13-620-52 **SN:** 5003013P**Cal Check v SCE:** Delta 21 mV**DVM:** Fluke **SN:** 85870565 **Cal:** Apr. 25, 2008 **Due:** Apr. 25, 2009**pH Meter:** Orion 720A **SN:** 003368 **Cal:** Jan. 24, 2008 **Due:** Jan. 24, 2009**pH electrode:** 13-620-296 **SN:** 6261198p**Initial pH:** 8.783**Final pH** 10.063**Potentiostat:** ESC 440-2 **SN:** 9209138**Ecorr:** -343.2mV **Ept:** -1.5mV **Eapplied:** 101mV**Test Temperature:** 94.7° C**Gas:** N₂ 99.999%**Strain Rate:** 1.6666667 x 10⁻⁷**File Name:** SsrMA22_SCW 89HT100mV**Thermometer:** Fluke 2190A **Cal.:** Apr. 24, 2008 **Due:** Apr. 24, 2009**T/C SN:** 334 **Cal:** Apr. 25, 2008 **Due:** Oct. 25, 2008**Measurement @ Fracture:** **Min.:** .0880" **Max.:** .0970"**Specimen Visual:**