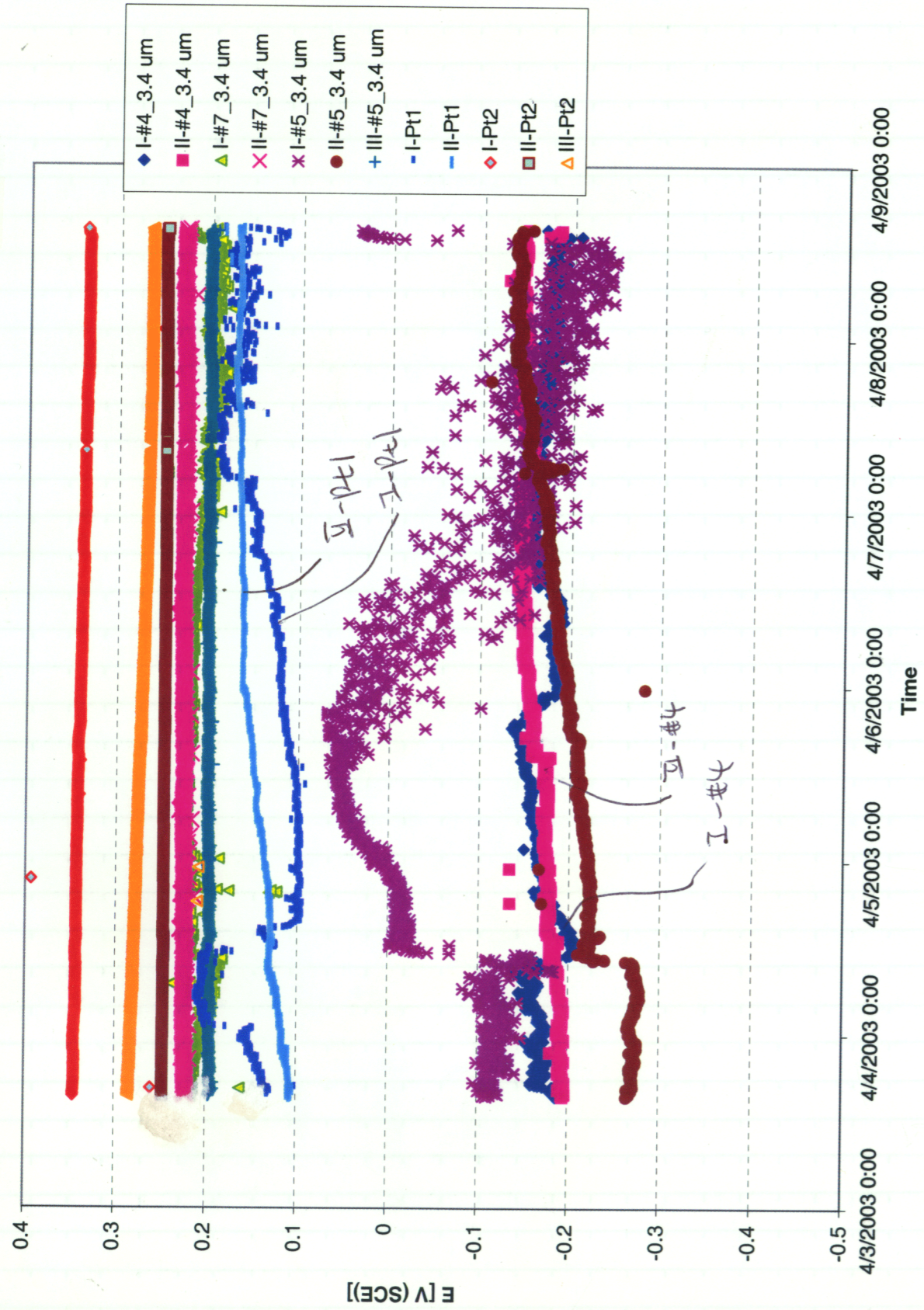


File: 03\_April03a00\_07a00\_Zr / Tab: Potential



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

Date \_\_\_\_\_

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

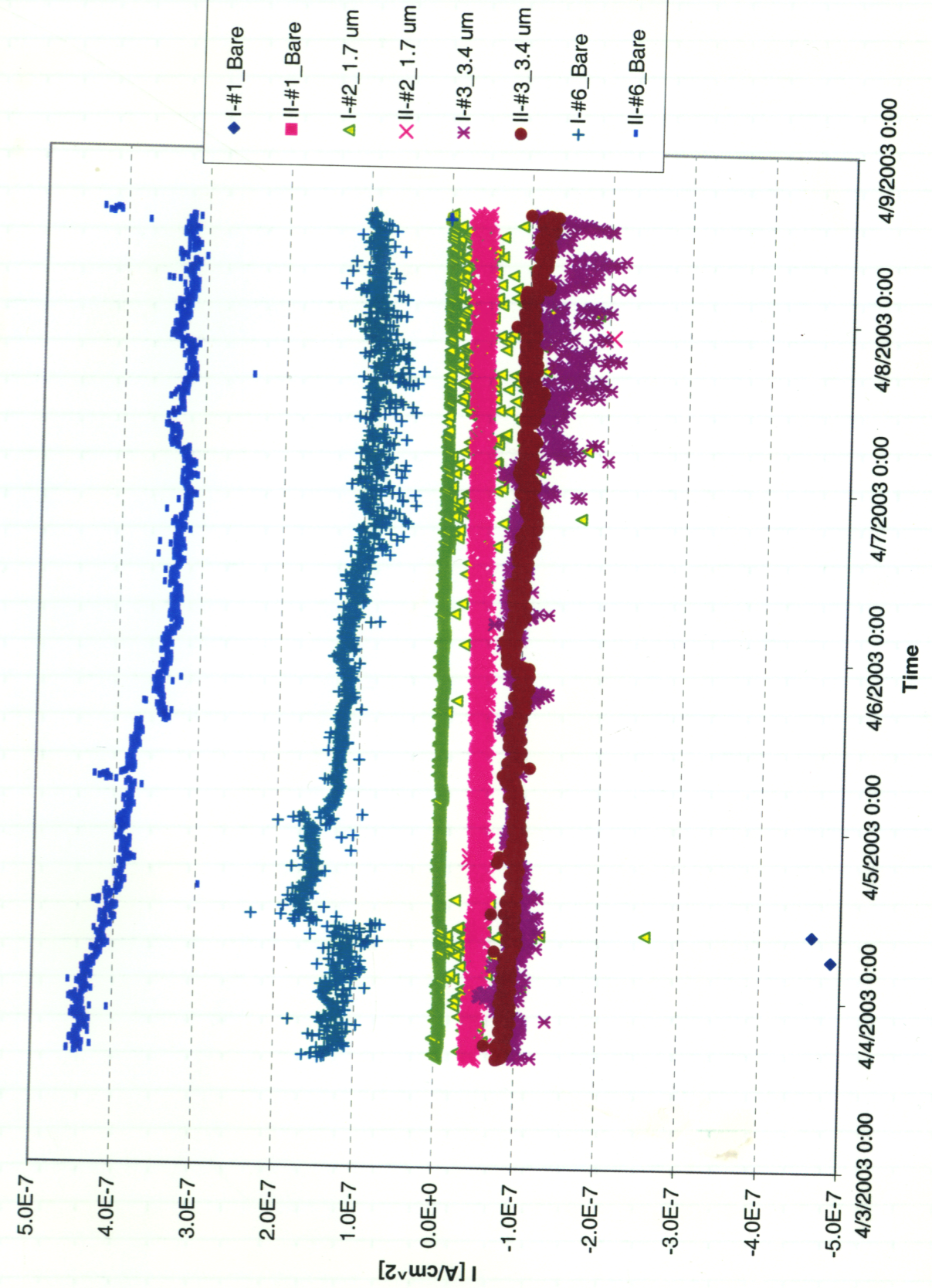
Date \_\_\_\_\_

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

*J. J. P.*

4/3/03

File: 03\_April03a00\_07a00\_Zr / Tab: Chart\_Current2



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

Date \_\_\_\_\_

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

Date \_\_\_\_\_

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

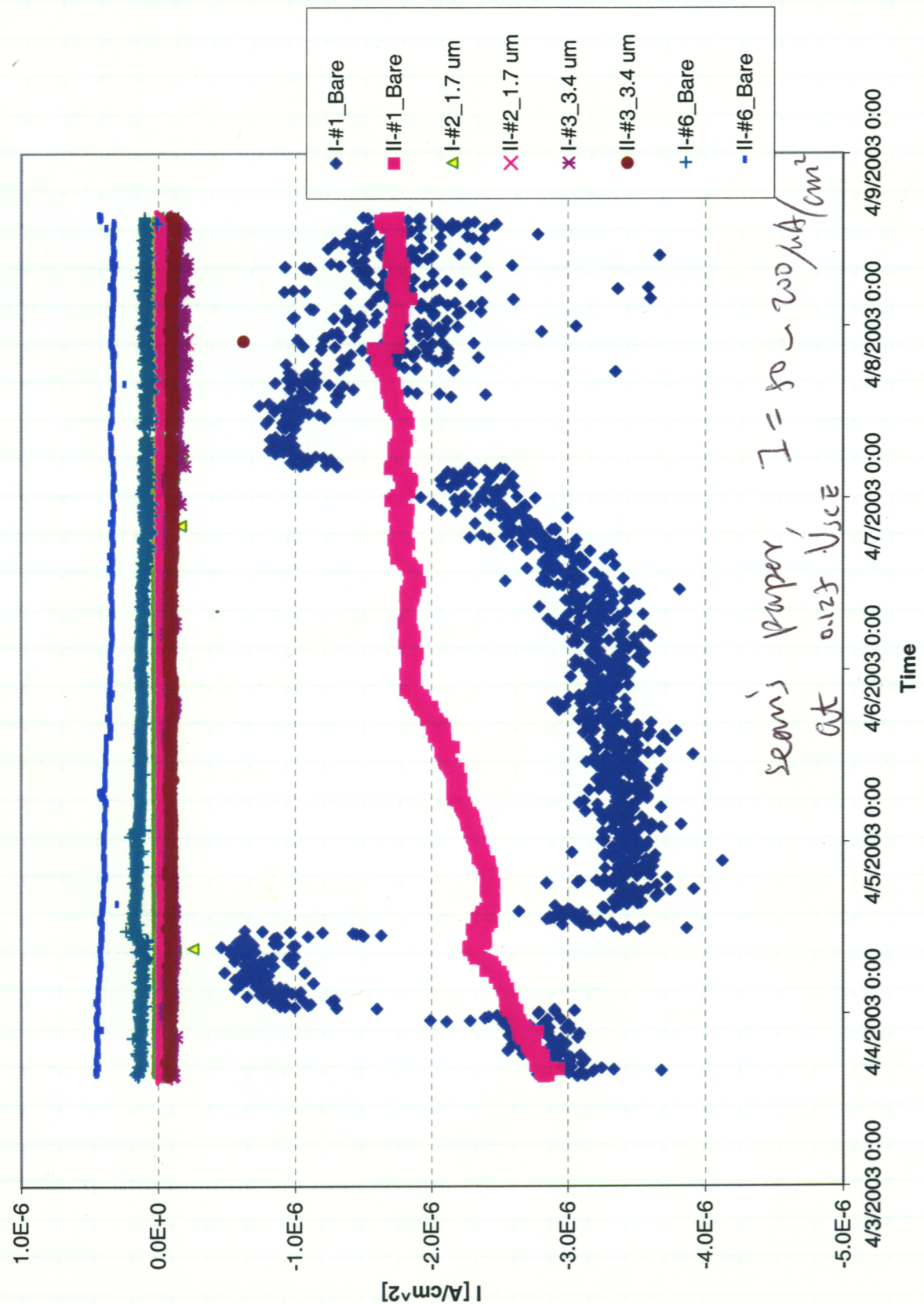
*J. J. P.*

4/3/03

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



03\_April03a00\_07a00\_Zr / Current



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

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

Date \_\_\_\_\_

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

Date \_\_\_\_\_

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

*J. Y. J.*

4/23/03

TITLE \_\_\_\_\_

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

4/23/03

14:29

water level in cell I + II too low, just touch the edge of the bare electrodes.

water added so  $\frac{1}{4}$ " of the bare electrodes submerged.

4/24/2003, 8:33

~~4/24/2003, 8:38~~

4/28/03

Noticed, program stopped stopped at

8:38

Restarted, file name 03-April28a

5/9/03 15:40

connected I-Pt2 with I-Pt1

II-Pt2 with ~~II-Pt1~~ #4

to raise the E.

16:22

removed I-Pt1, just I-Pt2 coupled with #1, 2, 3 electrodes.

removed II-Pt1, just II-Pt2 coupled with #1, 2, 3 electrodes.

5/12/03 8:52

$E_{I-Pt2} = 712 \text{ mV}$  ;  $E_{II-Pt2} = 194.79 \text{ mV}$ . good?

$E_{I-Pt1} = 241 \text{ mV}$  ;  $E_{II-Pt1} = 264 \text{ mV}$

connect I-Pt1 with I-Pt2  
II-Pt1 with II-Pt2.

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

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

Date \_\_\_\_\_

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

Date \_\_\_\_\_

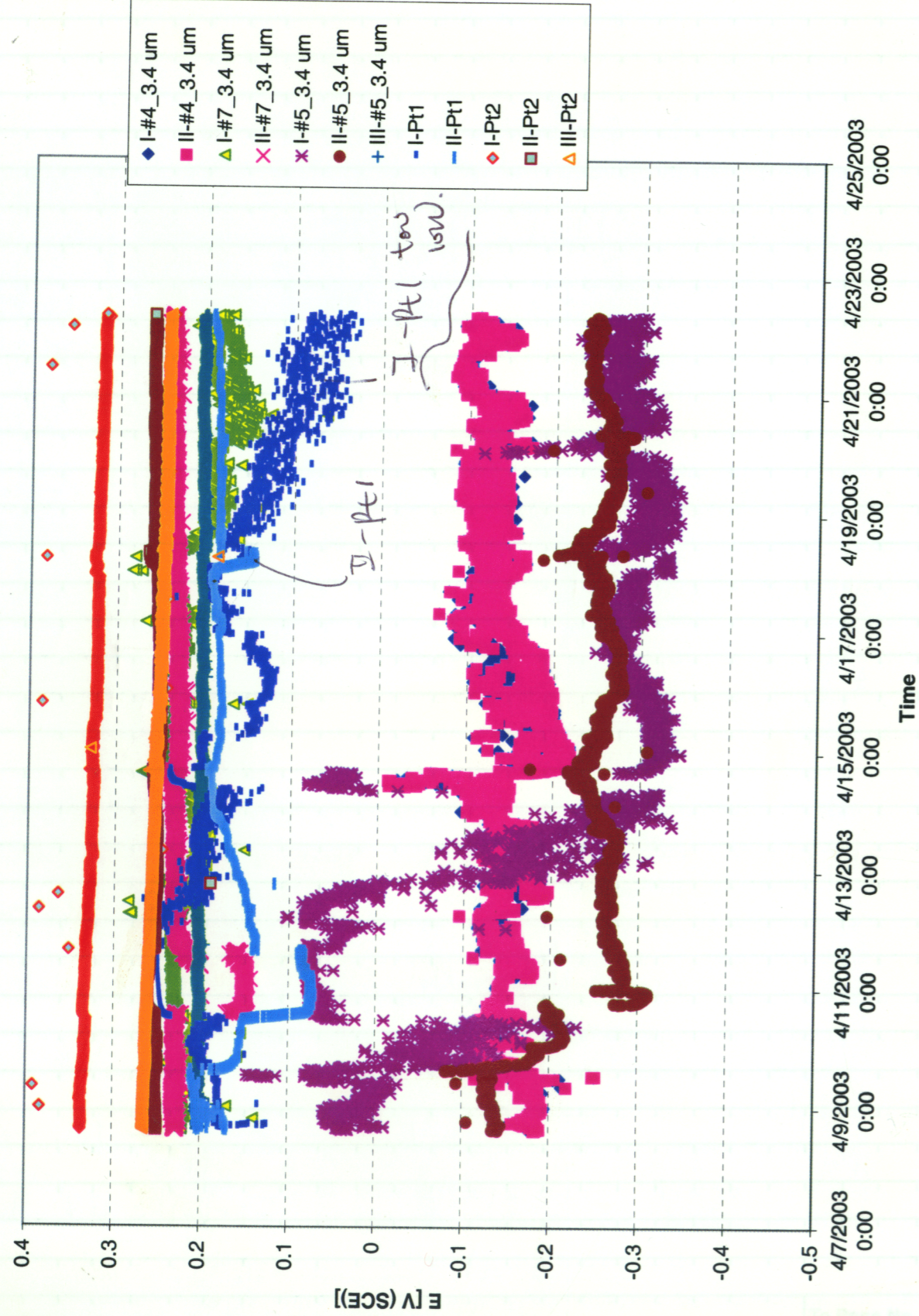
Recorded by \_\_\_\_\_

*J. Y. J.*

6/6/03



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



File: Zr\_03\_April08a00\_a03 / Tab: Potential

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

Date \_\_\_\_\_

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

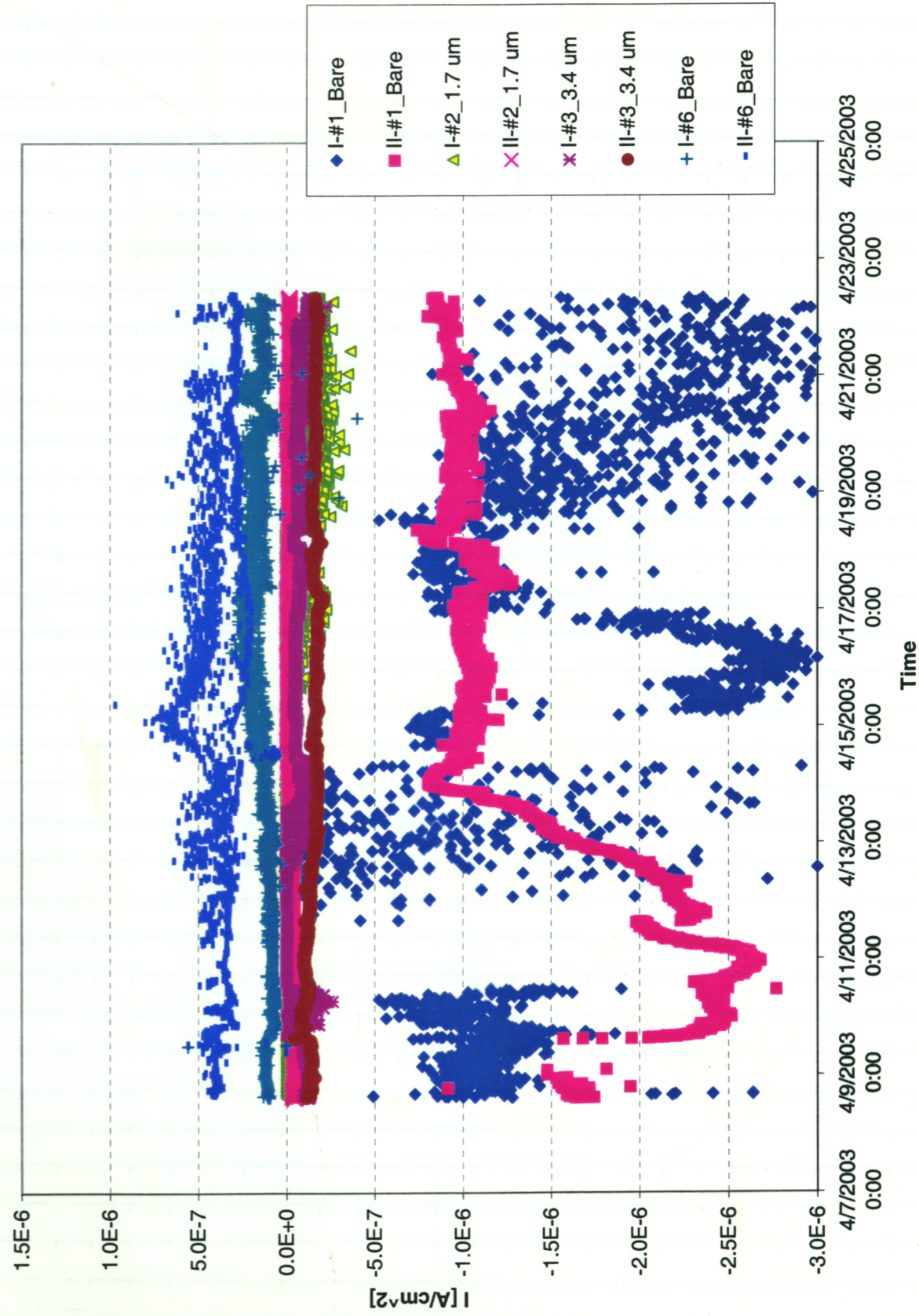
Date \_\_\_\_\_

Recorded by *J. Y. S.*

*4/28/03*

TITLE \_\_\_\_\_

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



Zr\_03\_April08a00\_a03 / Current

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

Date \_\_\_\_\_

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

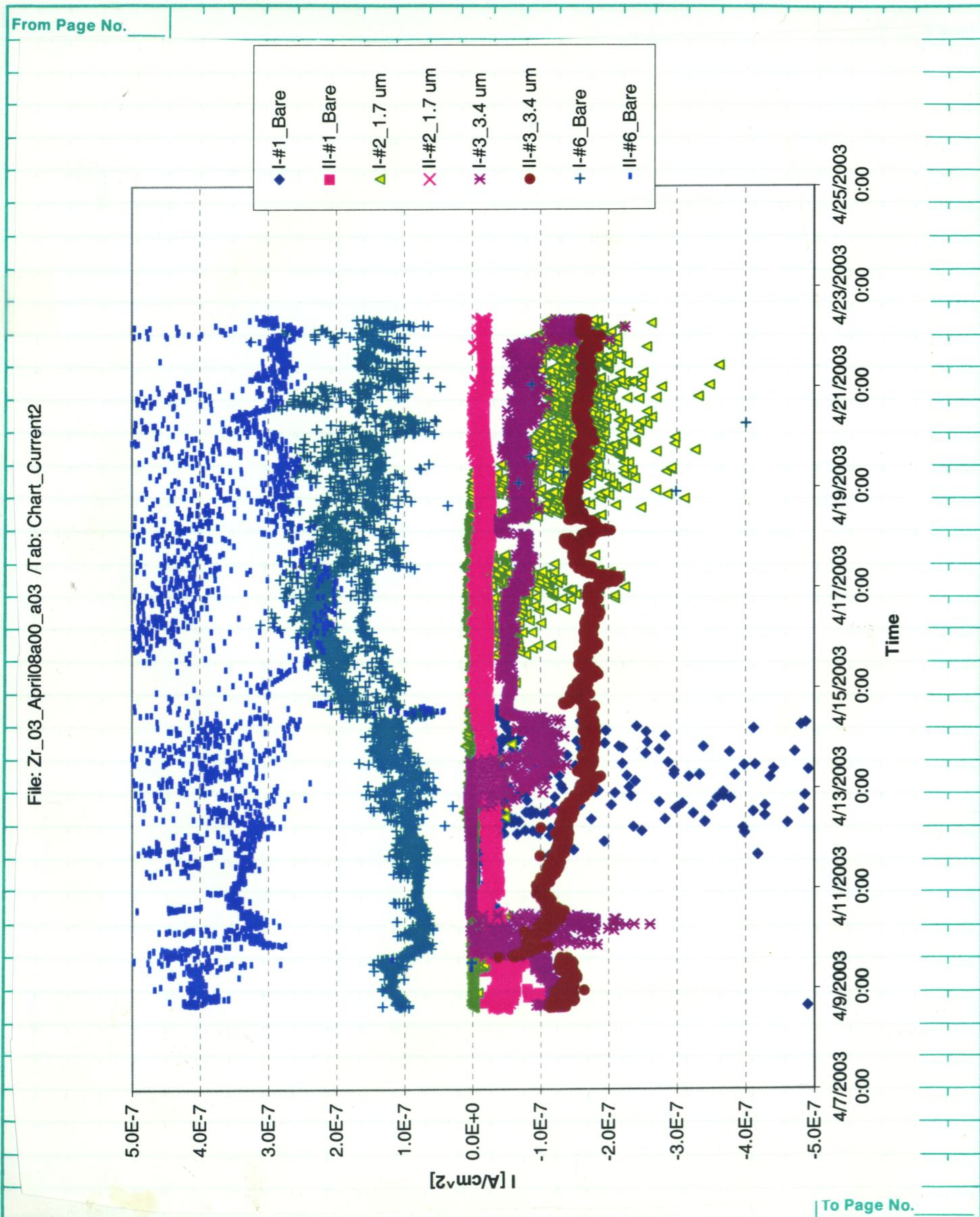
Date \_\_\_\_\_

Recorded by *J. Y. S.*

*4/28/03*

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





File: Zr\_03\_April08a00\_a03 /Tab: Chart\_Current2

Witnessed & Understood by me, \_\_\_\_\_ Date \_\_\_\_\_  
Invented by \_\_\_\_\_ Date \_\_\_\_\_  
Recorded by *[Signature]* 6/10/03

5/

6/2/03 17:00  
uncompile the electrodes.

By-passed 1k Resistors (#12) for #3  
Connector

By-passed 10k Resistors (#8) for #2  
Connector

By-passed 1k 2.2 6k/03  
10k Resistors (#17) for #2

Connector

T (Thermometer (SN H98-182)) = 92.2

controller Temperatures:

I	II	III
91.6	93.5	92.7
91.7	93.5	92.8 → set point

Cell I, bare coupons barely touch liquid level

17:07 data point # 5885 obtained! (showers)

17:11 last data point, power off! time 4:53 p.m.

Results see pages 65-67 and 74.

Witnessed & Understood by me, \_\_\_\_\_ Date \_\_\_\_\_  
Invented by \_\_\_\_\_ Date \_\_\_\_\_  
Recorded by *[Signature]* 6/10/03



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

6:3-03 Restarter computer with Data File ~~06-June-03~~ <sup>03-June-03</sup> ~~03-June-03~~  
@ 8:17 A.M. data see pages 75-76

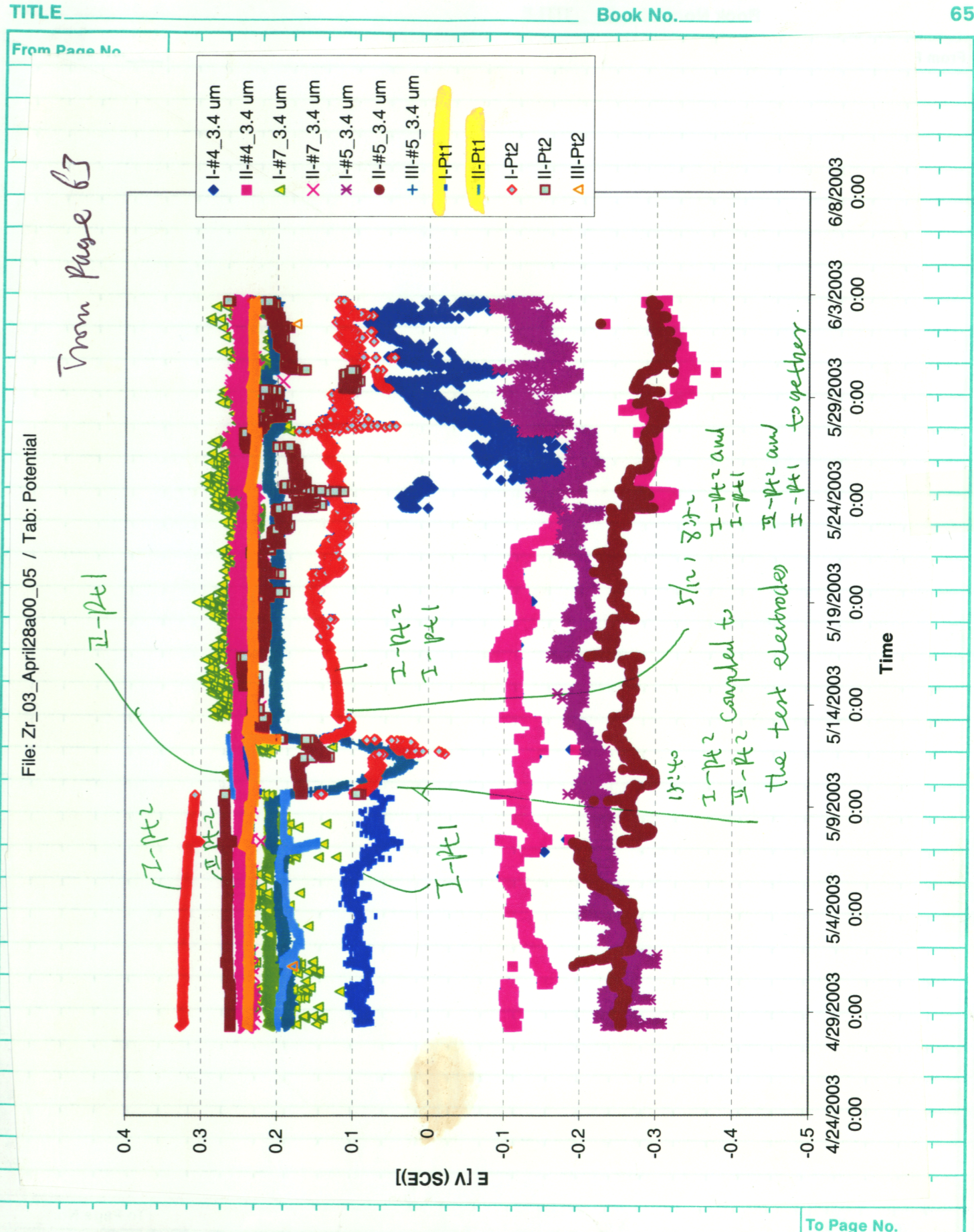
\* Note - Major power shutdown last night beyond UPS capability. All Temp Controllers And Keithleys shut down. But were back on this morning.

6/6/03  
8:59. Venton shut down. Data points 7 cycles  
8:56 A.M.

12:53  $T = 58^\circ C$   
16:48  $T = 40^\circ C$   
6/6/03 14:29 p.m. new file: 03-June-03.txt started.  
16:01 All connections to the cells disconnected.

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

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	6/10/03

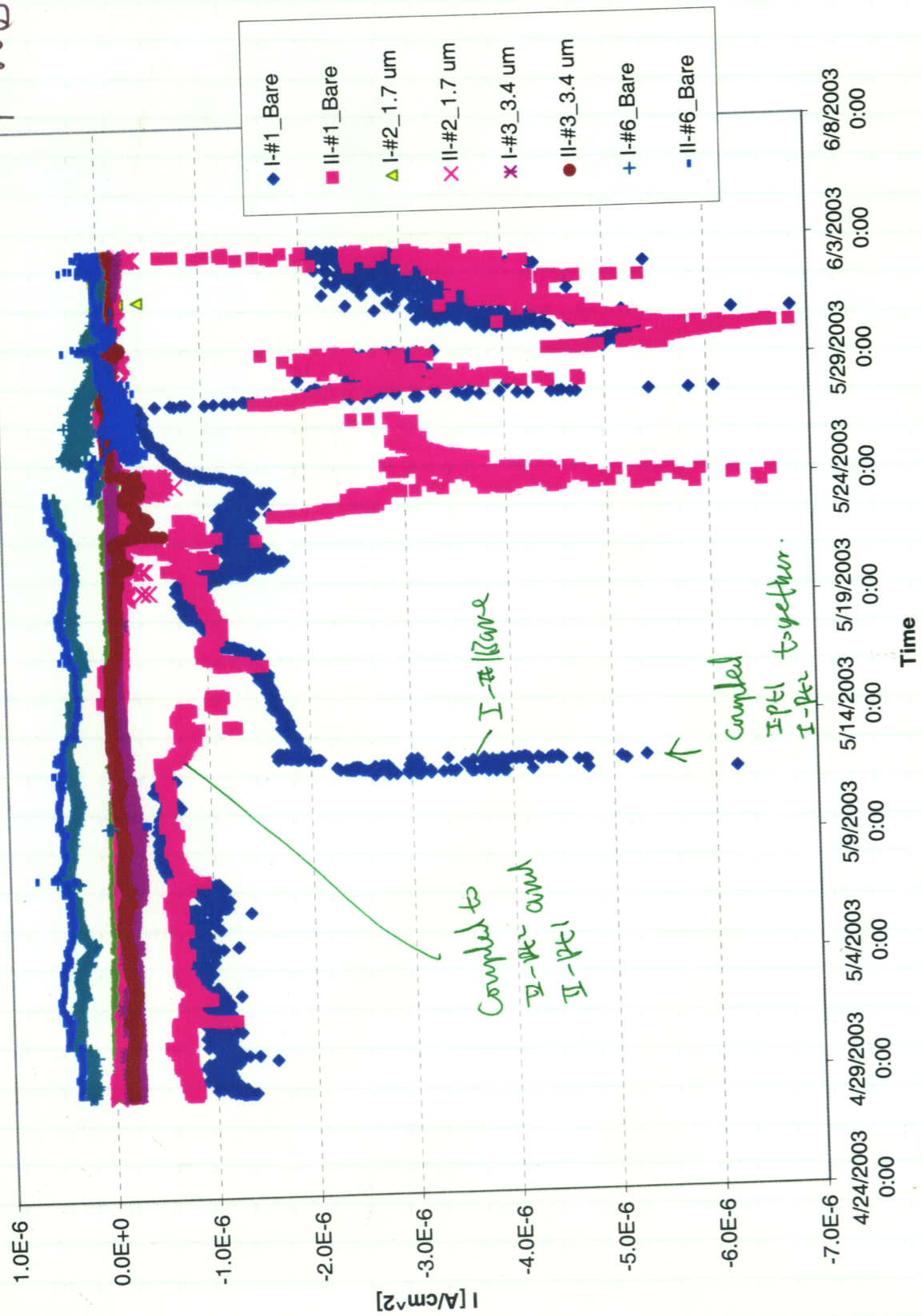


Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	6/10/03



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

*From page 65*



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

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

Date \_\_\_\_\_

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

Date \_\_\_\_\_

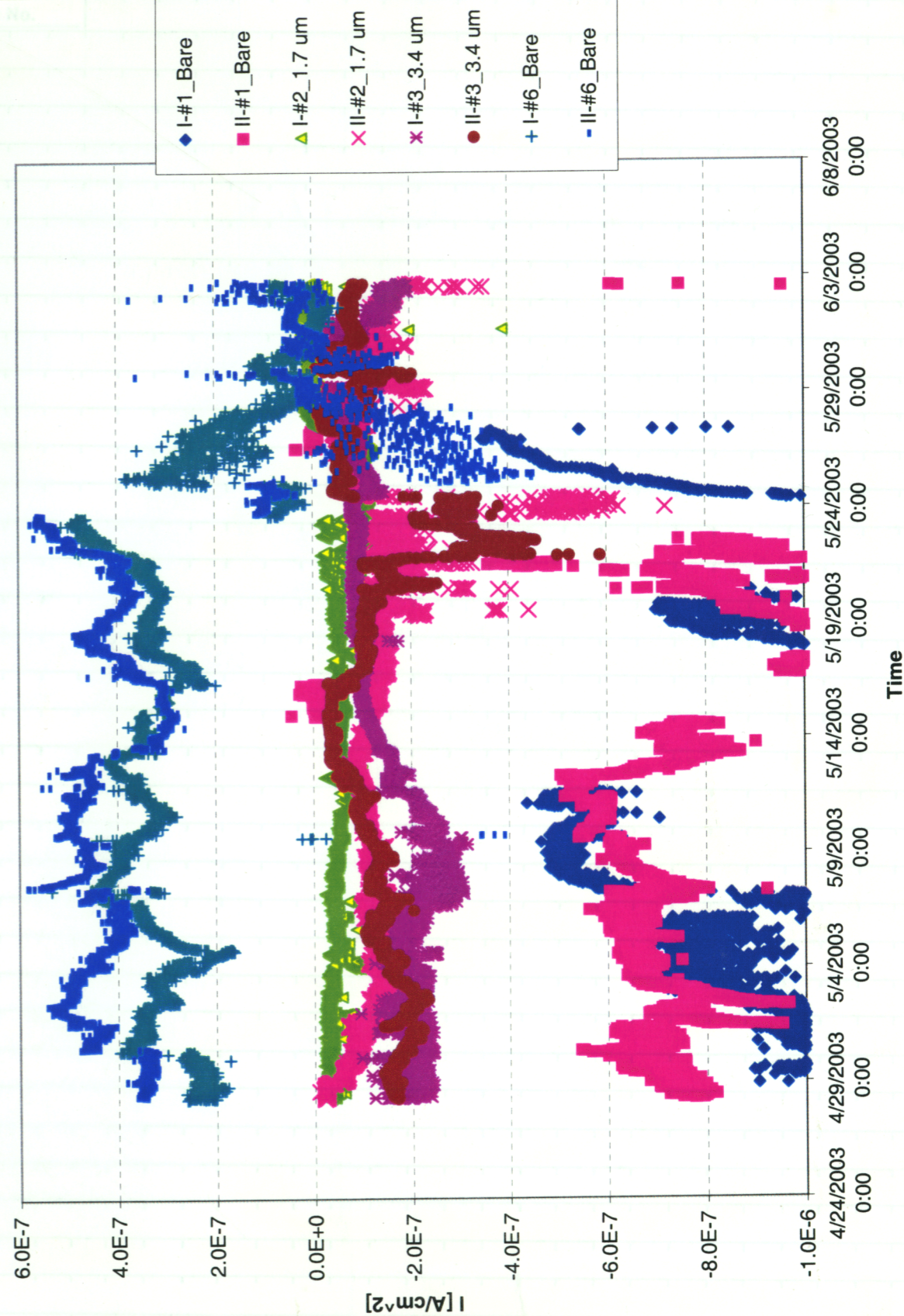
Recorded by *J. L. G.*

*J. L. G.*

*6/10/03*

File: Zr\_03\_April28a00\_05 / Tab: Chart\_Current2

*From page 65*



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

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

Date \_\_\_\_\_

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

Date \_\_\_\_\_

Recorded by *J. L. G.*

*J. L. G.*

*6/10/03*



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

6/10/03

1:43 p.m.

cell # III opened

max immersion depth = 57.2 mm

lowest depth mm = 36.4 mm

When took out: 47.2 mm depth.

No apparent corrosion -

wt: 69.2872g  
pu = 4.007

See pg #26  
see page 27

Restarted Test - New solution 0.1 M NaCl

Start pH = 5.965

11.697g NaCl lot # 030152

End pH = 5.48

+ DI water To 2000ml

Specimen End wt = 69.2860g

2:37 p.m.

cell II opened

#6 Bare electrode.

Apparent depth of immersion  
0.231 cm.

#1 Bare electrode

Apparent depth of immersion  
0.163 cm.

upp. joint to lead corroded!

pu = 4.032 see also page 27

The surface of I-#1; I-#6, II-#1 and II-#6 specimens were examined. see pages 25 - 29.

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

J. Yang

6/10/03

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

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

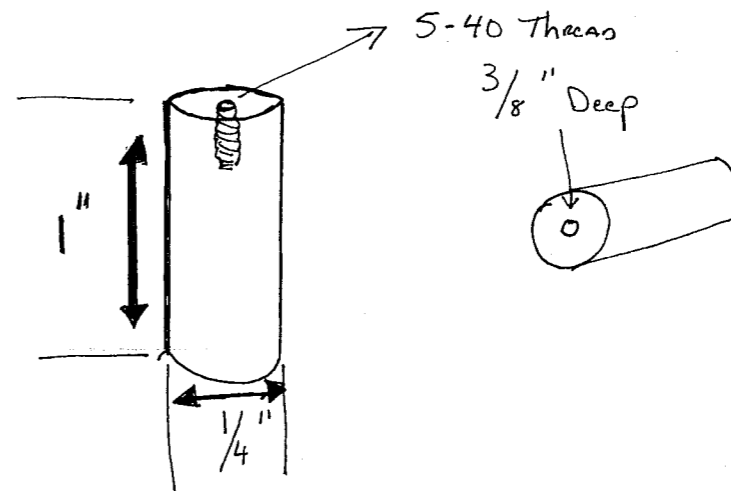
New Type III Specimens Made @ SWET Machine shop  
See pg #3-11 for material - Zinc Rod.

Drawings sent to machine shop

Zirconium Rod - Specimens Project/change #20.06002.01.081

Total = 6 Cylinders

#1223217, #243687 Rod supplied.



6 pcs Made From Supplied Rod  
#1223217, #243687  
Walter L. Smithson 6/23/03

For: Lictai Yang  
X 2483

Thanks Brian  
X 6627 Lab 5448

6 pcs OK  
Calipers 20-60-8  
Thd Gauge

JUN 23 2003  
SWIN 24 DA

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

B. Smithson

6/24/03

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



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

New Cell Specimen Configuration

Cell #2

Connection Color Wire

#1 = white  
#2 = Red  
#3 = Blue  
#4 = Green  
#5 = Black  
#6 = Brown  
#7 = Red (BRASS Red)

#4	#1
#5	#2
#6	#3

(#7)

Specimen #1 Type III Base  
Start wt: 4.79941g End wt: 4.76861g Specimen New

Specimen #2 Type I 1.7mm  
Start wt: 28.00863g End wt: 28.01380g

Specimen #3 Type I 3.4mm  
Start wt: 29.43789g End wt: 29.43919g

Specimen #4 Type II  
Start wt: 63.44178g End wt: 63.44563g

Specimen #5 Type II  
Start wt: 69.42486g End wt: 69.42962g

Specimen #6 Type III Base  
Start wt: 4.67159g End wt: 4.66957g Specimen New

Specimen #7 Type II  
Start wt: 63.80363g End wt: 63.79980g

All specimens weights taken with Sartorius Genius SN#12809099  
Cal 5/15/03 due 11/15/03

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

Witnessed & Understood by me, \_\_\_\_\_ Date \_\_\_\_\_  
Invented by \_\_\_\_\_ Date 6/26/03  
Recorded by *[Signature]*

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

New Cell Configuration

Cell #1

Connection Color Wire

#1 = Brown  
#2 = Black  
#3 = Green  
#4 = Blue  
#5 = Red  
#6 = white  
#7 = Red (BRASS Red)

#3	#6
#2	#5
#1	#4

(#7)

Specimen #1 Type III Base  
Start wt: 4.81699g End wt: 4.57850g Specimen New

Specimen #2 Type I 1.7mm  
Start wt: 27.97631g End wt: 27.88149g

Specimen #3 Type I 3.4mm  
Start wt: 29.28401g End wt: 29.29351g

Specimen #4 Type II  
Start wt: 69.47483g End wt: 69.47203g

Specimen #5 Type II  
Start wt: 69.53810g End wt: 69.54376g Specimen New

Specimen #6 Type III Base  
Start wt: 4.77415g End wt: 4.78418g Specimen New

Specimen #7 Type II  
Start wt: 69.79215g End wt: 69.79185g

All specimens wts taken with Sartorius Genius SN#12809099  
Cal 5/15/03 due 11/15/03

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

Witnessed & Understood by me, \_\_\_\_\_ Date \_\_\_\_\_  
Invented by \_\_\_\_\_ Date 6/26/03  
Recorded by *[Signature]*



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

New solutions for Cell #1 and Cell #2

Cell #1

0.1 M NaCl  
11.684g NaCl Lot # 030198  
+ DI water to 2000ml

pH Start = 5.791 Fisher Accumet 950 meter SN# 3340 cal 8/7/02 rec 8/7/03  
pH End = 1.73 pH probe # 13-620-296 SN# 2291257P6

Cell #2

0.1 M NaCl  
11.690g NaCl Lot # 030198  
+ DI water to 2000ml

pH Start = 5.677 Fisher Accumet 950 meter SN# 3340 cal 8/7/02 rec 8/7/03  
pH End = 5.63 pH probe # 13-620-296 SN# 2291257P6

Cell #3

No Solution Change See p# 68

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

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

Date \_\_\_\_\_

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

Date \_\_\_\_\_

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

6/26/03

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

6/27/03

17:00 wire connections made. (see Page 15)

Resistors are the same as June 10/2003.

6/30/03

11:54 I-1 Return connected to Reference electrode.

14:44 I-2 and I-3 Returns connected to Reference Electrode

All had been floated before connected to Reference electrode.

9:00 program restarted 03 July 02 a.

7/2/03

Complete the electrodes as shown in pages 15 & 45. connector 10k, # 12 to # I-3 Return also to II-Pt1

9:50

connector 10k, # 8 to # I-2 Return also to II-#4 & I-#4

connector 1k # 17 to # I-1 Return also to

10:10

connections done. I-Pt1

However I-3 ch. 1 (II-Bare) = -100 mV

+s. I-Pt2 too high. Reconnected I-Pt2 dis. I-Pt1 dis. 10/30/03

to I-3 Return, dropped to -60 mV. must be due to bad connection!

10:30 II-#7 -3.4 mV : -78 mV<sub>SCF</sub>, lead rod in liquid. pulled lead rod out.  $\phi = 166 \text{ mV}_{SCF}$  Good!

11:34 I-#1 positive current!  $\phi = +261 \text{ mV}_{SCF}$  if decoupled from I-Pt1,  $\phi = +295 \text{ mV}$

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

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

Date \_\_\_\_\_

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

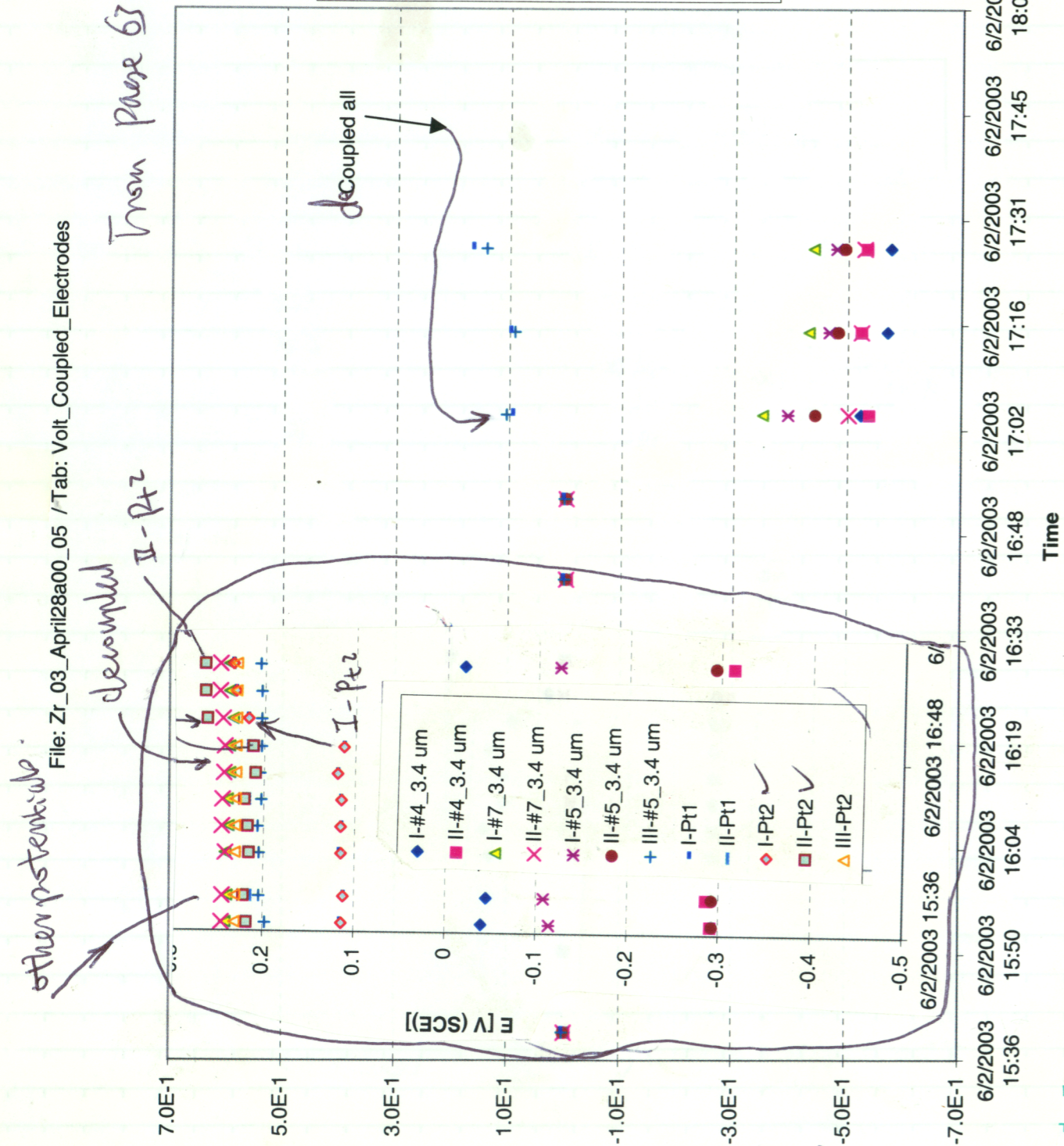
Date \_\_\_\_\_

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

10/30/03



- ◆ I-#1\_Bare
- II-#1\_Bare
- ▲ I-#2\_1.7 um
- ✕ II-#2\_1.7 um
- ✕ I-#3\_3.4 um
- II-#3\_3.4 um
- + I-#6\_Bare
- II-#6\_Bare



Witnessed & Understood by me,

Date

Inve.

Date

Recorded by

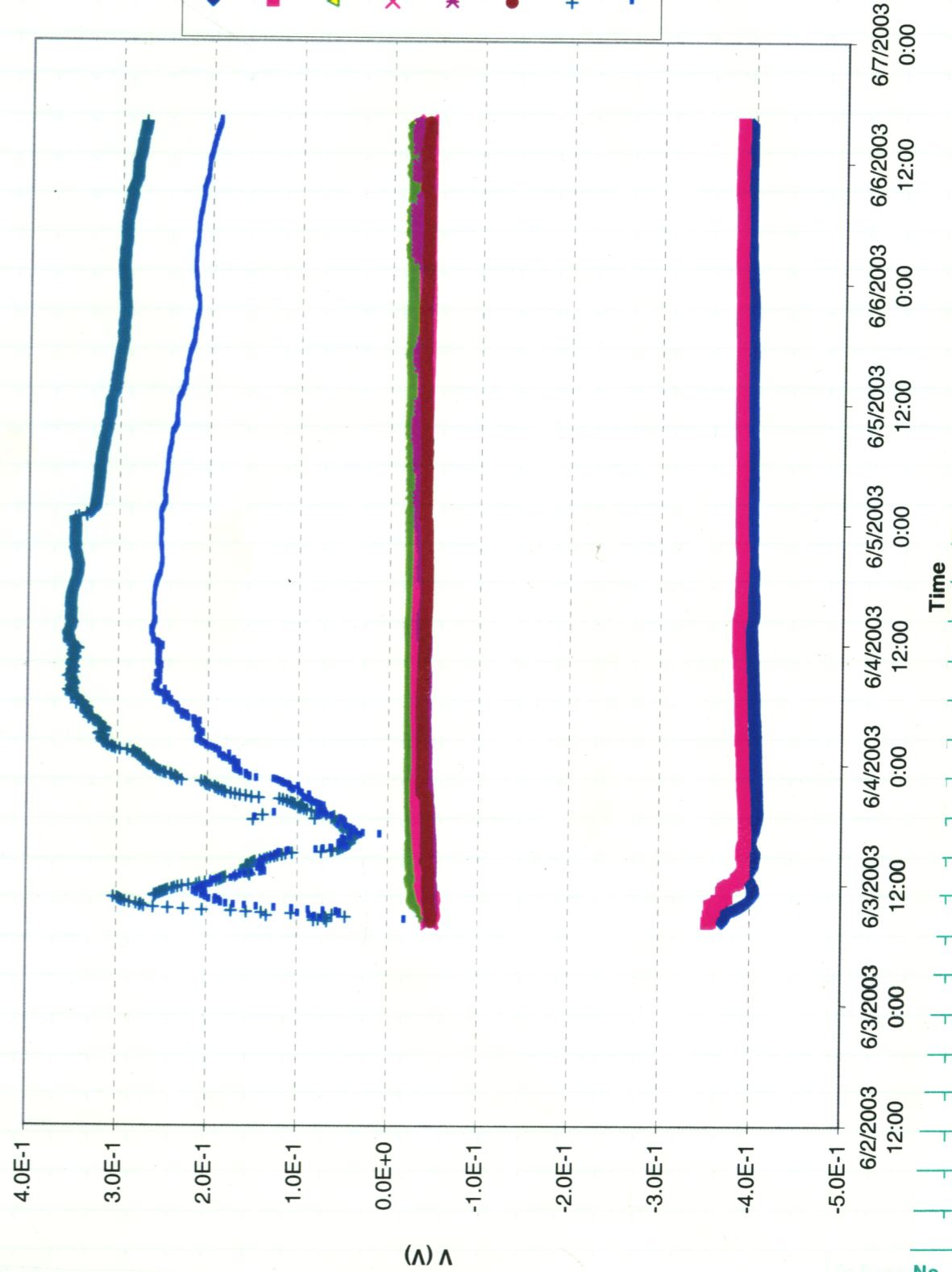
*J. Y. F.*  
6/30/03

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

- ◆ I-#1\_Bare
- II-#1\_Bare
- ▲ I-#2\_1.7 um
- ✕ II-#2\_1.7 um
- ✕ I-#3\_3.4 um
- II-#3\_3.4 um
- + I-#6\_Bare
- II-#6\_Bare

File: Zr\_03\_June0300\_June0600 / Tab: Chart\_Potential2

From Page 64



Witnessed & Understood by me,

Date

Invented by

Date

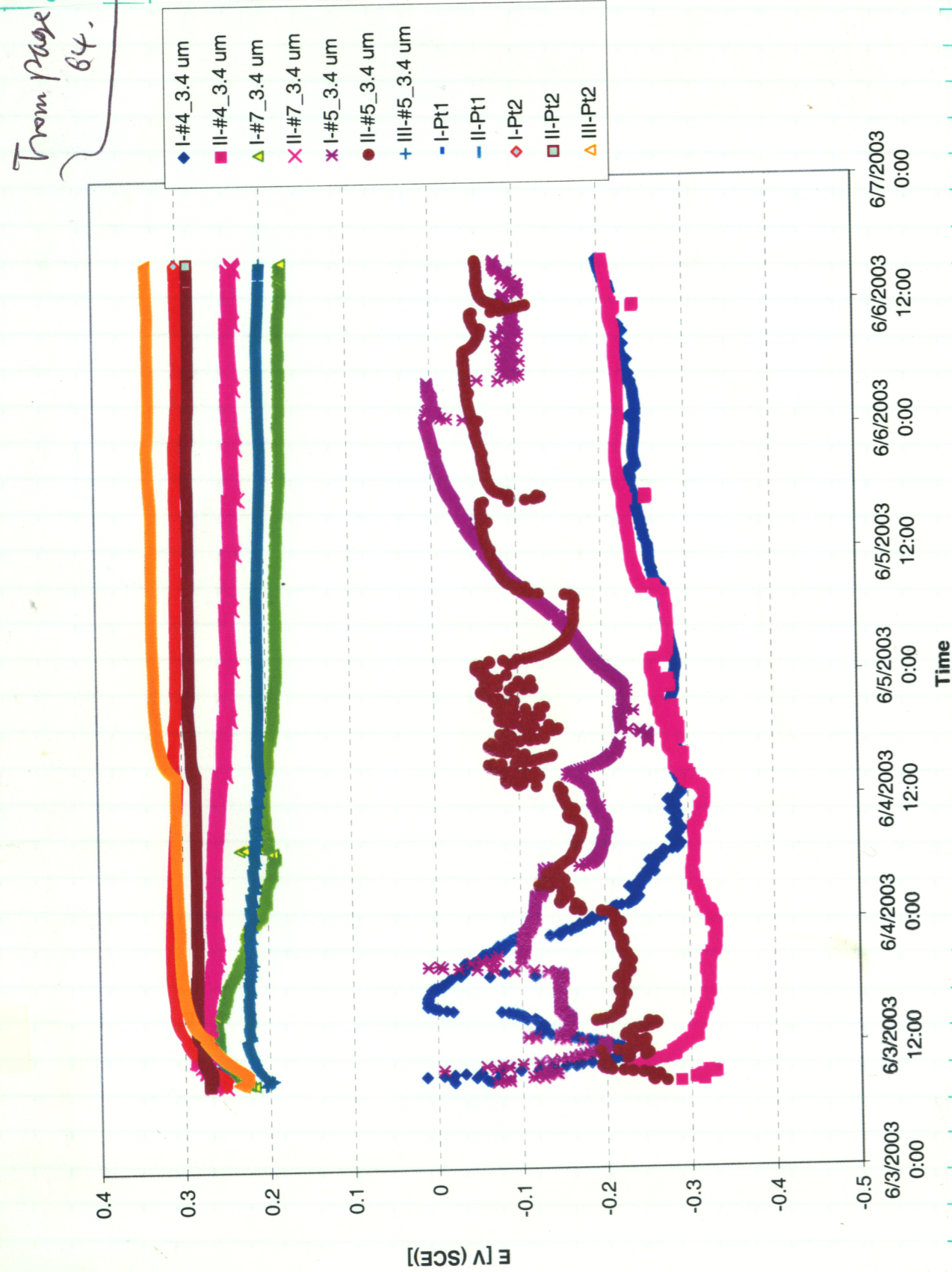
Recorded by

*J. Y. F.*  
6/30/03

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



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



File: Zr\_03\_June0300\_June0600 / Tab: Potential

From Page 64.

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

Witnessed & Understood by me, \_\_\_\_\_ Date \_\_\_\_\_  
 Invented by \_\_\_\_\_ Date \_\_\_\_\_  
 Recorded by L. J. J. 6/30/03

TITLE \_\_\_\_\_

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

7/2/03  
 11:34 II-#4 = -57 mV<sub>SCE</sub>, = -257 mV after decoupled with I-#6 + I-#6  
 I-#4 = -86 mV<sub>SCE</sub> = -87 mV<sub>SCE</sub> after + I-#4 decoupled with I-#6 + I-#6 + I-#4  
 I-#4 = -45 mV after decoupled with I-#4  
 Connector to I-#4 not good, re connected to I-#4  
 I-#4 = -69.1 mV<sub>SCE</sub>; I-#4 = +55 mV<sub>SCE</sub> after disconnected II-#4 alone  
 II-#4 = -67 mV<sub>SCE</sub>; II-#4 = -60 mV<sub>SCE</sub> after disconnected I-#4 alone  
 affecting each other  
 When shared same Return of II-2 connector.

7/2/03  
 1:00pm Spiked Both Cells #1 And #2 = 5 mM  
 Cell #1 Spiked with 2.708g FeCl<sub>3</sub>·6H<sub>2</sub>O lot# 005437 with new 100mls of Test solution Added FeCl<sub>3</sub> then FW = 270.3 Returns to Test cell once FeCl<sub>3</sub> was Soluble d=1.18  
 Cell #2 Spiked with 1080ul of 5 mM Hydrogen Peroxide 30% lot# 010839, I.W. = 34.01 31.8% Used Eppendorf pipette sn# 360050 d=1.18 for 50% H<sub>2</sub>O<sub>2</sub>  
 Cycle #41 Computer Time was 12:47 pm 7/2/03 d = 1.08 measured.

7/3/03 Resistor #17 (1k $\Omega$ ) on I-1 changed to 100 $\Omega$  (#23)  
 Resistor #12 (10k $\Omega$ ) on I-3 changed to 100 $\Omega$  (#11)

Witnessed & Understood by me, \_\_\_\_\_ Date \_\_\_\_\_  
 Invented by \_\_\_\_\_ Date \_\_\_\_\_  
 Recorded by L. J. J. 7/2/03



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

7/1/03  
15:32 Noted II-Pt1 potential was not stable  
0.1 - 0.2 V.  
II - #1 Bore current was low after the  
Resistor changed from 1000  $\Omega$  to 100  $\Omega$ ?

II - Pt1 = 219.6 mV<sub>SCE</sub>, = 210 mV<sub>SCE</sub> after decoupled. 1.5 min after decoupled.

II - #1 Bore = 219.6 mV<sub>SCE</sub>; = 108 mV<sub>SCE</sub> after decoupled.  
2.5. 7/1/03

II - #2 Bore = 105 mV<sub>SCE</sub>, 1.5 min after decoupled.  
-1.7  $\mu$ m

II - #3 3.4  $\mu$ m = 156 mV<sub>SCE</sub>, 1.5 min after decoupled.

15:40 II - Pt1 = 209 mV after decoupled,  
= 206 mV when coupled!  
why?

15:59 II - Pt1 = 195 mV when decoupled.  
= 193 mV when coupled!

16:00 disconnect II-#6 from connector I-2 Ch. 10  
to prevent interference

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

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>J. Y. J.</i>	2/14/06

TITLE \_\_\_\_\_

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

7/13/03 7:38 Computer was down, last night there  
were power off.  
program restarted. File: 02 July 13a

7/14/03 17:05 Circulating cooling water bursted.  
Tance!  
Reference electrode and condenser left  
without circulating water overnight!

7/15/03 8:47 Reference Temperatures without  
cooling: Cell I 66 $^{\circ}$  Cell II 62 $^{\circ}$  Cell III 60 $^{\circ}$

7/17/03 10:25 Return of I-1 and commons of #1, #2 and #3  
found disconnected from I-RE-1  
— connected!

Cell I, depth of immersion of Bore electrode:  $\frac{1}{4}$ "  
Cell II, depth of : : : :  $\frac{1}{2}$ "  
2.5. 7/17/03

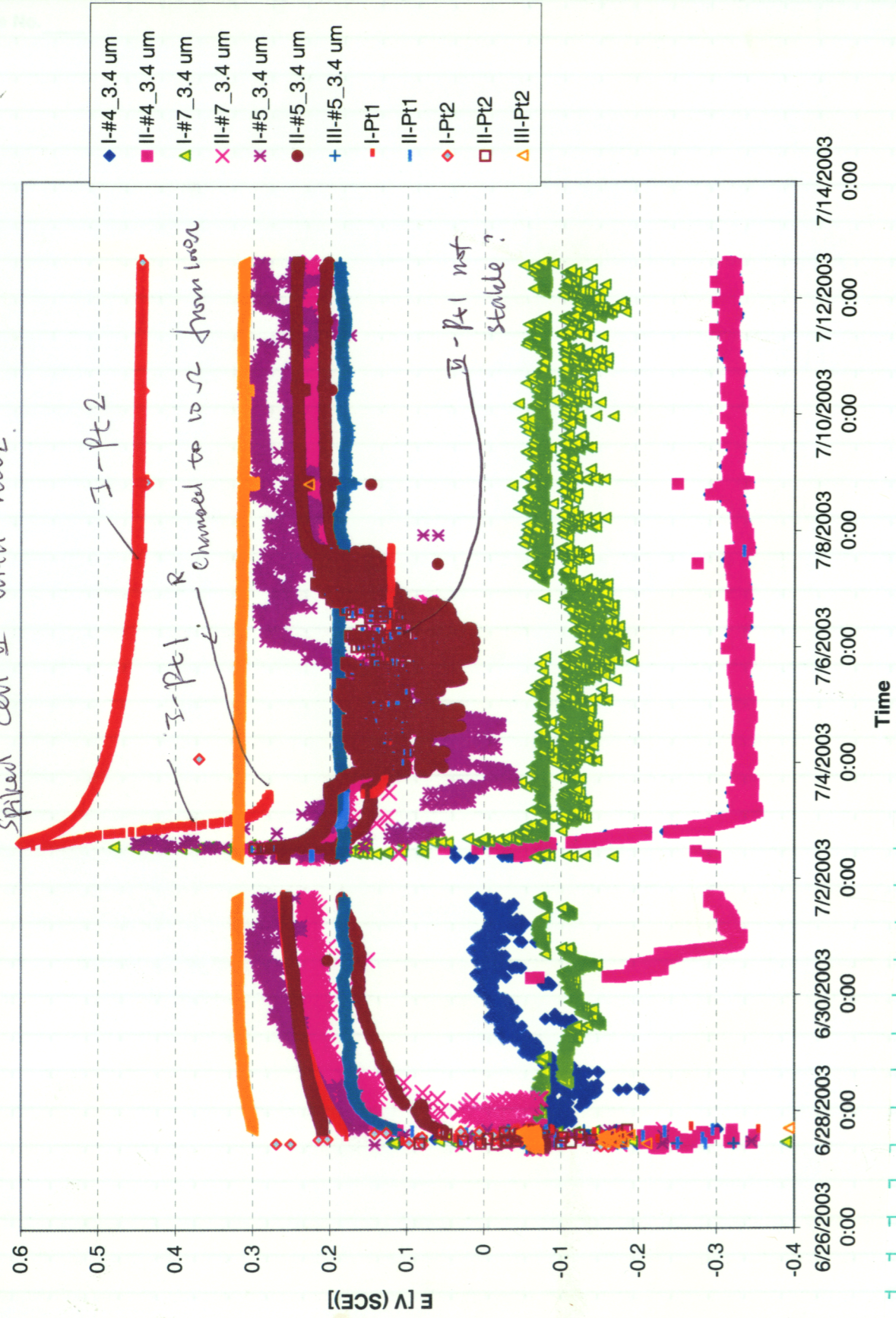
To Page No. \_\_\_\_\_

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by <i>J. Y. J.</i>	2/14/06



File: Zr\_03\_June0604\_July02a02 / Tab: Potential

↓ Spiked cell I with Teles  
Spiked cell II with H<sub>2</sub>O<sub>2</sub>



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

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

Date \_\_\_\_\_

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

Date \_\_\_\_\_

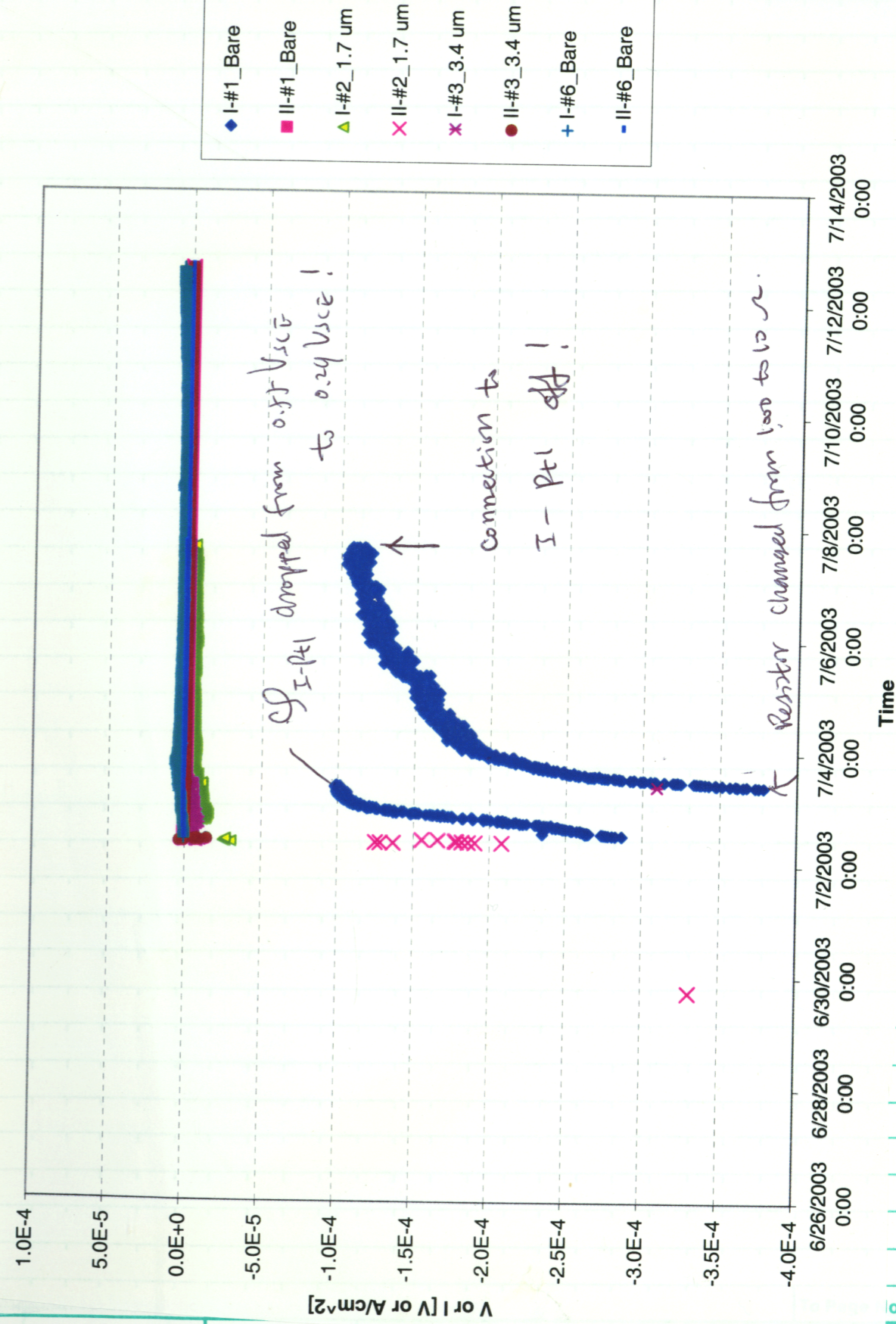
Recorded by \_\_\_\_\_

9/9/02  
2/14/03

TITLE \_\_\_\_\_

From Page \_\_\_\_\_

File: Zr\_03\_June0604\_July02a02 / Tab: Chart\_Current



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

Date \_\_\_\_\_

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

Date \_\_\_\_\_

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

9/9/02  
2/14/03