08/08/01

9:28 sensor in $MgCl_2 \cdot 6H_2O$ bottle, from lot # 00036

RH = 30.97 %, 25.92 °C.

9:31 in $NaNO_3$ bottle. —— lot # 961772A

9:45 RH = 70.61 % at 23.12 °C

9:50 RH = 70.0 % 23.1 °C

9:54 ~~9:44~~ Jing. 10/23/01 in $MgCl_2$ - NaCl bottle. From lot # 00036 and # 006924

10:01 RH = 34.54 at 23.2 °C

10:01 Sensor to KCl bottle From lot # 005573

10:25 RH = 77.57 % at 22.6 °C.

10:26 to $NaNO_3$ - NaCl bottle. From lot # 961772A and # 006924

10:35 RH = 69.18 % at 22.96 °C

10:35 to $NaNO_3$ - KNO_3 - NaCl —— lot # 7028KDPD

10:49 RH = 65.53 at 22.65 °C.

10:50 to $MgCl_2 \cdot 6H_2O$ bottle

10:57 RH = 35.88 % 22.9 °C.

12:29 RH = ~~32.6009 %~~ 32.61 % 22.7 °C. (should 32.8 ~~%~~) -

Jing. 8/8/01

12:29 to KCl bottle —— lot # 005573 ✓

12:46 RH = 80.1 %, 23.2 °C.

12:50 RH = 78.85 % 23.1 °C

Jingang 4/2/02

8/09/01

9:00 to $MgCl_2$ + NaCl bottle.

16:37 30.55 % 22.86 °C.

8/10/01

17:07 to NaCl + $NaNO_3$ + KNO_3 (3-salt) bottle.

8/13/01

8:53 67.34 % 21.55 °C

9:13 ~~66.57 %~~ 63.5 % Jing. 8/9/01 21.67 °C

9:13 to NaCl - $NaNO_3$ bottle (2-salt bottle).

9:40 70.57 % 21.9 °C

9:50 69.8 % 22.5 °C

10:10 raise oven Temperature. to 50 °C.

11:55 46.45 °C, RH = 66.46 %

15:09 46.78 °C 66.62 % NaCl - $NaNO_3$

15:09 changed to 3-salt bottle.

17:05 46.72 °C 62.63 %

8/14/01.

8:41 46.91 59.61 %

11:39 46.59 — 60.56 %

$\frac{60.56 + 59.61}{2} = 60.09$

to KCl bottle

12:46

13:52 45.66 °C 75.24 %

14:06 46.22 °C 73.94 %

Jingang 4/2/02

14:06 to $NaNO_3$ again.

14:41 46.38°C, 69.46% Glass T=48°C

14:42 to KNO_3 bottle

14:45 45.54°C 82.14%

15:15 46.43°C 87.94% Glass T=49°C

15:17 to NaCl

15:46 46.34°C, 77.41%

17:00 46.37 77.27%

to 3-salts bottle.

raise Tower to 70°C.

8/15/01

8:16 67.34°C, 52.83%

9:22 65.21°C, 55.26% bottle too dry, water added

9:26 to Two-salt

11:38 64.55°C 54.07% Glass T=64°C

11:41 to $MgCl_2$

11:56 63.64°C, 32.3%

14:11 64.11°C 31.37% o.k

J. Yang
4/3/02

8/16/01

11:35 to KCl bottle.

12:50 68.8°C 74.33%

14:29 68.98°C 74.57%

14:30 to $MgCl_2$ bottle.

16:41 68.75°C 25.63%

to 3-salt bottle.

8/17/01

8:09 68.96°C 46.68% 3-salt

to $NaNO_3$ bottle

10:14 68.75°C, 56.68%

10:27 68.76°C 56.71

to NaCl

10:34 67.85 67.60%

11:18 68.48 67.71

to Two-salt

13:15 68.88°C, 53.83%

to KCl oven to 85°C.

14:04 84.79°C 71.39%

85°C.

14:05 to Two salt

14:10 80.42°C, 52%

15:44 85.02°C 51.40%

15:56 To 3-salt bottle.

From now use a Teflon sleeve on sensor tip to avoid salt contamination and to reduce sensitivity increase stability.

J. Yang 8/16/01

J. Yang
4/3/02

16:39 38.27°C, 40.24%

16:41 to $MgCl_2 \cdot 6H_2O$ bottle

17:32 38.32°C 24.09

17:37 Change oven temp to 40°C.

08/10/01 (Monday)

8:39 38.16°C 26.24%

8:40 to KCl bottle

9:39 38.15°C 71.81

9:40 to Two Salts

10:17 38.13°C 57.34%

10:18 to 3-salts

11:05 38.17°C 52.70%

11:05 to NaCl Bottle

11:57 38.25°C 66.37%

Test terminated.

J. Lyons
4/3/02

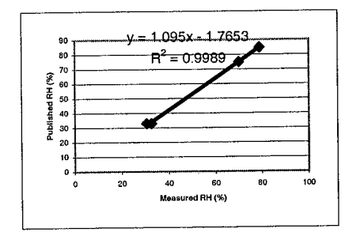
Data processing.

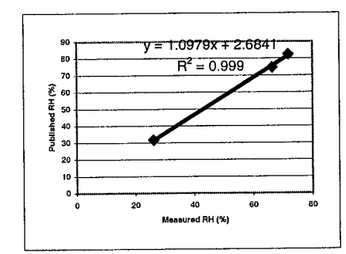
DRH_test_Hygrometer_summary.xls

Table . Comparison of Deliquescence points of single salt with salt mixtures

Salts	Deliquescence Point (Percent)						
	16.5oC	23oC**			38.13oC		
Dates of Data →		8/8/-8/13, 2001, morning			8/20/2001, morning		
	Published*	Measured**	Corrected†	Published*	Measured**	Corrected†	Published*
Pure NaCl	76.5				66.4	75.78466	74.68
Pure NaNO3	76	70	74.8882	74.8			
Pure KNO3	95						
NaCl+NaNO3 +KNO3	30.5†	63.5	67.7707		52.7	60.74343	
NaCl+NaNO3		69.8	74.6692		57.84	66.386636	
KCl		78.85	84.57895	84.7	71.81	81.724299	82.32
MgCl2.6H2O		32.61	33.94615	32.8	26.24	31.692996	31.6
MgCl2.6H2O+ NaCl		30.55	31.69045	32.8			
			1.095	-1.7618		1.0979	2.8841

* ANL-EBS-MD-000001 REV 00 ICN 01 (2001) (also Green span, 1977). J.L. 8/10/01
† Handbook value (Wreast, 1981)
** Hygrometer measurement





† — Corrections are based on the linear regression for pure salts.

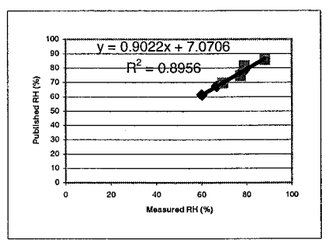
* CRWMS M&O, Environment on the Surfaces of the Drip Shield and Waste Package Outer Barrier, ANL-EBS-MD-000001, REV 00 ICN 01, Las Vegas NV, Office of Civilian Radioactive Waste Management System, Management and Operating Contractor, 2000.

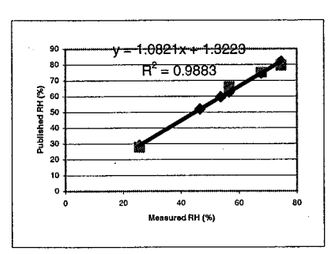
J. Lyons 4/3/02

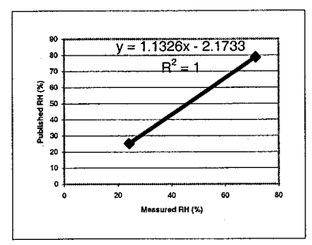
DRH_test_Hygrometer_summary.xls

Deliquescence Point (Percent)

	48oC			69oC			84.8		
Dates of Data →	8/13/2001 -8/14/01 Afternoon			8/16/2001 Mornig -8/17/01 Afternoon			8/17/2001, Afternoon		
	Measured**	Corrected	Published*	Measured**	Corrected	Published*	Measured**	Corrected	Published*
Pure NaCl	77.27	76.783594	74.45	67.71	74.591291	75.06			
Pure NaNO3	69.46	69.737412	69.5	56.71	62.688191	66.04			
Pure KNO3	88	86.4642	85.8						
NaCl+NaNO3+KNO3	60.085	61.279287		46.68	51.834728		40.24	43.40252	
NaCl+NaNO3	66.62	67.175164		53.83	59.571743		51.4	56.04234	
KCl	78.9	78.25418	81.5	74.57	82.014497	79.49	71.39	78.68301	78.68
MgCl2.6H2O				25.63	29.056523	27.77	24.09	25.11103	25.11
MgCl2.6H2O+NaCl									
		0.9022	7.0706		1.0821	1.3223		1.1326	-2.1733





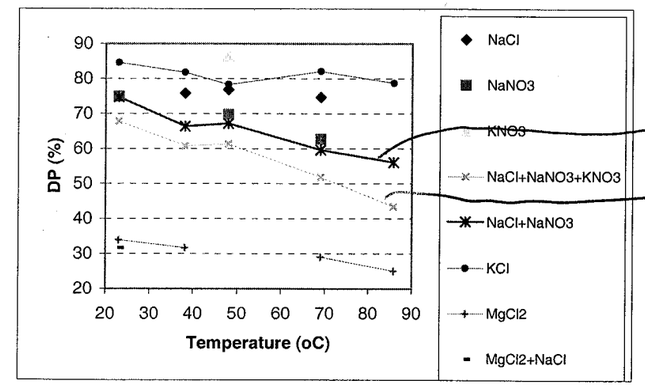


J. Yang
4/3/02

DRH_test_Hygrometer_summary.xls

Delequescence Data

	Temperature (oC)				
Salts	23	38.13	48	69	85.8
NaCl		75.78466	76.783594	74.591291	
NaNO3	74.8882		69.737412	62.688191	
KNO3			86.4642		
NaCl+NaNO3	67.7707	60.74343	61.279287	51.834728	43.402524
NaCl+NaNO3	74.6692	66.386636	67.175164	59.571743	56.04234
KCl	84.57895	81.724299	78.25418	82.014497	78.683014
MgCl2	33.94615	31.692996		29.056523	25.111034
MgCl2+NaCl	31.69045				



y = -0.2835x + 76.794
r² = 0.9674

y = -0.3749x + 76.79
r² = 0.9674

J. Yang
4/3/02

Continued on

10/22/01

Experimental Determination of the Deliquescence Points of Multi-component Salts and the Conductivity Behavior of Salt Deposits As a Function of Relative Humidity

Lietai Yang, Roberto T. Pabalan, Lauren Browning
Center for Nuclear Waste Regulatory Analyses
Southwest Research Institute
San Antonio, TX.

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Lyang
4/3/02

DRU Jy. 10/22/01

Table 1 Comparison between measured and published deliquescence points for pure salts

	Temperature (°C)	Measured (%)	Published (%)	Error (%)

DRU-Test-Hygrometer
Summary.xls
Comparison_Error.

Information potentially subject to copyright protection was redacted from this location. The redacted material was an article published by the Materials Research Society in 2002.

				2.4	

99% confid. interval ±1.51% Jy. 10/22/01

Table 2 Measured deliquescence points for salt mixtures

Temperature (°C)	23.0	38.1	48.0	69.0	85.8

File: same as Table 1.

Tab: Measured_DP_Mixture

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File: DP_30°C.xls
Tab: Data

Table 3. Measured values of impedance and relative conductances of salts at different relative humidities at 30°C.

	RH (%)	Impedance	Reciprocal of	Rel	RH-DP (%)

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Lyang
4/3/02

File: DP-50°C.xls
Tab: Data

Table 4. Measured values of impedance and relative conductances of salts at different relative humidities at 50°C.

	RH (%)	Impedance	Reciprocal of	Rel.	RH-DP (%)

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4/3/02

Table 4. Measured values of impedance and relative conductances of salts at different relative humidities at 50°C. Cont'd.

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9

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4/3/02

File: DP_Hyfrometer

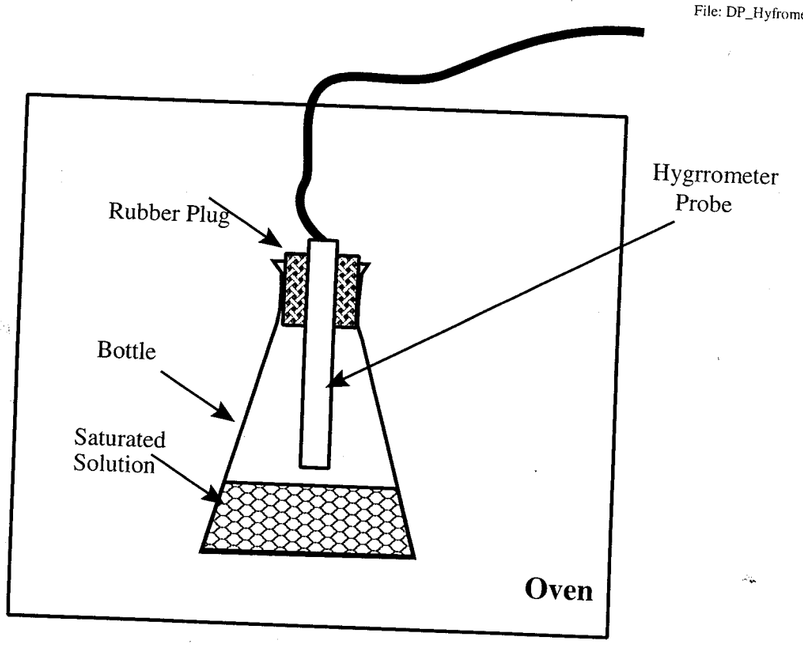

Figure 1

File:Teflon_Cell3

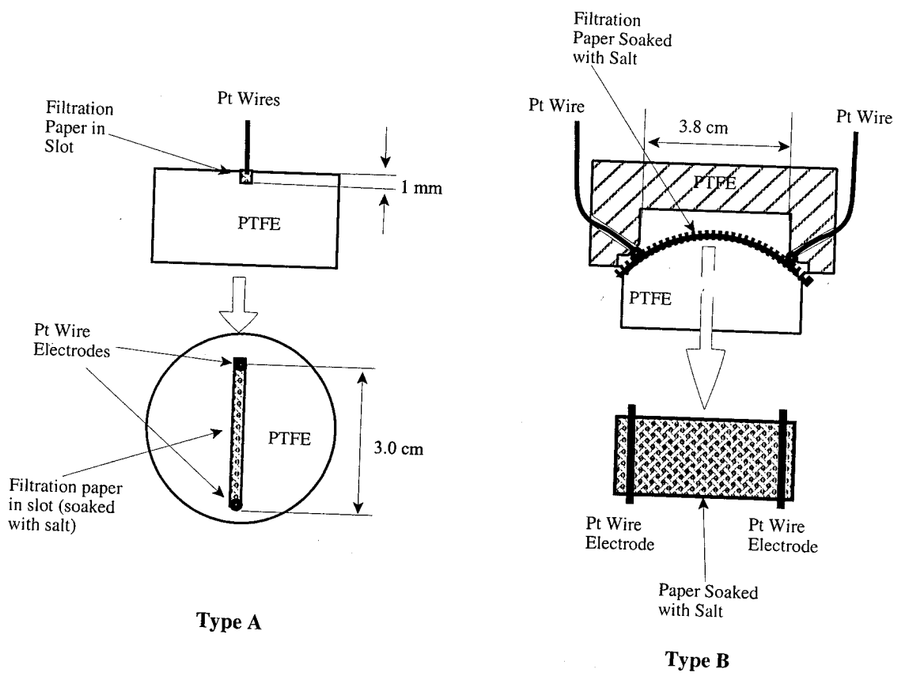

Figure 2

File: DRH_test_Hygrometer_summary.xls / TabChart_Compare_Published

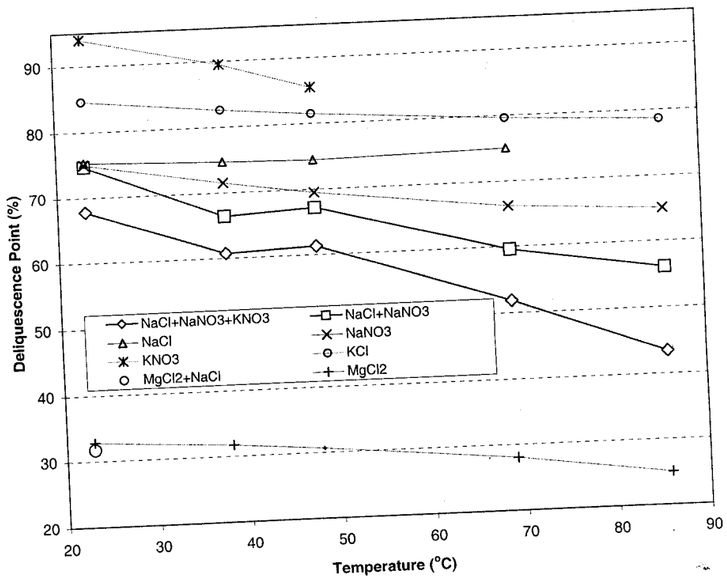

Figure 3 Comparison between the deliquescence points of pure and mixed salts.
Note: Values for salt mixtures were measured; values for pure salts are from literature (Greenspan, 1977).

4/15/02

File: 0612b_00_14a_01a.xls / Tab: Chart1

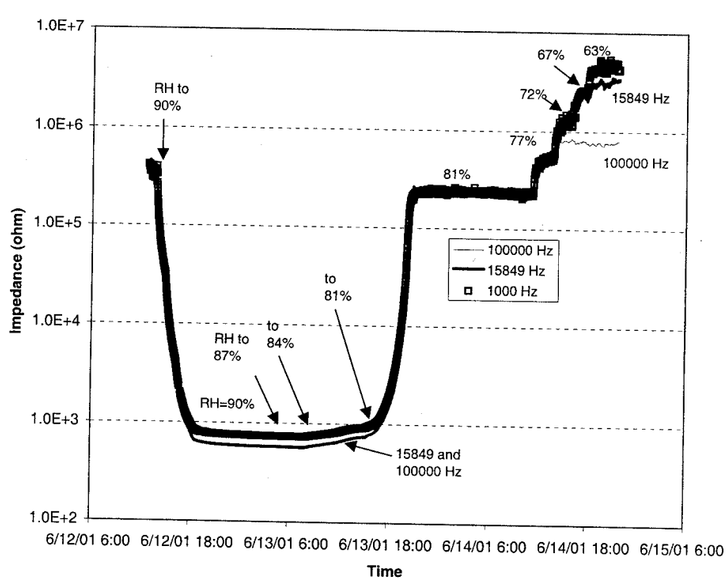

Figure 4 Typical responses of impedances measured at three frequencies to the changes in relative humidity.
Note: Filtration Paper dimension: 1x3x30 mm.

4/15/02

File: 0612b_DP.xls / Tab: DP_Chart

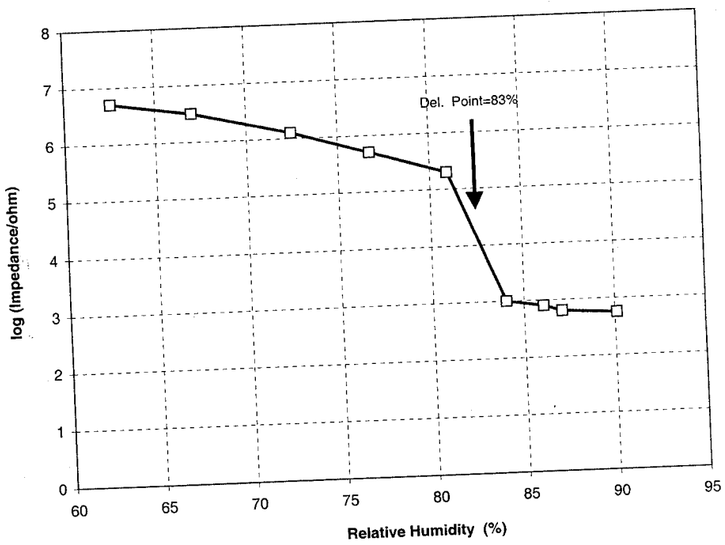

Figure 5 Relationship between the impedance and the relative humidity
Note: Filtration Paper dimension: 1x3x31 mm.

File: DP_30oC.xls / Tab: Chart

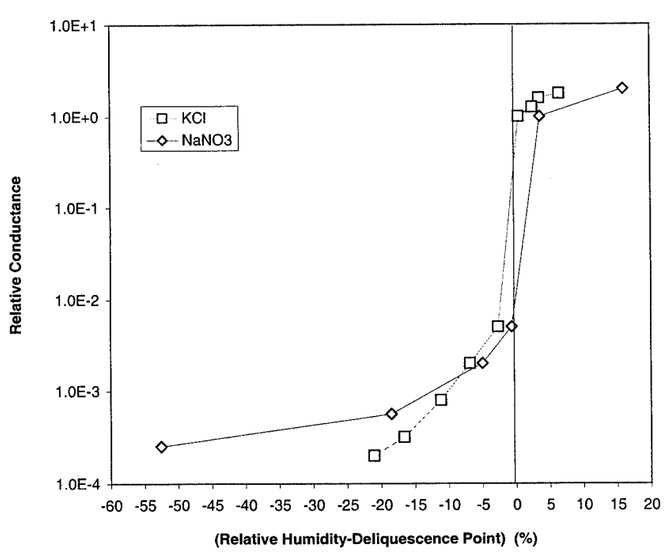

Figure 6. Measured relative conductances of salts as a function of the difference between the relative humidity and the deliquescence points at 30°C.
Note: Cell: Type A; Filtration Paper dimension: 1x3x30 mm.

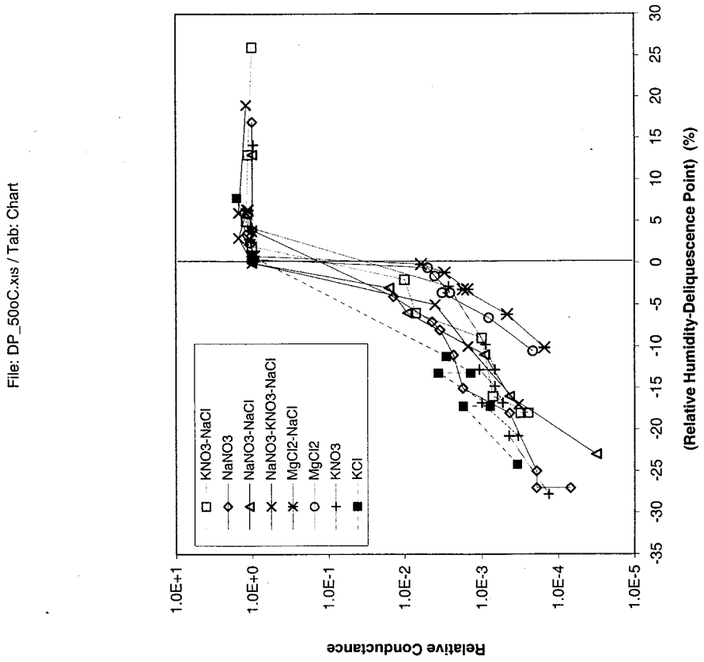

Figure 7 Measured relative conductances of salts as a function of the difference between the relative humidity and the deliquescence points of the salts at 50°C.
Note: Cell: Type B; Filtration Paper dimension: 0.23x26x46 mm.

J. Yang
4/3/02

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CRWMS M&O, Environment on the Surfaces of the Drip Shield and Waste Package Outer Barrier, ANL–EBS–MD–000001, REV 00 ICN 01, Las Vegas NV, Office of Civilian Radioactive Waste Management System, Management and Operating Contractor, 2000.

CRWMS M&O, In-Drift Precipitate/Salts Analysis, ANL–EBS–MD–000045, Revision 00 ICN02, Las Vegas NV, Office of Civilian Radioactive Waste Management System, Management and Operating Contractor, 2001.

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J. Yang
4/3/02

DRH and Corrosion Test.

Corrosion test: Sensors ① PTFE coated 1010 CS, 8 elect. (chan. 1-8)

② PTFE coated SS304, 8 elect. (chan. 9-16.)

Sensors placed upward, filtration paper soaked with NaCl soln (saturated) were placed on top of sensors. (Next page). (lot # 006924)

Sensor 1010 CS connected to ch. 1-8; SS304 to ch. 9-16 of DRH — conductivity test. Multi-Cell instrument

Cell I — NaCl + KCl (lot # 006924), paper (lot # 005573) 1.5 cm wider than base

Cell II — NaCl (lot # 006924), paper 1.0 mm wider than base

(DRH = 74.43% — Greenspan)

8/20/01

13:43 Z plot file started, 08200 on Cell I

13:47 (i/Ta/Tw) = 19/21 $Z_I = 10^{2.15}\ \Omega$.

13:51 18/21 to cell II.

13:56 18°C/21°C. Sensor program started. 08200

raise temp. 1 min interval.

14:37 40°C/41°C $Z_{II} = 310\ \Omega$ to cell I.

14:52 40°C/41°C.

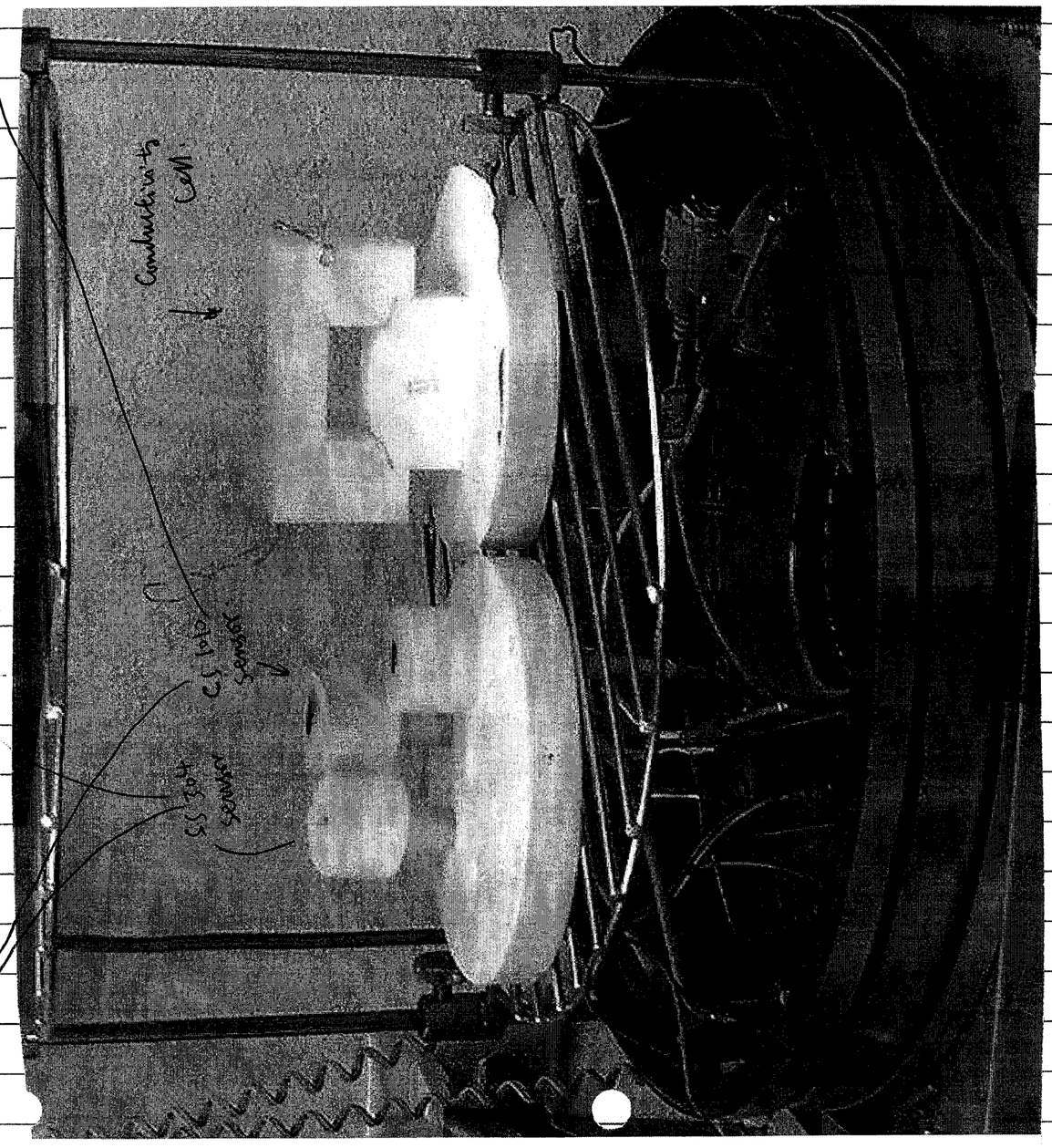
15:02 change humidity. to cell I

J. Yang 4/3/02

J. Yang 7/15/02

EDS Analysis see page 151 BoDK #497. (Do not have enough material to do solun. Analysis) J.Y. 05/20/03

Cont. Analysis see page 4, Book 5-22



made on 6/13/2001 see page 34 Bk# 429. J.Y. 05/20/03

J. Yang 09/09/02

15:14	41/50 ♀.	
15:33	41/50.	H. chamber opened, put put move wall soln. sated at 22°C.
15:37.		H. chamber closed.
15:39	40/50 ♀.	
15:50	41/50 ♀	
17:16	41/50 ♀. (58%)	to cell I.
17:25		restart sensor program. 0828b.txt.
17:30	41/50 ♀	to cell II.
8/21/01		
7:58	41/50 ♀.	Changed Humidity. to cell I
8:38	40/50 ♀.	
8:		
13.		
11:59	39/50	to cell II
15:17	39/50	to cell I
17:18	39/50	to II at 17:24
8/22/01		
8:00		Sensor program restarted 0822a to cell I
		Filter: 40; Δt = 2 min, settle ch.: 17 J.Y. 8/22/01
8:10	39/50	changed Humidity ~~(38/50 22~~
		(38/50 ♀, Tcooler = 22°C, knob: 1 turn)
12:39	37/50 (44%)	
8/23/01		
7:59		$Z_{II} = 10^{6.2}\ \Omega$. to cell II.

J. Yang 4/3/02

8:05 37/50°C, $Z_I = 10^{5.5}$. Change RH.
(36/50, 17°C, 1turn)
12:51 38/50 to cell II

8/24/01 8
8:14 $Z_{II} = 10^{6.5}$ to cell I

8:21 38/50 Change RH
(18/50.5, 0°C, full turns)
12:37 26/50°C (14%) to (36/50, 17°C, 1turn) to cell II
16:06 $Z_{II} = 10^{6}$ 33 J.y. 8/24/01 to cell I
17:17 34/51 to (~~38~~/50, 22°C, 1turn).

8/25/01
9:24 37/50 to (38/50, 22°C, 1turn).
10:49 37/50
11:43 37/50

08/27/01 (Monday).
8:04 37/50 to (39.5/50, 27.5°C, 1turn). to cell II
8:21
12:36 39/50 to (41/50, 32.5°C, 1turn).
15:14 41/50 (88%) to cell I
8/28/01
8:04 41/50 to (42.5/50, 32.5, 1turn) to cell II
12:29 #5179 41.5/50°C.

J. Yang
4/3/02

8/29/01
8:14 41.5/50 to cell I
14:24 42/50 to (43.6/50, 32.5°C, ½ turn) to cell II

14:26 43/51
17:17 42/50

8/30/01
8:07 42/50 (64%) to cell I
12:30 to cell II
17:15 42/50 to (43.7/50, 32.5°C, ½ turn)
17:19 44/50 (72%)

8/31/01
8:19 43/50 Sensor program stopped.
to cell I
8:28 44/50
8:36 44/50
13:19 44/49.5°C. to cell II
17:06 #7461 44/50 to cell I
17:12 to cell II

9/4/01 after Labour Day.
8:06 #9993, Sensor program stopped at 5:39 a.m 9/2/01.
8:12 43/50, Sensor prog. started 09:04a, to cell I.
8:14 to cell II
13:35 43/50 to (43.6/50, 32.5, ¼ turn).

J. Yang
4/3/02

9/05/01

8:16 45/50 (76%) to cell I

8:18 to cell II

17:20 43/50

9/06/01

11:29 41/51 (56%) to (43, 32.5, ½ turn).

17:18 42/51

9/9/01

Reservoir J.Y. 9/9/01

13:09 Water in humidifier gone.

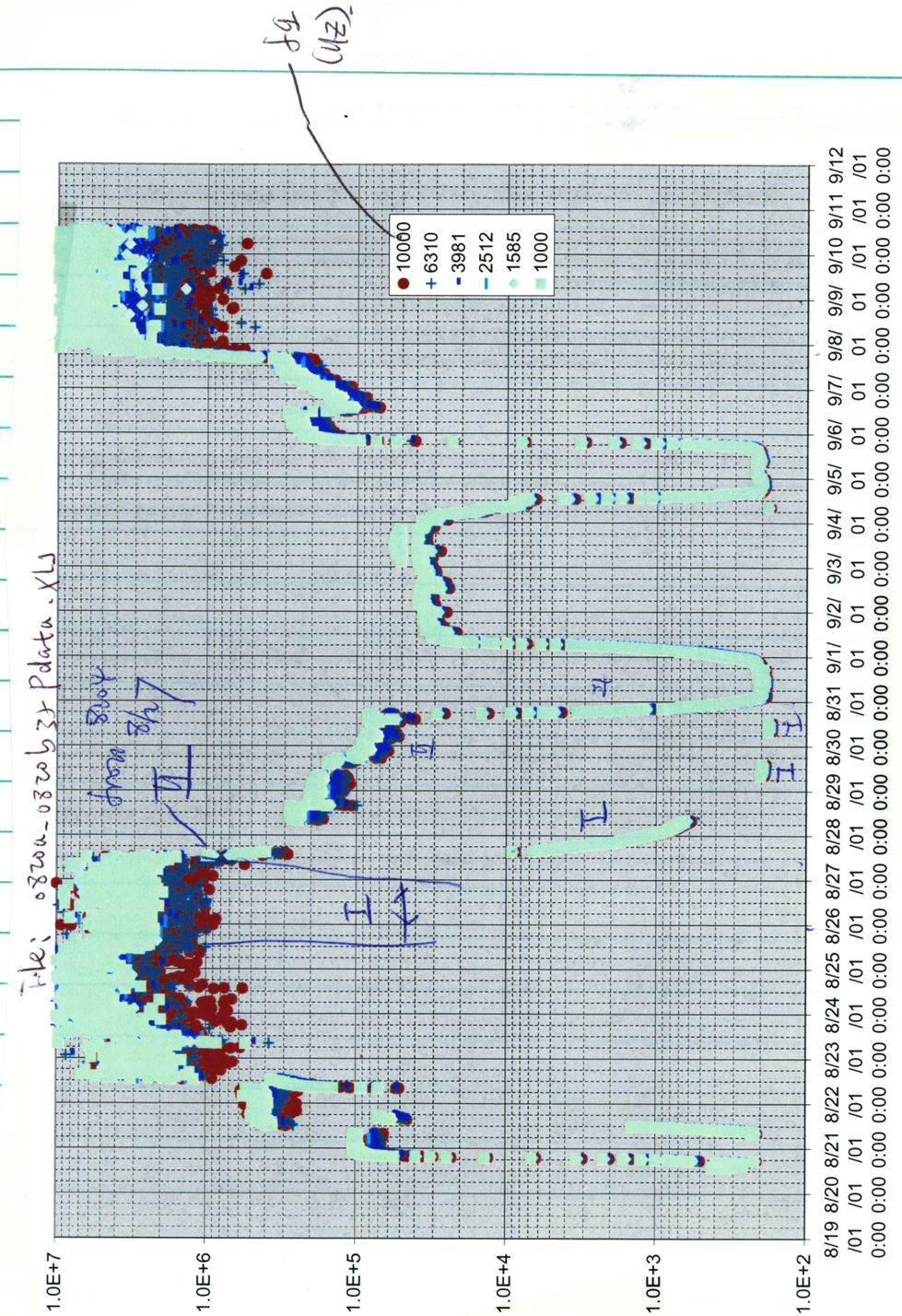
paper on SS sensor blown out.

13:11 30/51

13:13 30/50. test terminated.

J. Yang

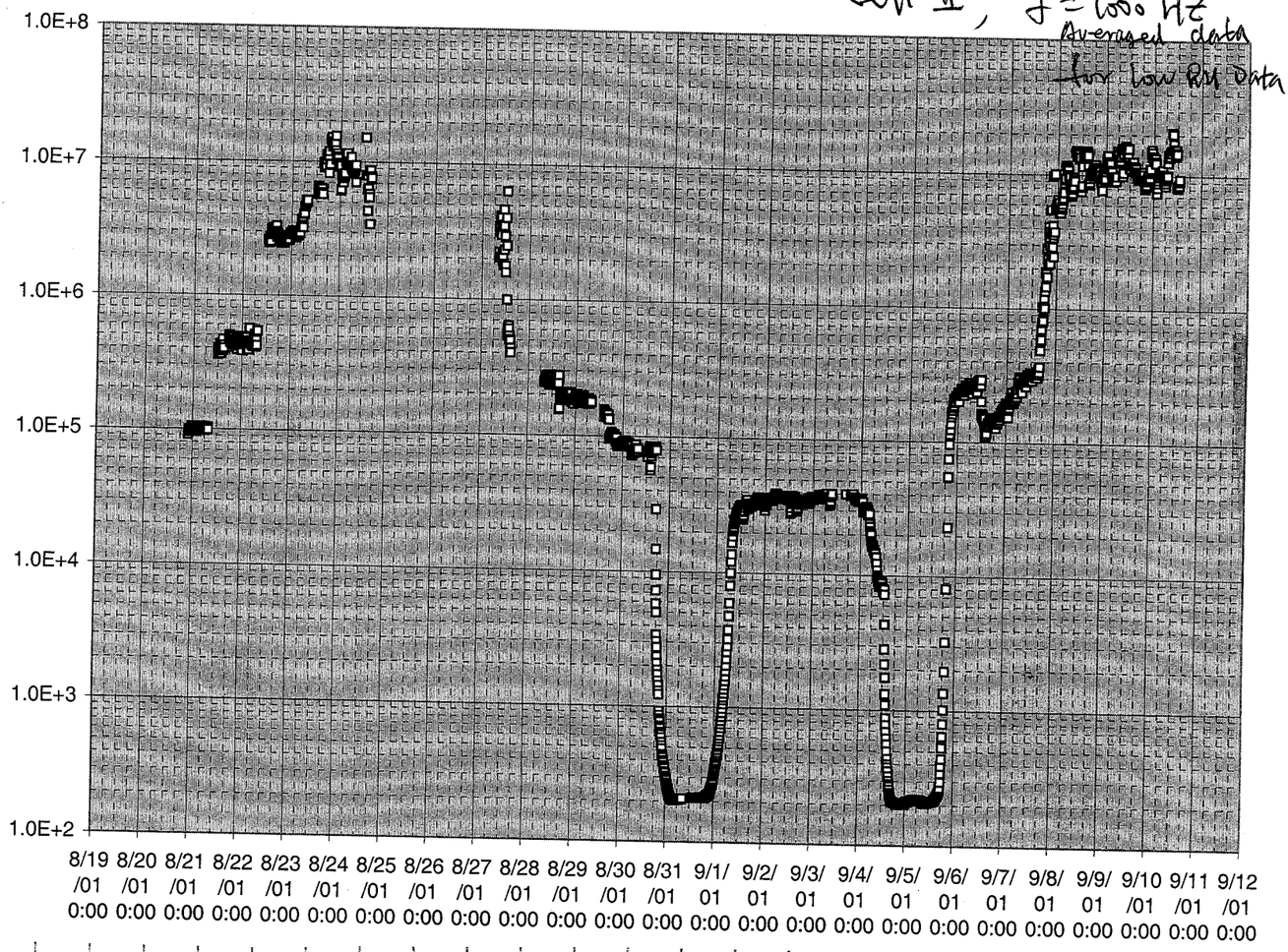
4/3/02



J. Yang 4/3/02

File: 0820a_0820b35PData_II.xls II_chart

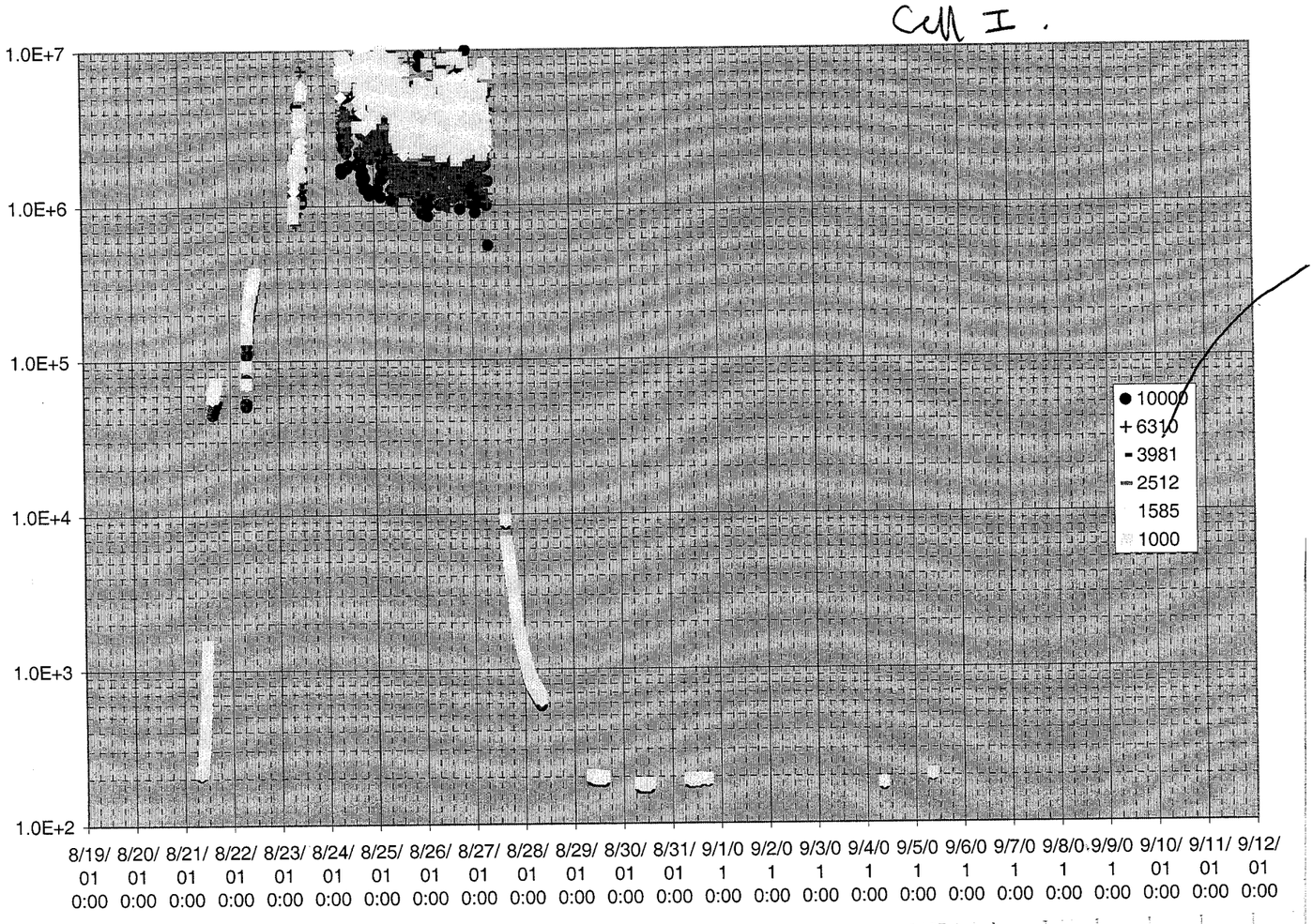
cell II, f = 1000 Hz
Averaged data
for low RH Data



20/5/71 [illegible]

0820a_0820b35PData.xls I_Chart1

Cell I.

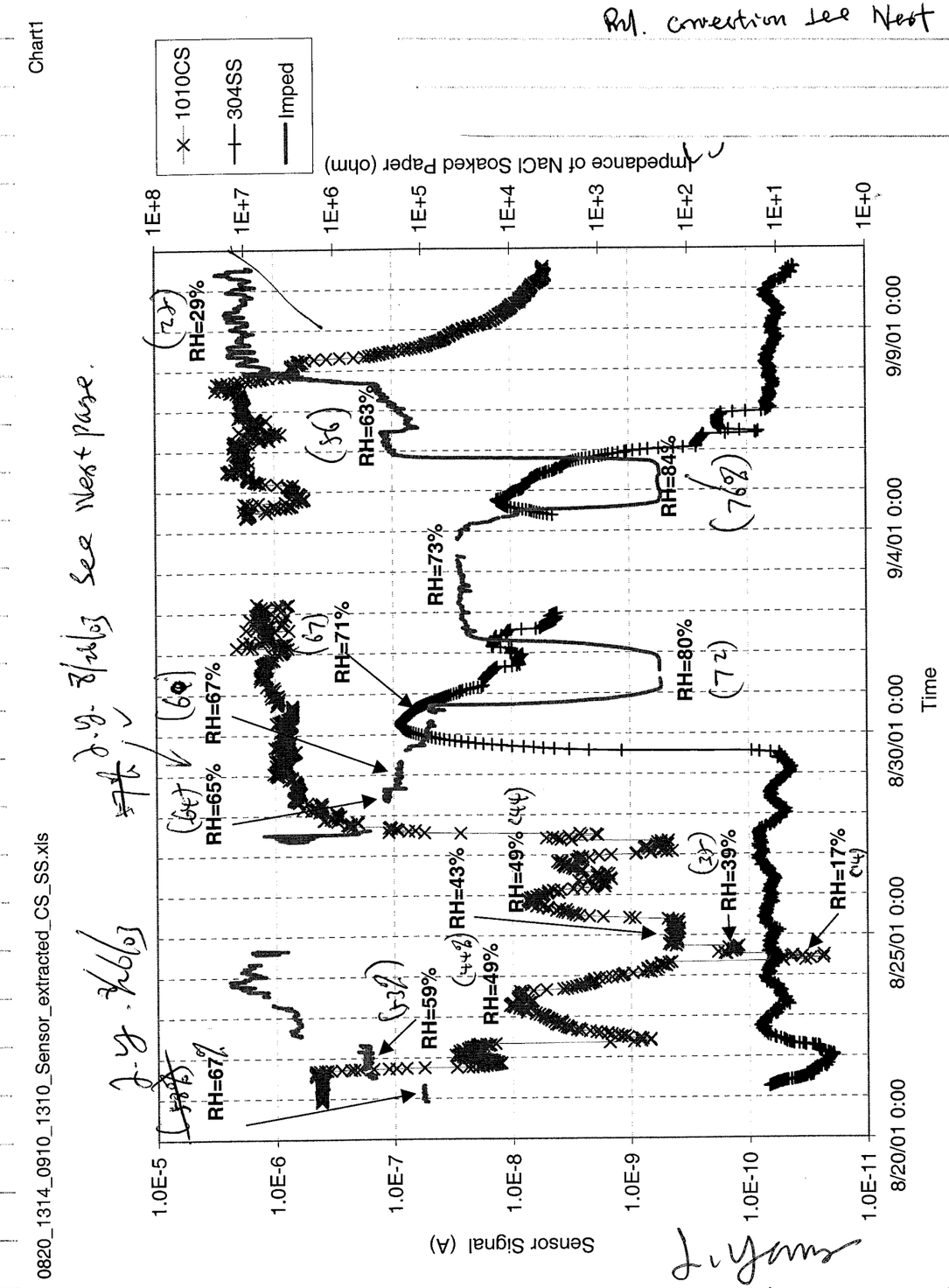


fg (Hz)

20/5/71 [illegible]

J. Yeans 7/17/02

Rel. correction see Next page.



J. Yeans 4/3/02

RH correction

Corrections

0820a_0820b35PData.xls

directly measured value

Correction 9% at about 84% (Notebook 70) and 4% at about 30% (Notebook 12

	Factor	Corrected
58	6.592593	64.59259
53	6.12963	59.12963
44	5.296296	49.2963
35	4.462963	39.46296
14	2.518519	16.51852
38	4.740741	42.74074
44	5.296296	49.2963
58	6.592593	64.59259
60	6.777778	66.77778
64	7.148148	71.14815
72	7.888889	79.88889
66	7.333333	73.33333
76	8.259259	84.25926
56	6.407407	62.40741
25	3.537037	28.53704

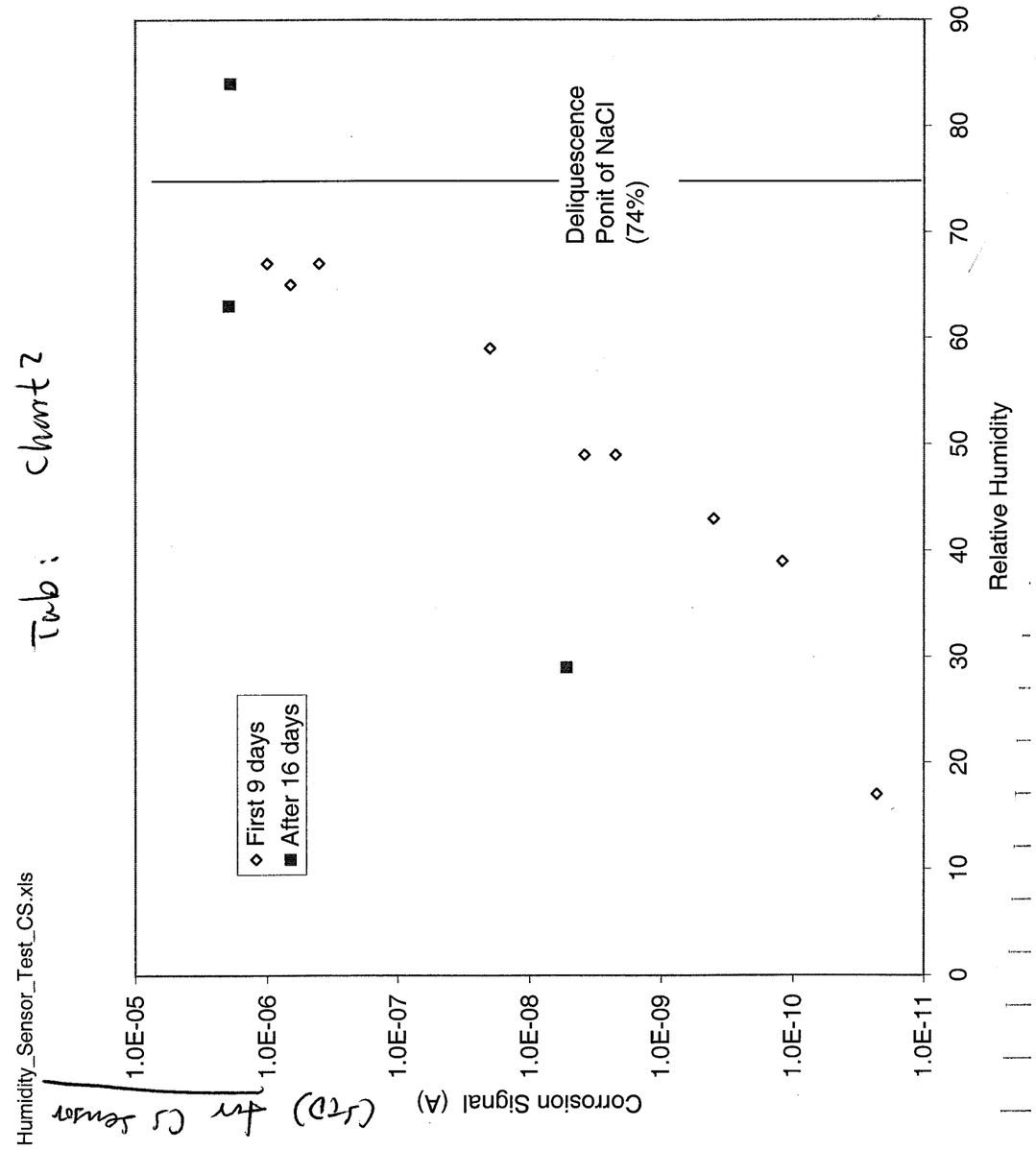
RH=	Factor
84	9
30	4

DH of NaCl=74.%, according to Greenspan

J. Yang
4/3/02

Chart 2

Tab:

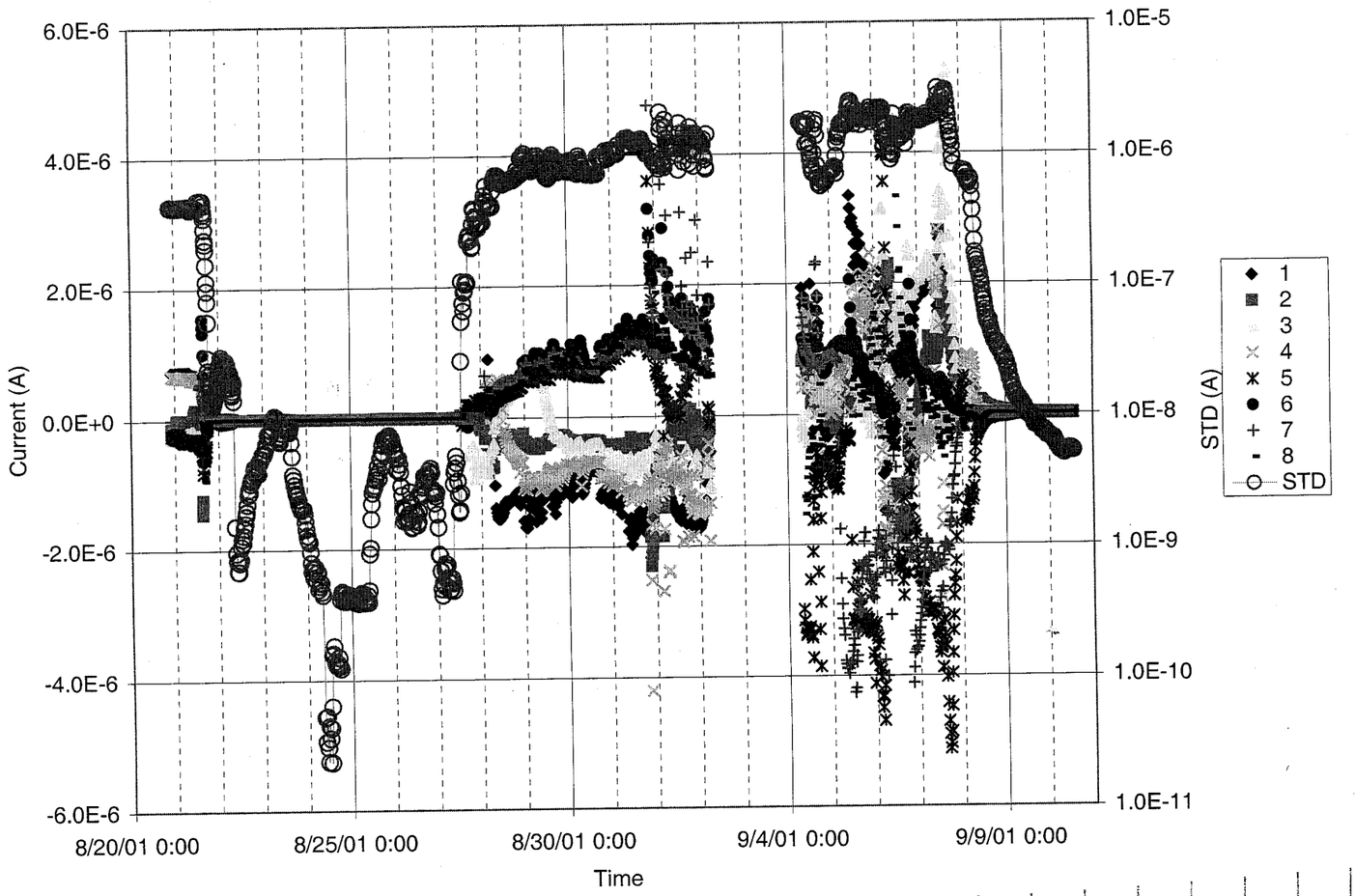


J. Yang
4/3/02

0820_1314_0910_1310_Sensor_extracted.xls

CS_Chart1

carbon steel sensor.

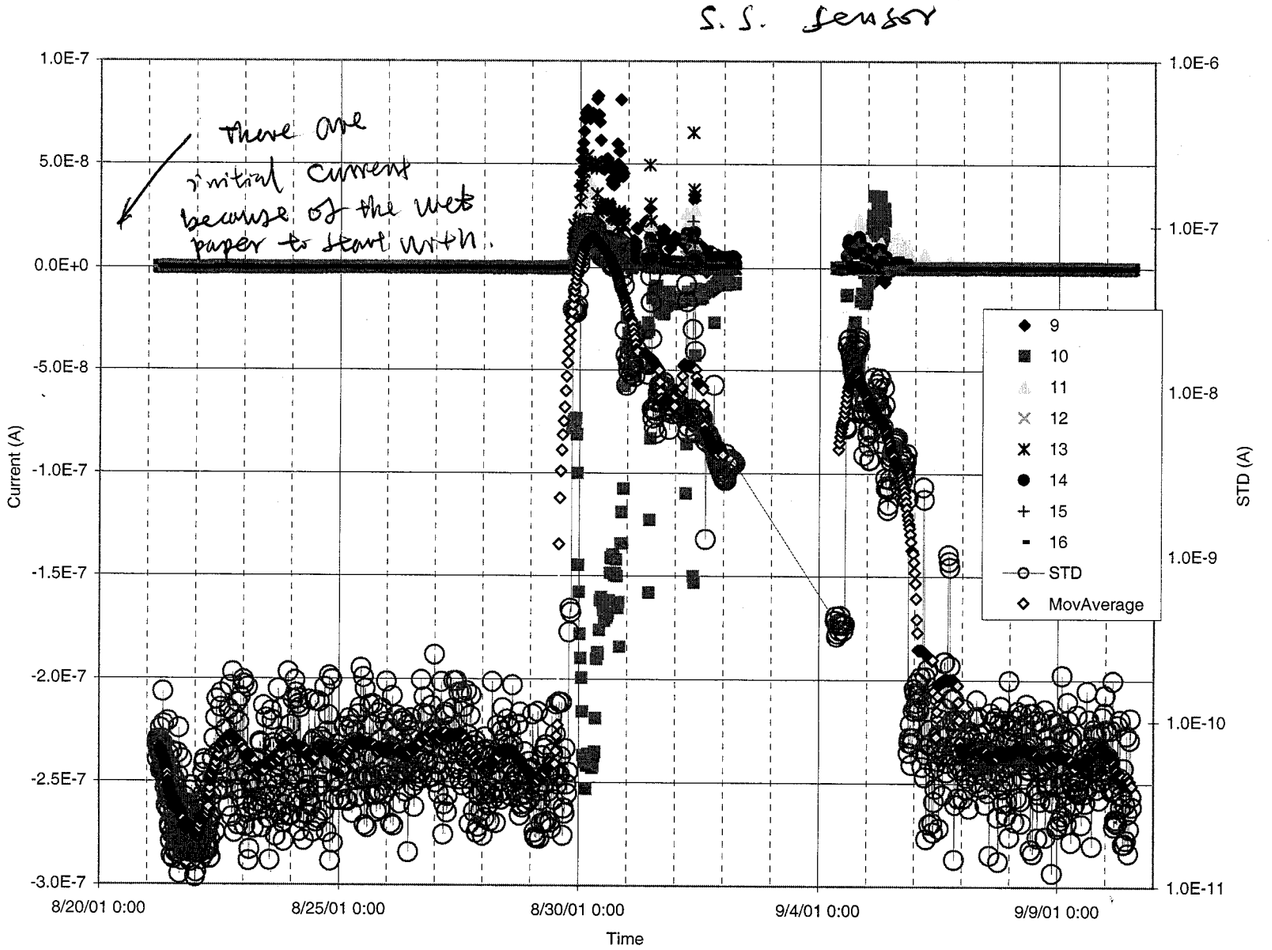


20/5/7 enclosed

0820_1314_0910_1310_Sensor_extracted.xls

SS_Chart2

S.S. sensor



20/3/7 enclosed

6/20/02

Corrosion of Carbon steel and S. stainless steel materials under salt deposits in Humidity Controlled environment.

Test #1. using KCl

Sensors Carbon steel : D-CS1010-2, 16 working Electrodes
S. steel : D-SS316-1, 16 working electrodes
See note book #497 For details (pages 107, 110, 111)
Confirmatory Analysis of CS1010 and SS316
see page 153, Book 497 For SS316
page 151, Book 497 For CS1010 (EDS only).

14:00 KCl salts, lot # 005573.
dried in oven at 50°C, for 2 hours
~~Humidity chamber set to 50% RH and 50°C.~~
J. Yang. 6/21/02

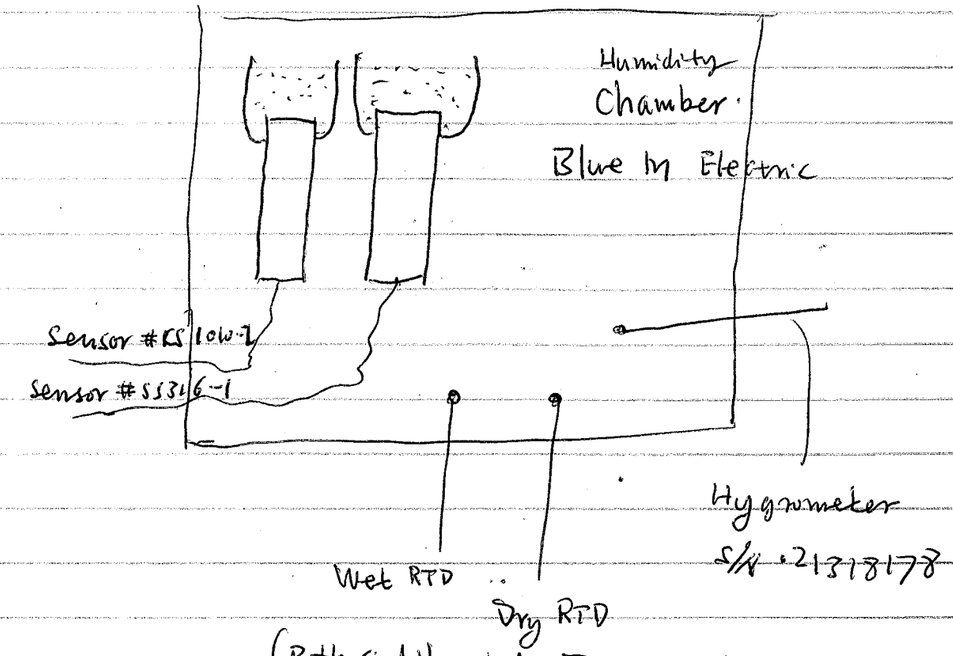
16:25 ~~RH(w) =~~
RH(meter) = 38.5%

16:30 dried salt transfered to ~~two~~ of sensors
See page 173 for set up

16:45 Td = 49°C, Tw = 33°C, RH (meter) = 39.07%

6/21/02
7:49 Wet Water gone
refilled: RH (meter) = 36.72%

8:10 Td = 49°C, Tw = 34°C RH (meter) = 37.6%, T (meter) = 47.41°C
J. Yang 7/17/02



(Both Calibrated Jan. 22/02, AN: 604828)

8:25, Dpoint = 13.30, Connectors #1 – 4 of meter to Sensors in Humidity Chamber.

Connections:

Connector:	#1	#2	#3	#4
Sensor:	D-SS316-1(S)	D-CS1010-2(S)	D-CS1010-2(L)	D-SS316-1(L)

Sensor program has been used for crevice test.
Data program name: 02-0618a.

13:21 Tw/Td = 34°C/49°C, RH(Meter) = 37.32 T(Meter) = 47.32°C.
P channel #1 – 32 = -6.8 – -3.1 μV Except #23

Found return of ch. 23 broken.
J. Yang 7/17/02

Meter connectors returned to the crevice sensor

13:41. New connection.

Connectors	II-2	II-3	II-4	II-5
Resistors:	100k-1	100k-2	100k-3	100k-4
Sensor cable	D-SS316-1(S)	~~D-SS316(L)~~ D-SS316-1(L) J.Y. 6/21/02	D-CS1010-2(S)	D-CS1010-2(L)

14:27 Sensor program started. 02-0621a.

Results see pages 183-184 J.Y. 7/10/02

16:47 Td/Tw = 49°C/33.5°C, RH (meter) = 37.76%, T(Meter) = 47.30°C

Set (Td/Tw) = 52/38.5°C, Cooler = 14°C.

6/24/02 Td/Tw = 51/35°C ⇒ [35% RH] RH (m) = 34.79%, T(m) = 48.64°C

8:25 Signal of sensors: -2 ~ -8.5 μV. with 100k Ω Resist.

8:32. Set to 65% RH. as Target. (51°C/42°C = Td/Tw) cooler = 14°C.

9:03 Still Td/Tw = 51/35 Change cooler = 25°C.

9:05 Td/Tw = 51/38 Change cooler = 30°C

9:15 Td/Tw = 51/40 Change Cooler = 34°C

9:25 Td/Tw = 51/41

10:36 Td/Tw = 51/41 RH(m) = 57.2%, T(m) = 48.86°C.

Sensor signals -2.6 ~ -9.7 μV.

Td/Tw = 51/42 RH(m) = 56.64% T(m) = 48.82

2:26 Sensor signal: -2.0 ~ -20.2 μV (56.57 - 59.35%)

J. Yang 7/15/02

6/25/02

9:35. Td/Tw = 51/41. RH (m) = 59.86 T(m) = 48.82°C
↳ 56% RH.

18.6 ~ -18 μV — Sensor Signal.

6/26/02

9:43 Td/Tw = 51/42 ~ 52/42 (51/41) RH(m) = 62.2% ~ 58.05% (%) T(m) = 48.83°C

Sensor signal SS: -0.05 ~ -15.87 μV!

CS: +790 ~ -870 μV! Corroding!

8:53 Sensor signal SS: +4 ~ -6 μV

CS: +913 ~ -890 μV

9:06 Set Td/Tw = 51/37.5°C. Target (51/33.5°C) (37% HR)

9:16 Td/Tw = 51/38 Change Cooler = ~~20~~ 30°C (JPL 6-26-02)

9:22 Td/Tw = 51/38 Change Cooler = 20°C

9:41 Td/Tw = 51/34 Change Cooler = 19°C

9:55 Td/Tw = 51/34 ~~Change Cooler~~ (JPL 6-26-02) Change cooler = 18°C

10:07 Td/Tw = 51/33 34.5% RH

13:27 Td/Tw = 51/33 31.6% RH

Sensor signal SS: -5 ~ -3 μV

CS: +1.6 ~ -10 μV

J. Yang 7/15/02

14:00 Sensors were removed and discoloration due to corrosion of carbon steel was noted on the carbon steel sensor. The salt directly above the carbon steel sensor was also discolored.
No discoloration noted on stainless steel sensor.

14:16 Sensors were polished ~~and~~ John Sandy 6-26-02 at 1000-grit and placed back in humidity chamber

14:54 Sensors were connected same as pg 174.
15:20. Program interrupted; and restarted. Results see pages 175–176
new File: 02-0626a., chamber close to dry the system.
4:45 p.m. Td/Tw = 51/33°C, RH(m) = 36.7%.
~~Chamber opened~~ J.Y. 6/27/02
Signals: −13 — −0.8 μV (SS)
−4 — +22 μV (CS) J.Y. 6/27/02
5 min pass
6/27/02 ~~Chamber closed, after sensors repolished to 1000 grit. pre dry it before salt put on.~~
8:27 Td/Tw = 51/33°C, RH(m) = 37.41,

8:41 Signals −5.6 — −0.59 μV (SS)
−4.8 — −0.6 μV (CS)
Td/Tw = 51/33°C, RH(m) = 37%.

8:52. ~~kcl~~ Salt (dried over night at 50°C, lot # 005573) placed on top of sensor, with a beaker over the sensors and the hygrometer.
8:53 Set Td/Tw = 51/33°C.

J. Yang 7/15/02

8:56 Td/Tw = 50/33 RH(m) = 56.9%, T(m) = 36.7°C

9:03 Td/Tw = 51/33 RH(m) = 42.2% T(m) = 47.3°C

9:16 Td/Tw = 51/34 RH(m) = 38.2% T(m) = 47.2°C
10:19 Td/Tw = 51/33 RH(m) = 35.9% T(m) = 47.69°C.
11:27, Data# 247. Connector II-3 disconnected for size test.

13:43 Td/Tw = 51/? RH(M) 35.4% T(m) = 47.7°C
Range: 35.48% – 36.16%
13:54 Connector II-3 Returned
Connector II-5 Disconnected
Datapt. 277

6-28-02
9:27 Connector II-5 Returned
~~Connector II-3 Disconnected~~ JPL 6-28-02
Td/Tw = 51/34 RH(M) = 36.8% T(m) = 47.75°C

9:30
Signals Data pt. 510
SS: −6.546 — −3.435 μV
CS: −7.248 — −3.867 μV
9:32 Connector II-3 Disconnected
13:00 Data 554 Td/Tw = 51/34 RH(M) = 36.14% T(m) = 47.77°C
SS −6.029 — −4.5 μV only one connected
CS −6.89 — −3.661 μV

J. Yang 7/15/02

6/28/02

16:42 Data #602

Connector II-5 disconnected for size effect test

Connector II-3 returned

Td/Tw = 51/34, RH(m) = 35.34% T(m) = 47.79°C

→ 34% RH ~36.00% ~47.80°C

17:26 Set : 52/38.5°C, cooler = 34°C.

17:27 Set : 52/38.5°C, set cooler : 34°C.

17:38 Td/Tw = 51/39°C. RH(m) = 50.4%, T(m) = 47.93°C.

Connector II-5 returned.

6/31/02

JPL 6-31-02

J.Y.

7/09/02

7/01/02. J.Y.

7:23

SS: -9.859 – -3.416 μV

CS: -2642136.03 – -3.934 μV

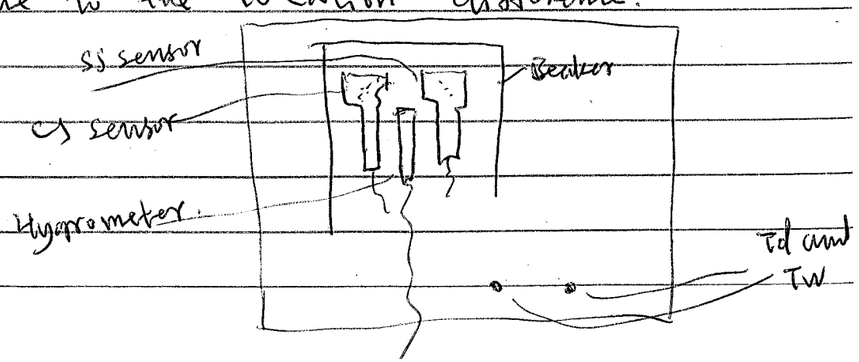
this level of signal are only seen on connector II-5, not II-4 must be due to bad connection of return.

Td/Tw = 51/40 RH(m) = 61.31% T(m) = 47.73°C

9:11 Td/Tw = 51/40, RH(m) = 60.70 – 62.36%, T(m) = 47.77°C – 47.78°C

→ 53% RH

The RH from Td/Tw is much less than RH(m). probably due to the location difference.



J.Yang 7/15/02

The temp. of T(m) is only 47.7°C.
The temp of Td is 51°C.

The RH(Td/Tw) was closer to RH(m) previously (see page 175). That time the T(m) was 48.8°C, because it was closer to the bottom.

9:29 II-5 Removed

10:32. Signals from II-4.

-3 – -7.3 μV

13:10 Data 1357

SS: -11.632 – -3.776 μV

CS (II-4) only: -8.809 – -5.973 μV

14:19 II-5 Returned

16:11 II-5 Removed

17:23 Td/Tw = 51/40 RH(m) = 61.16% T(m) = 47.77°C

Data 1407 SS: -7.774 – -4.163 μV

CS (II-4 only): -6.497 – ~~-5.747~~ -5.747 μV

JPL 7-1-02

J.Yang 7/15/02

7/2/02 7:31

T_d/T_w = 51/39 T(m) = 47.72°C RH(m) = 51.65% ?

~~Stir Magnet was not stirring~~ JPL 7-8-02

Data 1582

SS: -13.139 - -3.891 μV

CS: (II-4 only) -7.124 - -5.594 μV

8:37 II-5 Returned

8:46 II-3 Removed

9:24 T_d/T_w = 51/40 T(m) = 47.77°C RH(m) = 61.77 - 63.27%

SS: (II-2 only) -4.91 - -3.731 μV

CS: -10.51 - -3.045 μV

12:07 T_d/T_w = 51/40 RH(m) 62.52 - 63.61%

T(m) 47.82°C

Data 1639 SS: (II-2 only) -4.944 - -1.355 μV

CS: -5.532 - -3.769 μV

16:42 II-3 Returned

16:53 T_d/T_w = 51/40 T(m) = 47.79°C RH(m) = 61.73 - 62.85%

Data 1695 SS: -7.506 - -3.773 μV

CS: -7.56 - -4.83 μV

Lyons 7/15/02

7/3/02

T_d/T_w = 51/40 RH(m) = 61.63 - 62.94% T(m) = 47.7°C

Data 1868

~~SS: -7.742 - -1.623 μV~~ JPL

~~CS: -7.742 -~~ 7-3-02

SS: -7.742 - -1.623 μV

CS: -6.203 - -3.504 μV

9:14 II-5 Removed

11:43 T_d/T_w = 51/40 RH(m) 62.03 - 63.31% T(m) = 47.78°C

SS ~~-4.558 - +8.098 μV~~ JPL 7-3-02 -5.723 - -3.877 μV

CS (II-4 only) -7.472 - -4.368 μV

7/5/02

8:31 Data # 2452.

T_d/T_w = RH(m) = 58.73 - 60.28, T(m) = 47.76 - 47.77 °C

signals

SS (II-2, II-3): -3.25 - -5.70;

CS (II-4 only): -4.20 - +0.47

8:51 Data # 2456 II-5 returned.

10:51 signals SS -8.7 - -4.13 μV; CS: -4.2 - -9.8 μV

II-5 removed.

14:10 program restarted. 0705a.

Lyons 7/15/02

Results see pages 187-188

7-8-02

8:18 Data 821

SS: -5.039 – -3.63 μV

CS: (II-4 only) -4.913 – -3.553 μV

T_d/T_w = 51/35 RH(n) 34.48 – 35.03% T(n) = 47.89°C

8:54 II-5 Returned to CS

9:13 Found reason for Low RH — Water in reserve tank empty, — refilled.

9:14. T_d/T_w = 51/40

16:46 T_d/T_w = 51/40 RH(n) = 54.72 – 56.26% T(n) = 47.97°C

Data 910

SS -4.509 – +1.627 μV

CS -5.562 – -3.484 μV

7-9-02

8:10 T_d/T_w = 51/40 (51/39) RH(n) 57.01 – 58.25% T(n) = 47.83°C

Data 1083

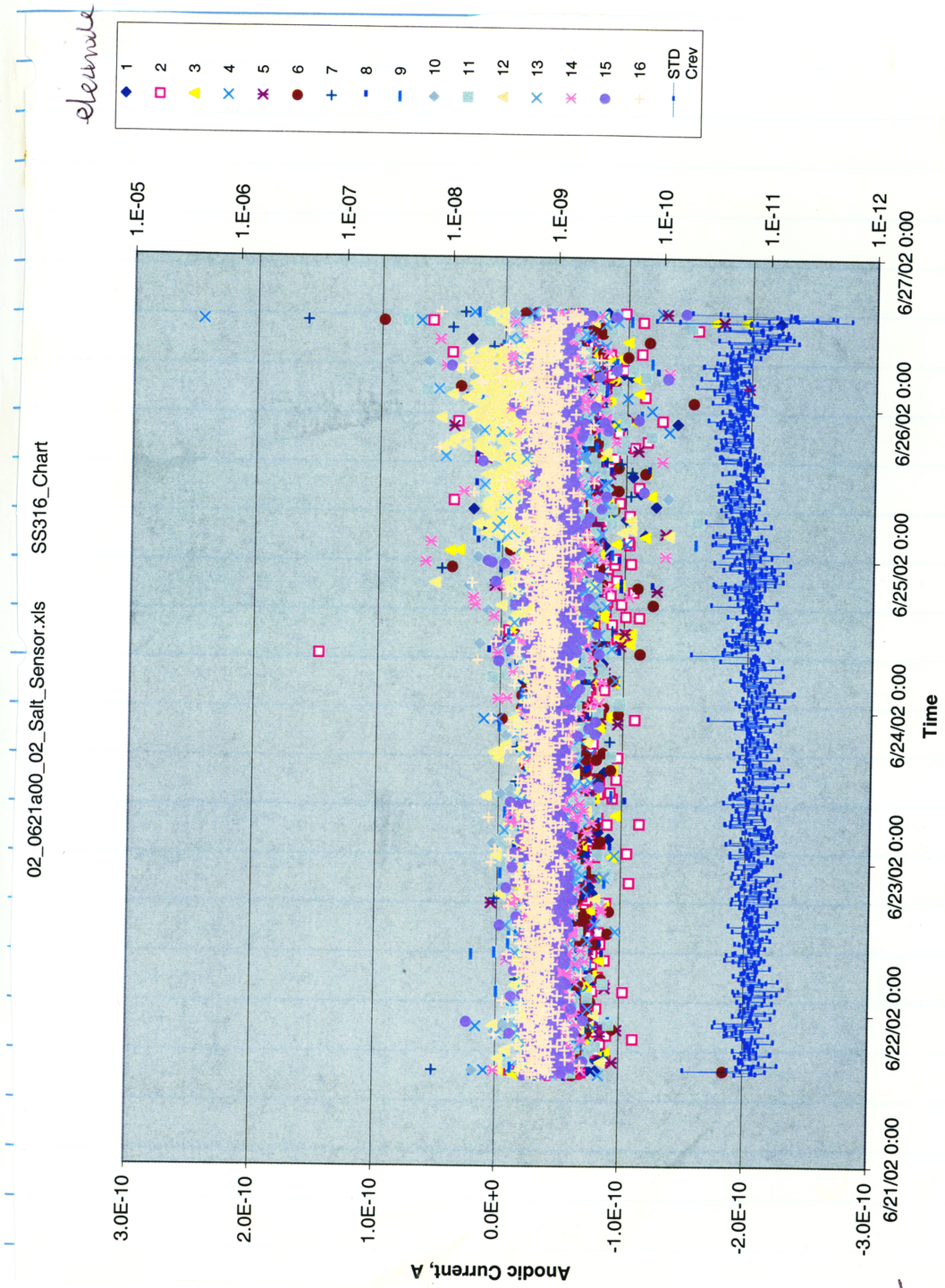
SS: -5.867 – -3.296 μV

CS: -6.989 – -4.546 μV

11:25 II-3 Removed

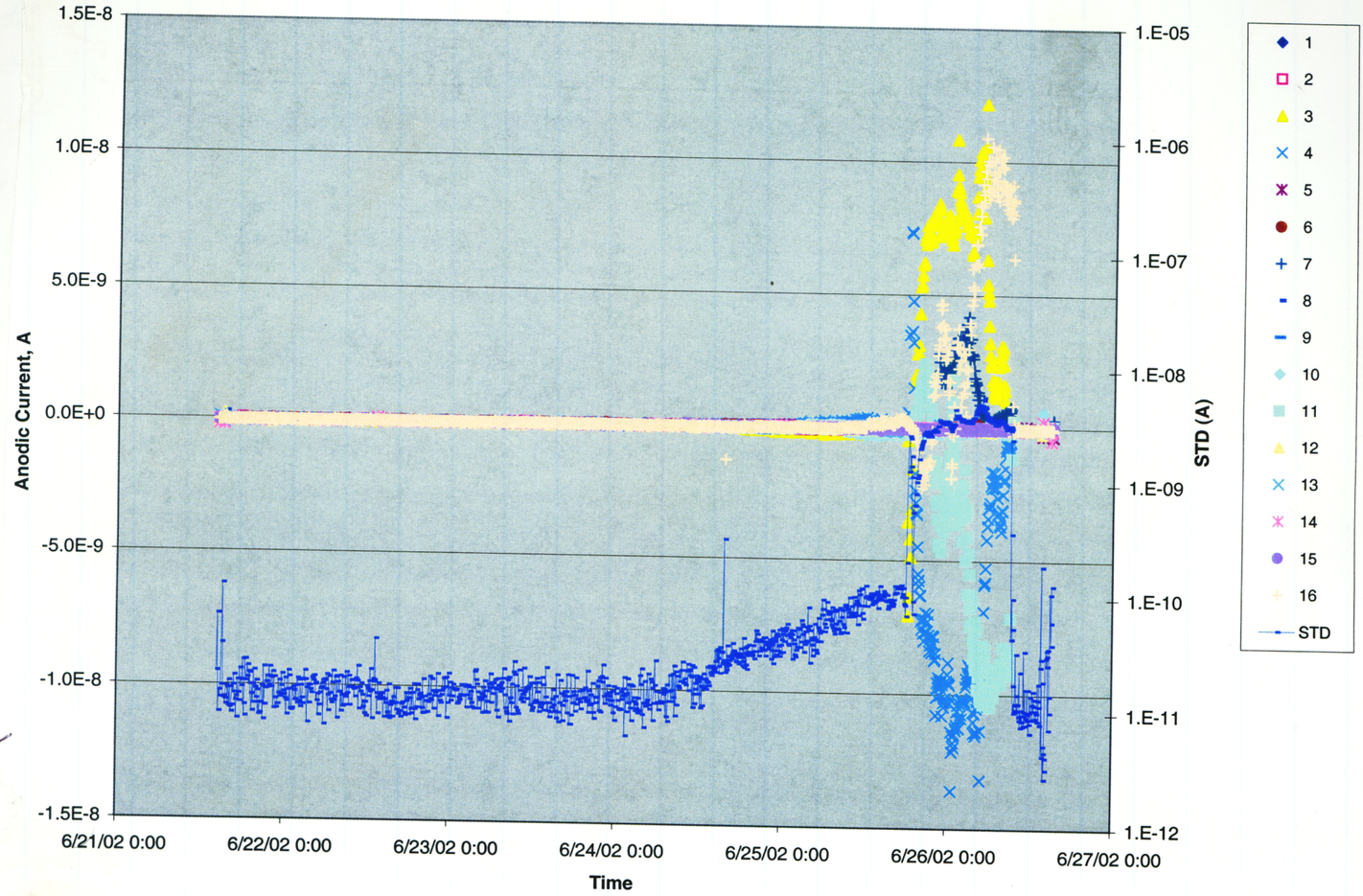
New Data File: 02-0709a see pages 191-192.

L. Young 7/15/02



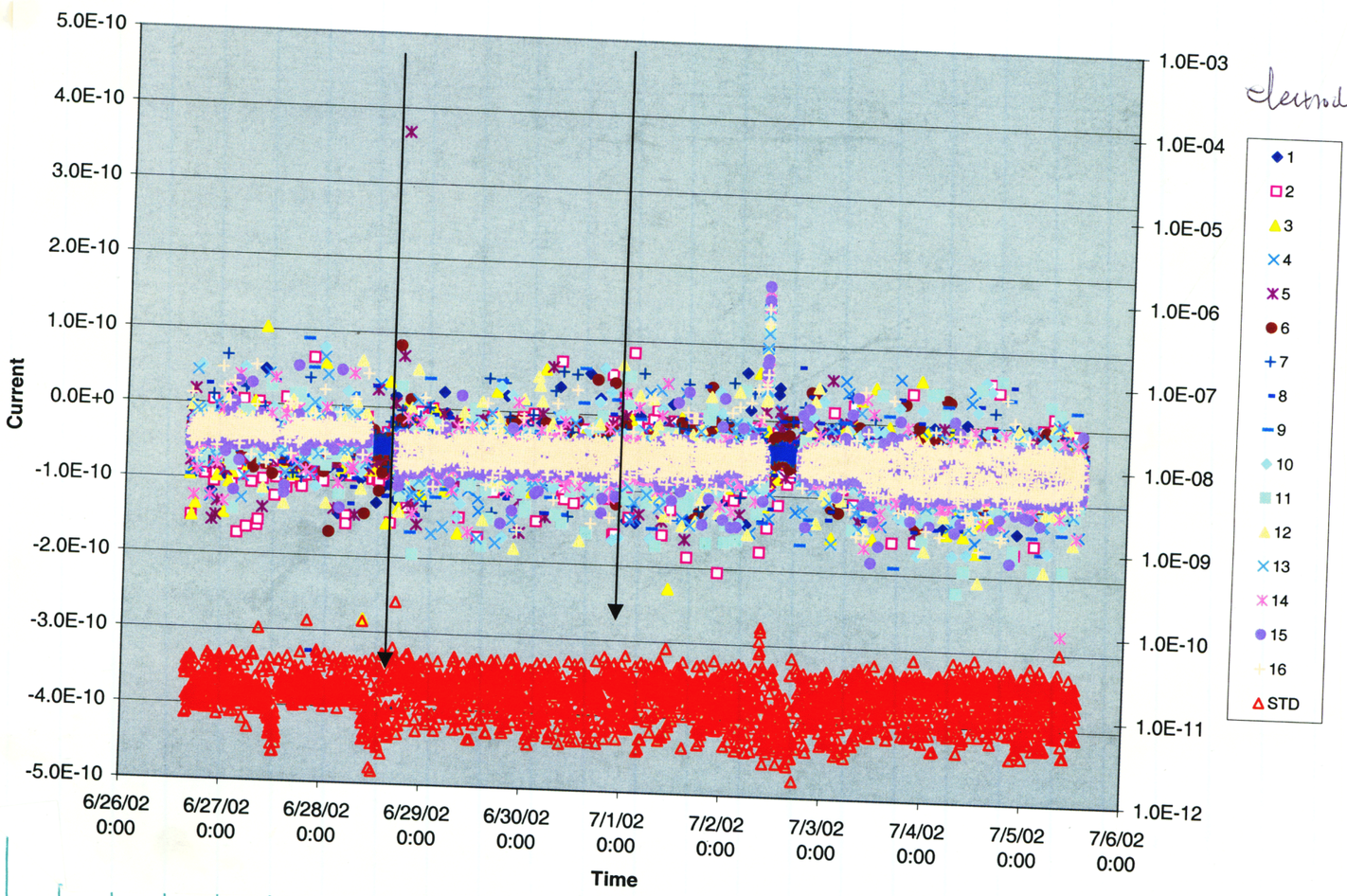
L. Young 7/15/02

02_0621a00_02_Salt_Sensor.xls / Tab: CS_1010_Chart



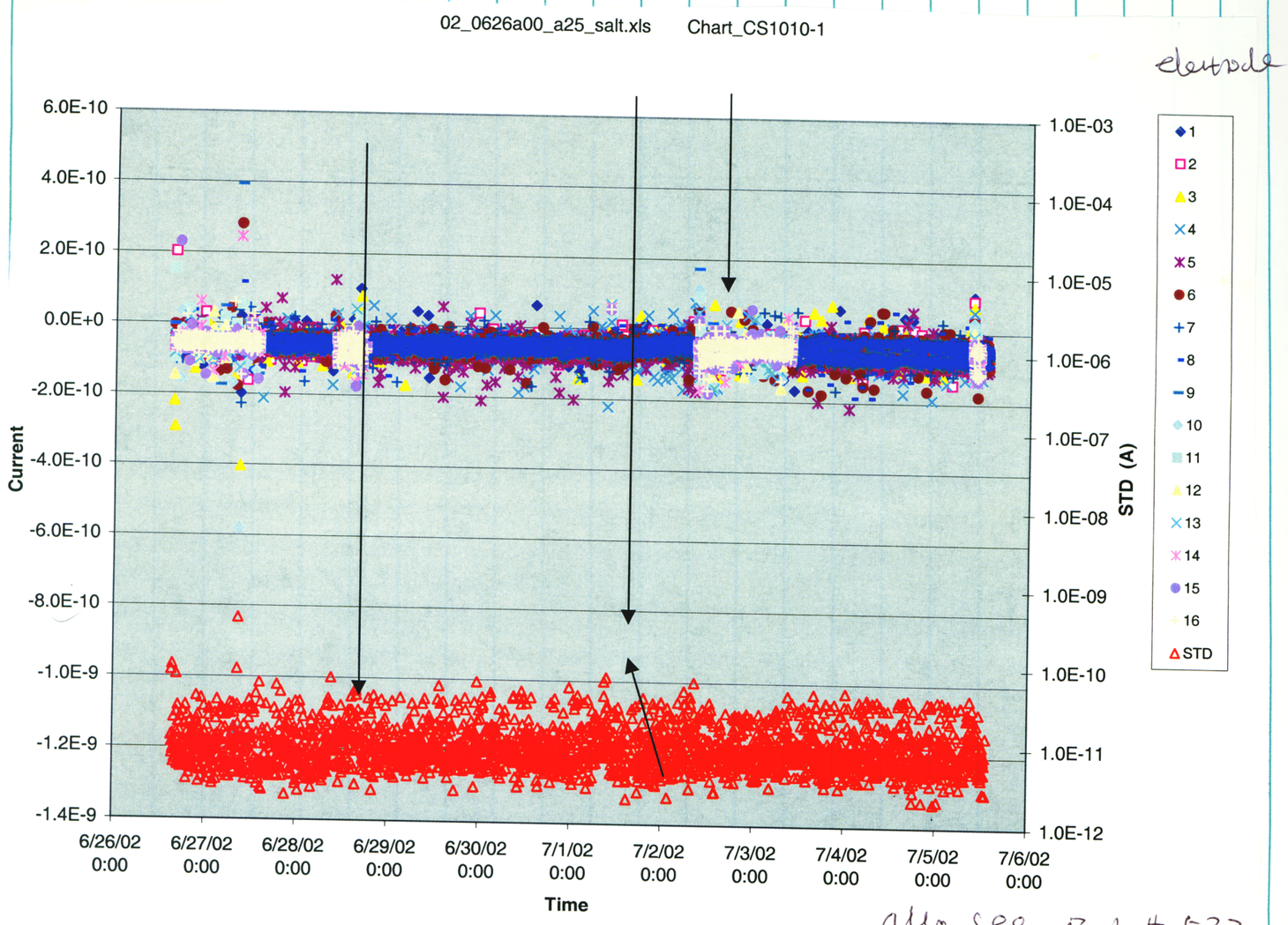
J. Young 7/1/02

02_0626a00_a25_salt.xls Chart_SS316-1

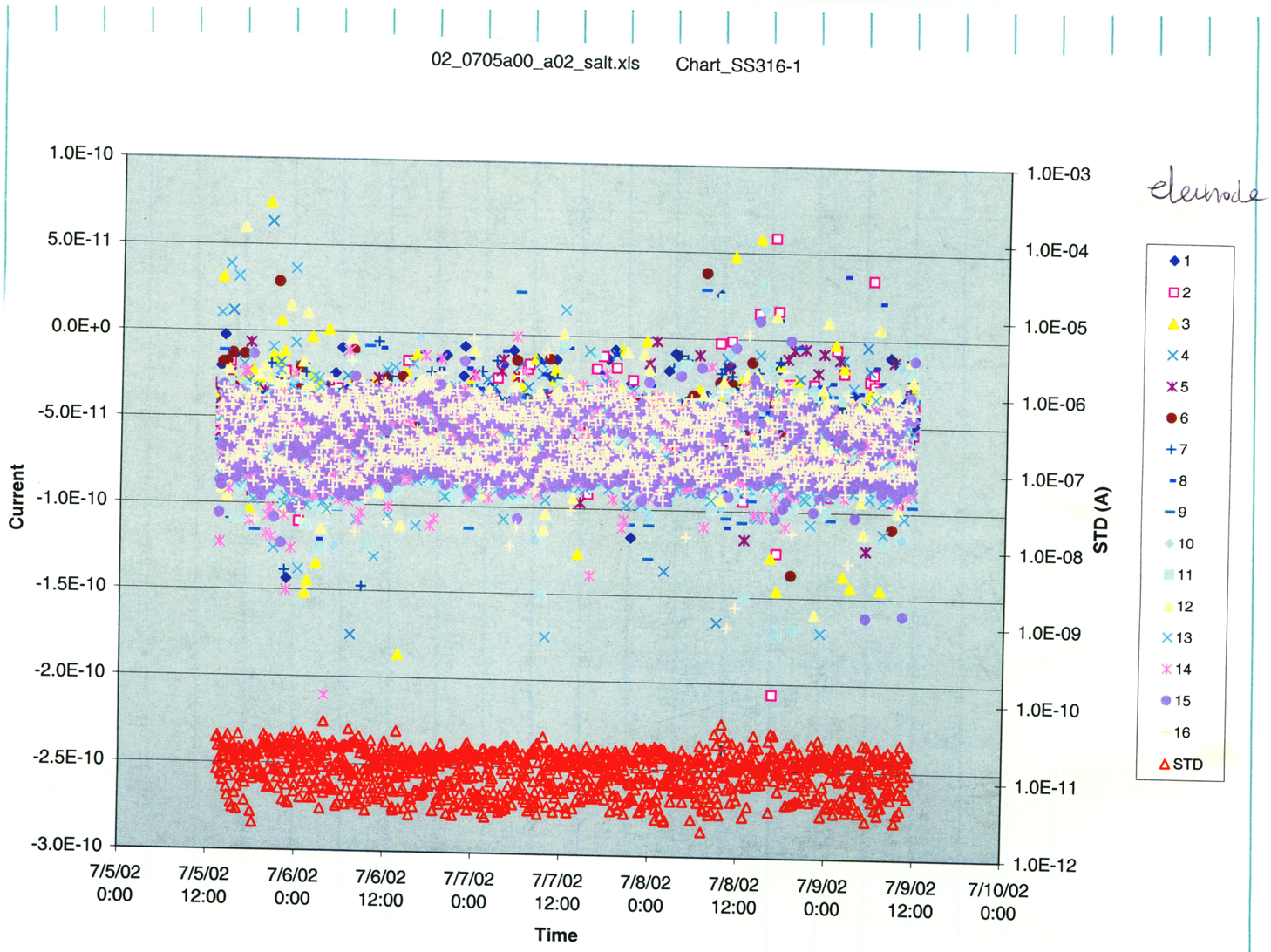


J. Young 7/1/02

Also see page 34 of Book #533
J.Y. 8/6/02

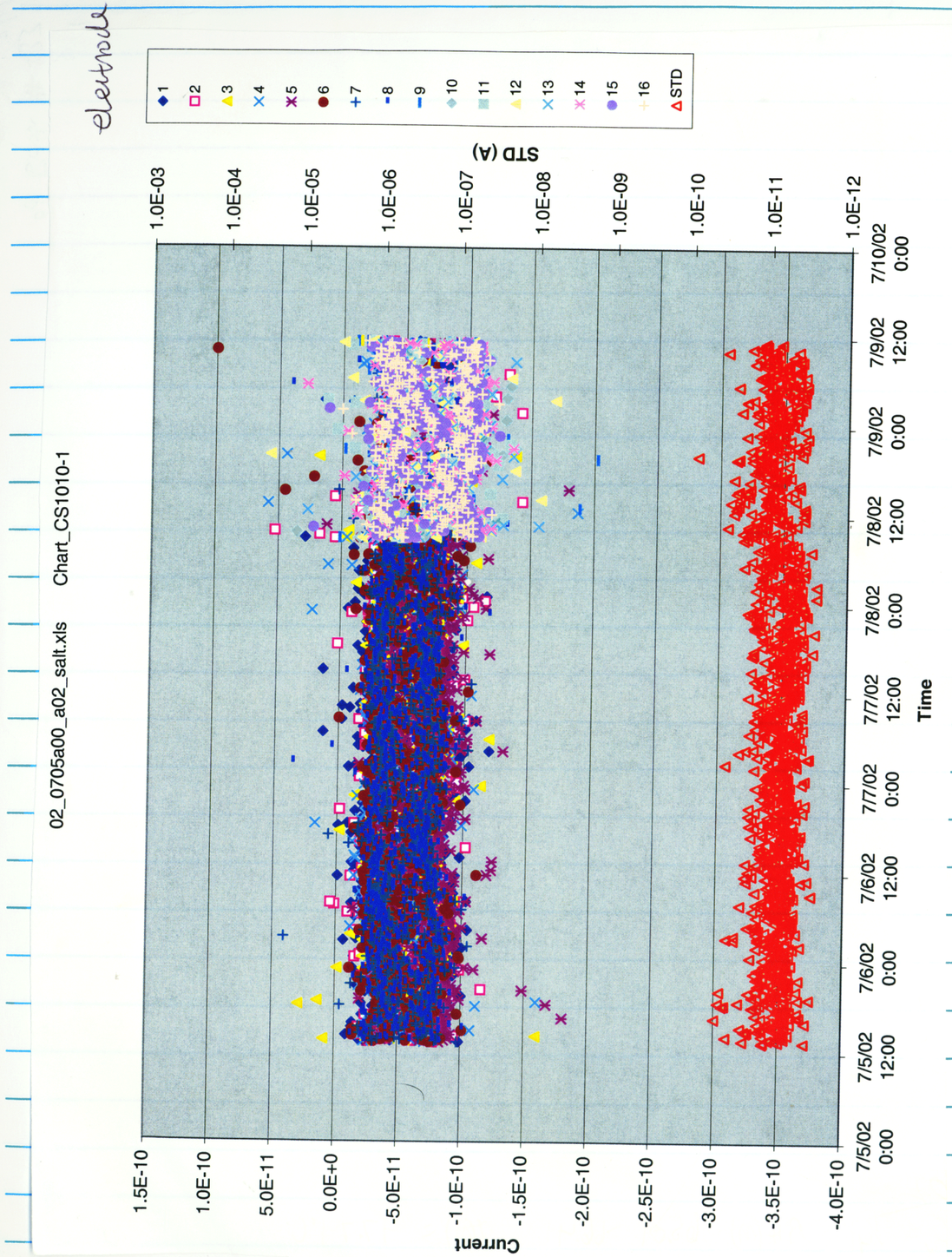


also see Book # 533 Page 39. 8/6/02



Also see page 39 of Book # 533

electrode



J. Lyons
7/15/02

7-10-02
~~Td~~ JPL 7-10-02

13:44 Td/Tw = 51/40 ~39, RH(m) = 58.30 - 59.87% T(m) = 47.90°C ±0.00°

13:46 Set Temp Td/Tw = 52/40 Target Humidity 65%

15:11 ~~Td/Tw = 52~~ J.L. 7/10/02
Td/Tw = 51/40, RH(m) = 59.91 - 61.26 %, T(m) = 47.

15:14 Set Temp Td/Tw = 52/41 °C

15:12 Data 309, program terminated. II-3 returned.

15:22 program restarted. 02-0710a. see pages 191-192

15:34 Td/Tw = (51-52)/(40-41)
Set Td/Tw = 51.5/41 °C

16:11 Td/Tw = (50-51)/40 RH(m) = 61.98 - 63.19% T(m) = 47.63 °C

16:17 Set Td/Tw = 51.8/41.3 °C, II-3 removed.

7-11-02

8:05 Td/Tw = 51/41 RH(m) = 64.78 65.87% T(m) = 47.69°C

17:00 Td/Tw = 51/41 RH(m) 65.18 - 66.64% T(m) = 47.80°C

7-12-02
9:01 Td/Tw = 51/41 RH(m) 65.01 - 66.41 T(m) = 47.74°C

J. Lyons
7/15/02

7/12

17:32. program restarted. 02-07126 } Results see pages 145-146 RH(m) = 65-66.5%

7/15/02 program restarted 02-0715a

7/15/02

8:52 T_d/T_w = 51/41 - 51/42 RH(m) = 68.23 - 69.54% T(m) = 47.79°C

T_d/T_w = 51/41 - 51/42, RH(m) = 68.32 - 69.56% T(m) = 47.80°C

SS (#-2 only): -5.453 - -3.973 μV

CS: -647.249 - +389.21 μV

18:10

~~7/15/02~~ program restarted II-3 returned.

J.Y. 7/16/02 02-07156. Results see page 39, Book #533

7/16/02

8:16 T_d/T_w = 51/40 - 51/41, RH(m) = 66.43 - 67.83% T(m) = 47.69°C

8:08 Data # 46

SS: -6.166 - -2.86 μV

CS: -464.005 - +268.734 μV

8:20 program change, new File: 02-0716a.

8:20 Set T_d/T_w = 51.8°/42°C. Target RH = 70% Results see page 39, Book #533

9:12 II-3 Removed

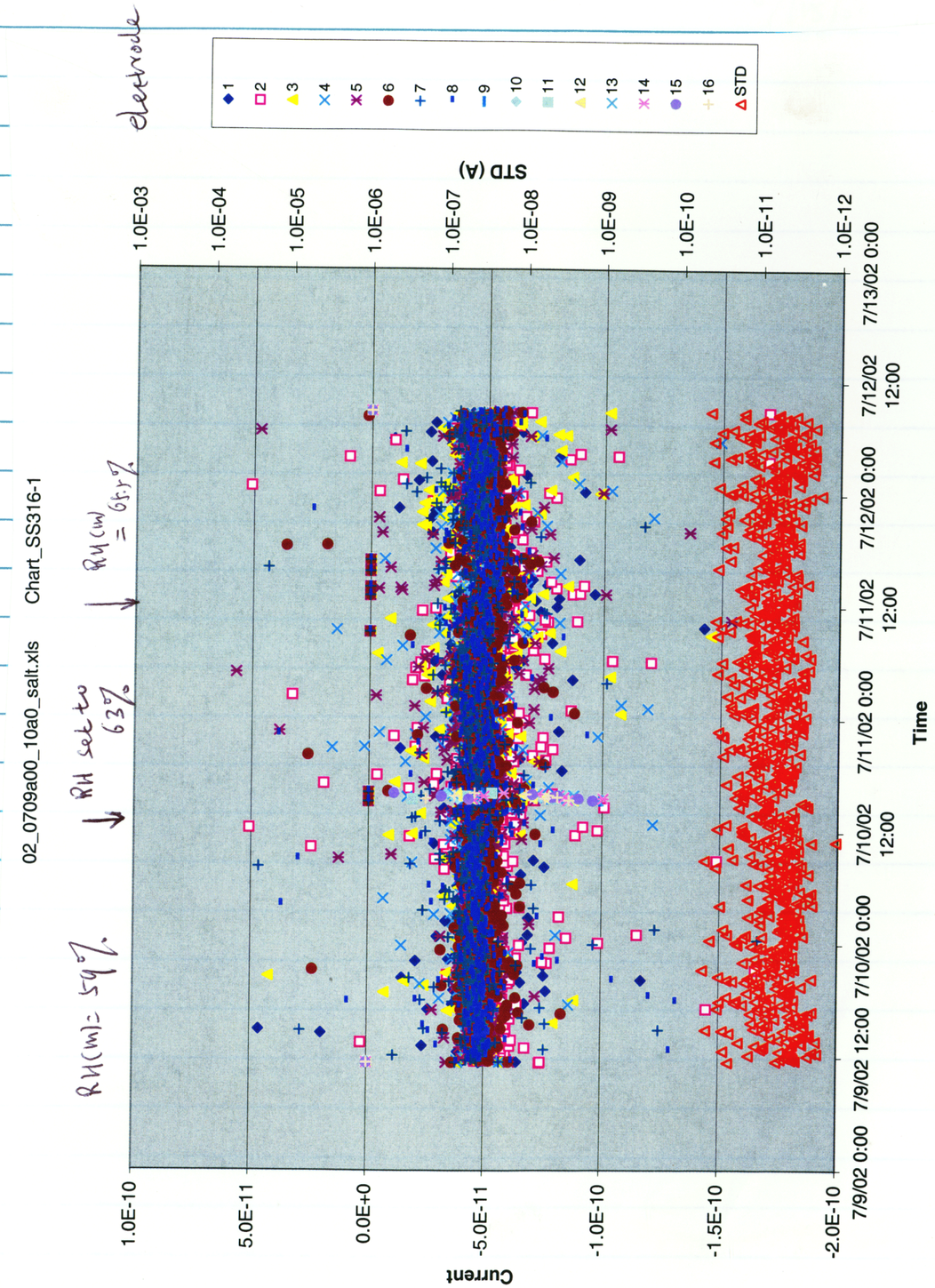
9:23 RH(m) = 68.70 - 90.07%

9:24 Set T_d/T_w = 51.8°C/43°C SPL 7-16-02

11:21 II-3 Returned

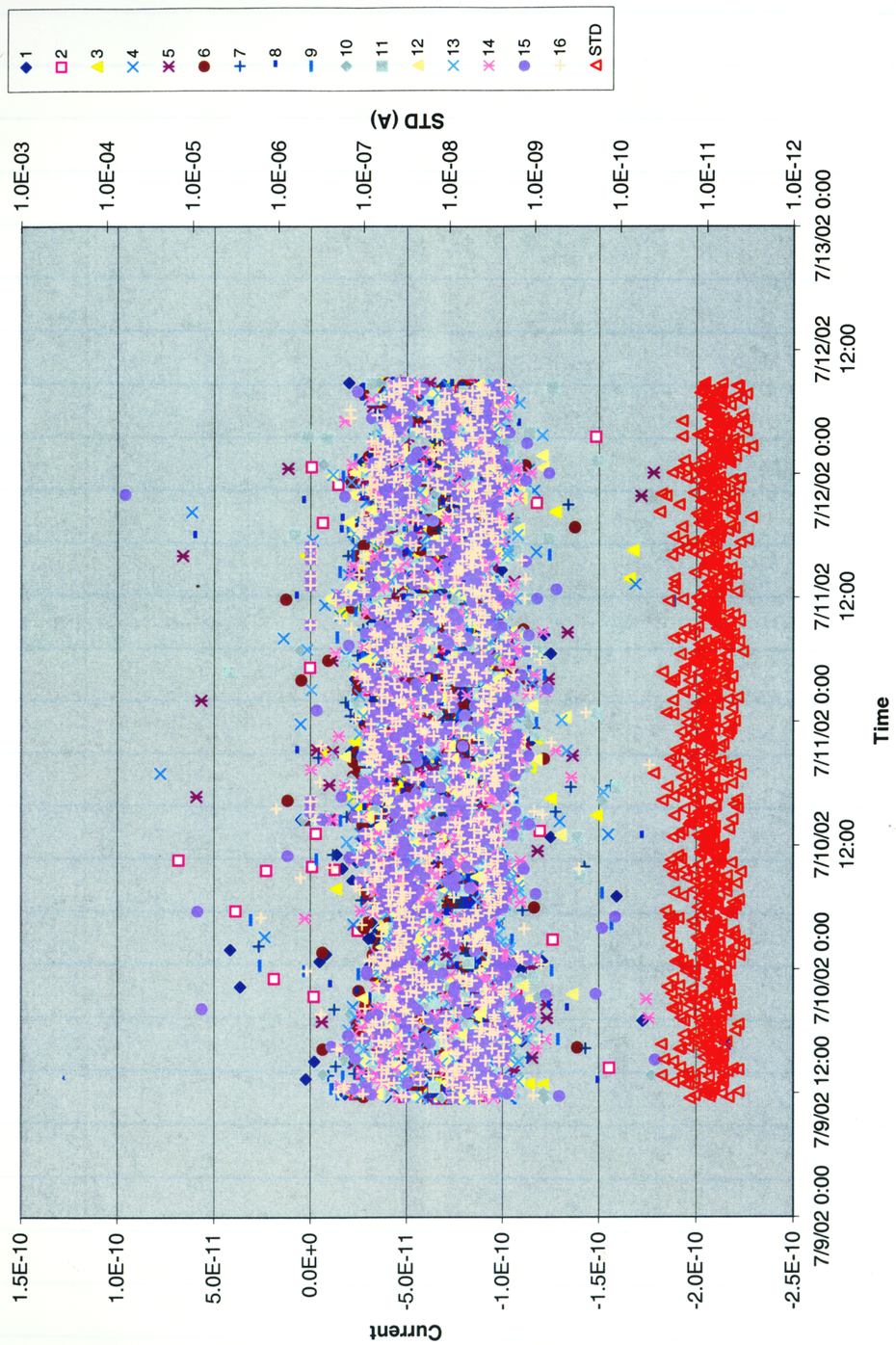
- continued on page 147 -

J. Yang 7/16/02



J. Yang 7/15/02

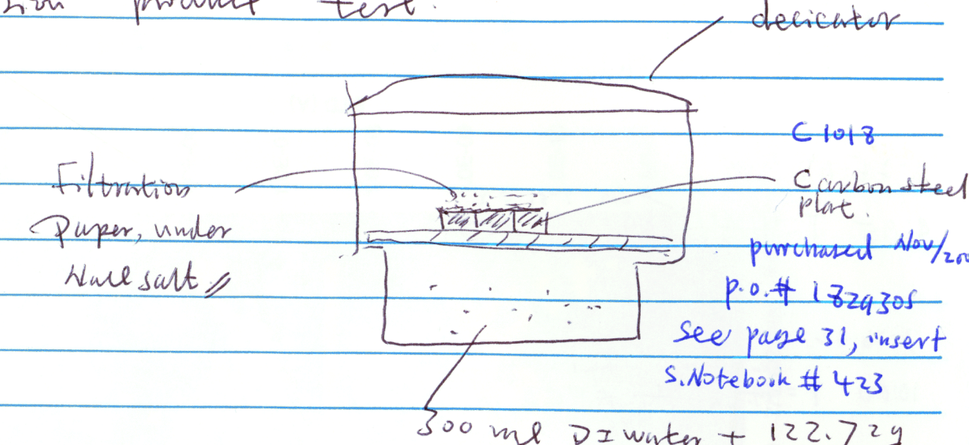
elevated



J. Gray 7/17/02

07/15/02

Corrosion product test.



Nacl: Lot #020814 → 7 molal (solubility 6.1 – 6.25 molal 10 – 40°C.)

Carbon steel polished to 320 grit.
washed with Acetone

11:14. Desiccator placed in oven, 50°C.

17:00. T (indicator) = 51°C ; calibrated Thermometer placed in oven.

7-16-02
1:50 T = 51.1°C
7-17-02
10:30 T = 49.8°C
7-18-02 15:07 T = 49.1°C
7-19-02
9:36 T = 49.1°C
7-22-02
8:51 . T = 49.1°C

Justin Sanders 7-25-02