5/13/03 20mm wire was cut from Goodfellow PO # 1831325 LS 14715 BG Stainless steel wire.

These wires were inserted into a female / female 9 pin connector and held in place by microstop. The whole bottom end was assembled and micro stop.

The test using these sensors was very irratic. Moisture worked it's way thrue the micro stop, I believe and gave false indication.

note: Mybe this design would work if epoxy was used instead of micro stop.

For now these sensors will not be used.

J. Y.
10/3/03

5/13/03
13:39 Test and control sensors' com connected to coil #1 + #2

1 RSD 6/13/03

Test – Cpn (1kΩ) and Cntr – Cpn (~~10~~ 1kΩ) connected to coil #3

Potentials

Test cell (to own Ref)

304 wire	EN1	EN2	Pt wire	Coupon	Control	Counter
-224 mV	-227 mV	-228 mV	-52 mV	-121 mV	-196 mV	-383 mV

Air cell (to own Ref)

304 wire	EN1	EN2	Pt wire	Coupon	Counter
-141 mV	-62 mV	-107 mV	183 mV	-151 mV	187 mV

Control cell (to own Ref)

304 wire	EN1	EN2	Pt wire	Coupon	Control	Counter
-282 mV	-303 mV	-298 mV	-280 mV	-127 mV	-286 mV	-513 mV

Ref control to Ref air -11 mV
Ref control to Ref test 9 mV

Pin 6 connected to Cntr – Pt wire.
Pin 7 has been with ~~Cntr – Cpn~~ Cntr – Cntr
J. Y. 5/13/03

Ch. 40 to Cntr – Cpn.
Ch. 40 Return to coil #3 } current

1505 Changed Cntr – Cpn to coil #3 to a 1kΩ resistor

17:05 Ref air – Ref, test = -88.6 mV !
Ref, cntr – Ref, test = -68.6 mV !

J. Y.
10/3/03

5/14/03 8:15 Readings

control cell	I-4	-75.979	-111.453	-122.653	-207.818	-543.273	-99.987	-104.764	-108.998
	II-5	-10.653	-8.981	-9.364	-6.76	-11.798	-9.855	-9.485	-34.046
test cell	II-2	-9.574	-8.894	7.02	-6.267	-6.512	-5.983	-5.202	-6.192
	II-3	-16.142	-17.354	-30.323	-34.385	-32.615	-27.186	14.081	-12.952

Potentials

Test cell (to own Ref)

304 wire	EN1	EN2	Pt wire	Coupon	Control	Counter
-241 mV	-249mV					

Air cell (to own Ref)

304 wire	EN1	EN2	Pt wire	Coupon	Counter

Control cell (to own Ref

304 wire	EN1	EN2	Pt wire	Coupon	Control	Counter

Did not take rest of potentials due to salt bridge not working

Changed out salt bridges to glass with a flexable bridge between them.

J. [signature] 10/3/03

4 RDP
5/15/03
17:04 Ref, air − Ref, test = −5.5 mV, No N_2 bubbling out of vent in test and control cells.
Ref, cont − Ref, test = −1.8 mV

	304-wire	Control	Noise 1	Noise 2	Pt wire	test	Pt cont
test cell	−196	−194.8	−213	−209	−68	−157	−368
air cell	−67		−34	−44	+197	−140	+200
	coil (1+2) = −158		coil 3 = −151.6				
cont. cell	−221	−240	−231.2	−229	−14.0	−155	−460 ↑ Pt count

5/15/03
08:13 Started Repassivication test on ~~Control~~ ~~Coupon~~ in N_2 test cell
RDP 6/20/03 ~~Control~~ ~~Coupon~~ 6/20/03
6/20/03 file will be 03-May 15 a Rep, result see page 141 6/19/03, J.Y.

11:30 Repassivation test still going on in test cell.

	wire	contr	Noise 1	Noise 2	Pt wire	test	Pt count
Air cell	−82.2		−73.1	−63.1	+166.2	−172.4	+188
	coil #3 = −171.0		coil #1/#2 = −191.4				
cont cell	−186.1	−229	−211.3	−214.5	+27.6!	−176.2	−496

moved → −386 mV!
↓
−162 mV later.
↓
11:34 moved again → −390 mV

Ref cont − Ref, test = −8 mV

Ref air − Ref, test = −13 mV

Repassivation test done,

13:18

test cell	wire	Control	Noise 1	Noise 2	test	Pt count	Pt-wire
	−339	−387	−338	−338	−170	−461	−353

J. [signature] 10/3/03

5/15/03

3:30pm Started repasivication test on control coupon in N2 control cell
File name will be 03May15b Rep.

Result see page 175 J.Y. 8/13/03 ~~Can't find this file!~~ J.Y. 6/19/03

File found 8/13/03 J.Y.

5/16/03

8:23 a.m. J.Y. 5/16/03

Test cell	wire	control	test	Noise N1	Noise N2	Pt-wire	Pt count
	-228	-250	-143	-226	-225	-113	-442
Air	-87	~~-158~~	-158	-75	-69	+172	+158
	coil #3 = -123		coil #1/#2 = -159				
Control	-248	-264	-243	-258	-259	-196	-511

Ref, cont - Ref, test = +97 Ref, air - Ref, test = -19

Ref, air - Ref, cont = -116

08:55 a.m Electro chemical noise test on N2 test cell File name EB03May16a.cor
see page 269

09:26 a.m Electro chemical noise test on air cell File name EB May 16 b.cor 03 RJD 7/16/03
see page 260

09:42 a.m Electro chemical noise test on N2 control cell File name EB May 16c.cor 03 RJD 7/16/03
see page 264

10:05 a.m Linear Polarization of N2 control (control coupon) in N2 control cell
File name LPR03May16a.cor (area 3.2 cm²)
see page 250

10:21 a.m Linear Polarization of wire in N2 control cell File name LPR03May16b.cor (area 3.2cm²)
see page 241

J.Y. 10/3/03

5/16/03

10:44 a.m Linear polarization of control coupon in N2 test cell File name LPR03May16c.cor
see page 212

11:00 a.m Linear polarization of wire in the N2 test cell File name LPR03May16d.cor
see page 203

11:52 a.m Linear polarization of wire in the air cell File name LPR03May16e.cor
see page 222

12:05 p.m. Control cell; Test cell; Dummy Cell
Inoculate with approximately 40 ml. Vibrio natriegens (slime former) culture using aseptic technique. Culture consists of organisms in a small amount of nutrient broth with 1.5% NaCl (≈10 ml.) with the balance (30 ml) sterile modified Baar's broth as a nutrient source.

To maintain volume in cell, approx. 40 ml brine is withdrawn prior to inoculation of organism in broth.

Same procedure is performed on all three cells.

Plan is to harvest growth after approximately 3 days growth and perform serial dilutions to quantitate growth of slime former. 5/16/03.

see page 232

2:29pm Linear polarization of coupon in the air cell File name LPR03May16f.cor

	wire	control	test	N1	N2	Pt wire	Pt count
Test	-211mV	-220mV	-179mV	-210mV	-211mV	-211mV	-457mV
Air	-93mV	N/A	-155mV	-79mV	-76mV	+174mV	+161mV
		coil #3 → -145mV		coil #1:2 → -158mV			
Control	-240mV	-241mV	-237mV	-240mV	-240mV	-230mV	-496mV

J.Y. 10/3/03

5/19/03

08.22 a.m	wire	control	test	n_1	n_2	Pt wire	Pt counter
Test cell	~~-686~~ mV RSD -389 mV	~~-460~~ mV RSD -263 mV	~~-329~~ mV RSD -183 mV	~~-652~~ mV RSD -364 mV	~~-377~~ mV RSD -362 mV	~~-407~~ mV RSD -226	~~-801~~ mV RSD -445
air cell	-161 mV	-265 mV	N/A	-140 mV	-128 mV	+174 m	+161 mV
		coil #3	-270 mV		Coil 1-2	-328 mV	
Control cell	-226 ~~-402~~ mV	-225 mV	-215 mV	-248 mV	-265 mV	-216 mV	-448 mV

* meter battery was low, took readings with new meter.

Meter Fluke 87III Sn# 73850992 Due Jan 08, 04

5/20/03

09:00 am	wire	control coupon	Test Coupon	n_1	n_2	Pt wire	Pt counter
Test cell	-368 mV	-281 mV	-194 mV	-350 mV	-291 mV	-250 mV	-465 mV
air cell	~~-132~~ 66 mV	-126 mV	N/A	-48 mV	-44 mV	+180 mV	+161 mV
		coil #3 → -132 mV		Coil #1:2 → -153 mV			
Control cell	-240 mV	-238 mV	-219 mV	-252 mV	-264 mV	-230 mV	-448 mV
		test Ref → air cell = -38 mV		test Ref → control Ref = +23 mV			

09:20 a.m. Electrical chemical noise on N2 test cell. file name EB03 May 20a.cor
see Page 269

Set up is as follows:

Cable	
WE + RE2	Noise #1
RE1	Reference
Ground	Noise #2
CE	N/A

09:37 a.m Electrical chemical noise on Air Cell file name EB03 May 20b.cor
see page 261

09:55 Add some solution to both N2 cells to ensure probes are covered J. Y. 10/3/03

5/20 RSD 5/19/03

0956 am Electrical chemical noise on N2 control cell file name EB03 May 20c.cor
see page 265

10:34 a.m Linear polarization of wire in N2 control cell file name LRM03 May 20a.cor
see page 242

10:51 am Linear polarization of ~~wire~~ control coupon in N2 control cell file name LRM03 May 20b.cor
see page 251

1:55 pm Linear polarization of control coupon in N2 test cell file name LRM03 May 20c.cor
see page 213

2:12 pm Linear polarization of wire in N2 test cell file name LRM03 May 20d.cor
see page 204

2:45 pm Linear polarization of coupon in air cell file name LRM03 May 20e.cor
see page 233

3:06 pm Linear polarization of wire in air cell file name LRM03 May 20f.cor
see page 223

3:30 Performance verification on the solitron is due. Stopped testing to due a performance verification

5/21/03

08:27 am	wire	control coupon	test coupon	n_1	n_2	Pt wire	Pt counter
Test cell	-344 mV	-289 mV	-230 mV	-328 mV	-289 mV	-275 mV	-456 mV
air cell	-21 mV	-149 mV	N/A	-70 mV	-61 mV	+178 mV	+98 mV
			coil #3 = -148 mV	coil #1:2 = -46 mV too high?			
Control cell	-254 mV	-253 mV	-313 mV	-260 mV	-265 mV	-247 mV	-450 mV

08:30 Electrical chemical noise on N2 test cell file name EB03 May 21a.cor see page 270 J. Y. 10/3/03

Ref, con − Ref, test = ? Ref, air − Ref, test = ?

5/21/03

08:46 Electrical Chemical noise on Air cell
File name EB03May21b.cor
See page 261

09:07 Electrical Chemical noise on N2 control cell
File name EB03May21c.cor
See page 261

10:05 Linear polarization of wire in a control cell
LRM03May21a.cor
see page 243

10:27 Linear polarization of control coupon in control cell
LRM03May21b.cor
See page 252

10:45 Linear polarization of coupon in Air cell
LRM03May21c.cor
see page 239

12:05 Linear polarization of wire in Air cell
LRM03May21d.cor
see page 224

12:33 Linear Polarization of wire in N2 test cell
LRM03May21e.cor
see page 205

12:52 Linear Polarization of control coupon in N2 test cell
LRM03May21f.cor
see page 214

1:15 Started Repassivation test of wire in N2 test cell
File will be named 03May21a Rep see page 142 J.Y. 6/18/03

5/22/03 08:10	Wire	Control	Test	n_1	n_2	Pt wire	Pt counter
Test cell	-345mV	-312mV	-225mV	-331mV	-309mV	-307mV	-480mV
Air cell	-83mV	-145mV	N/A	-73mV	-41mV	+165mV	+184mV
	Coil #3 = -137mV		Coil 1:2 = -196mV				
Control cell	-268mV	-266mV	-241mV	-273mV	-275mV	-262mV	-452mV

J.Y. 10/3/03

5/22/03

08:19 Started repassivation test on control coupon in N2 Test cell file will be 03May22a Rep See page 143. J.Y. 6/19/03

9:46 Ref, cont - Ref, test

Ref, cont - Ref, air = +96.3 mV ; Ref, test - Ref, air = +87.5 mV

9:57 after squeezing bubbles in salt bridge out.

Ref, cont - Ref, air = +6 mV ; Ref, test - Ref, air = +18 mV
≈37 mV at 9:59

12:44 Started repassivation test on wire in air cell
file will be 03May22b Rep see page 144.

5/23/03 0827	Wire	Control	Test	n_1	n_2	Pt wire	Pt counter
Test cell	-339mV	-330mV	-197mV	-337mV	-322mV	-326mV	-481mV
Air cell	-173mV	-130mV	N/A	-70mV	-65mV	+169mV	+120mV
	Coil #3 = -187mV		Coil 1:2 = -218mV				
Control cell	-282mV	-280mV	-197mV	-284mV	-286mV	-276mV	-453mV
	N2 test Ref - Air Ref = -29mV			N2 test Ref - N2 control Ref = 00mV			
	Air Ref = N2 control Ref = +30mV						

0338 Repassivation test on wire in N2 control cell
file name 03May23a Rep see page 145

5/23/03 1105 Test cell: Using aseptic technique remove 10 ml spine and slime former. Inoculate with 10 ml SRB in modified Baar's broth.

J.Y. 10/3/03

1105 (con't) (B)

Control cell: Using aseptic technique withdraw 10 ml brine & slime former. Inoculate with 10 ml sterile modified Baar's broth. GRB 5/23/03

Dummy cell: Using aseptic technique withdraw 5 ml brine and slime former. Inoculate 5 ml SRB in modified Baar's broth.

All three harvest solutions are cultured using serial dilutions to quantitate cfu/ml of slime former (Vibrio natriegans).

Plan is to perform harvest for active SRB cultures after 3 to 4 days incubation in test cells and control cell. 5/23/03 (L)

5/27/03 GRB Anaerobe Systems called for QC data and formula. Jeremy McDonald says to expect documents at the end of this week. They are being signed today, he said. GRB 5/27/03

J. Yg 10/3/03

PURCHASE REQUISITION
SOUTHWEST RESEARCH INSTITUTE ™

REQUISITION DATE 5/6/03

SUGGESTED OR PREVIOUS SUPPLIER ANAEROBE SYSTEMS
CITY, STATE MORGAN Hill, CA.
ATTN: JEREMY McDONALD
PHONE 408-782-7557 FAX 408-782-2031

DELIVER TO BLD. 57

LN.	QTY.	UNIT	DESCRIPTION	ORG	PRO.	EST. UNIT PRICE
1	12	PKG	AS-888B Baar's Broth			15.85
2	27	PKG	AS-888a Baar's Agar			7.40
3	12	PKG	AS-NB15 Nut. Broth 1.5%			13.85
4	27	PKG	AS-889A Nut. Agar 1.5%			7.40

Items received 5/23/03 GRB

R. J.Y. 5/23/03

J. Yg 5/23/03

5/27/03	wire	control	Test	n_1	n_2	Pt wire	Pt counter
Test cell	-311 mV	-315 mV	-217 mV	-311 mV	-309 mV	-310 mV	-470 mV
Air cell	-84 mV	-172 mV	N/A	-55 mV	-51 mV	+150 mV	+123 mV
			coil #3 = -175 mV	coil 1&2 = -234 mV			
Control cell	-301 mV	-301 mV	-216 mV	-302 mV	-303 mV	-300 mV	-497 mV

Test Ref to Air Ref = -23 mV
Test Ref to control Ref = 0 mV

0854 a.m. Electrical noise test on n_2 Test cell
file EB.May.27a.corr RSD 03 see page 270

0936 a.m. Electrical noise test on Air cell
file EB.May27b.corr RSD 03 see page 261

J. Yg 10/3/03

5/27/03 Electrical noise test on N2 control cell
0955 a.m. file name EB_May27c.cor
RSD 7/14/03 03 See page 266

12:30 ~~1036~~ pm Linear polarization of N2 control cell wire
file name LRM_03May27a.cor
Data RJD 7/14/03 See page ~~224~~ 244 RJD 7/14/03

2:07 pm Linear polarization of N2 control cell control coupon
file name LPR_03May27b.cor
Data RJD 7/14/3 See page 253

2:45 pm Linear polarization of Air cell ~~coupon~~ coupon RJD 7/14/03
file name LPR_Data_03_May27c.cor
See page 235

5/27/03
1500 GNB. From Harvest of 5/23/03.
Culture for Vibrio Natriegans

Concentration:	CELL: Test	Control	Dummy
Agar	10^0 TNTC	TNTC	TNTC
	10^1 "	"	"
	10^2 "	"	"
	10^3 "	"	"
	10^4 "	"	"
	10^5 "	"	$\boxed{8\times10^5}$
	10^6 $18\times10^6 = \boxed{1.8\times10^7}$	$10\times10^6 = \boxed{1\times10^7}$	ng
	10^7 ng	ng	ng
	10^8 ng	ng	ng
	10^9 ng	ng	ng
	10^{10} ng	ng	ng
	10^{11} ng	ng.	ng.

TNTC = Too numerous to count

Broth	10^7	10^7	10^7

J. Yr 10/3/03

5/27/03 GNB.

5/23/03 GNB Inoculate Test cell and Control
1500 GNB 5/29/03 cell with 20 ml sterile Baar's Broth. Inoculate test cell with SRB.

Harvest 20 ml brine from test cell and control cell prior to inoculation step.

Culture harvest for growth of slime former and SRB.

Aseptic technique used throughout process.

Dummy cell left alone - no harvest and no inoculation.

Plan: Perform harvest on all cells in about 2-3 days to check bacterial population. GNB 5/23/03.

3:08 pm Linear polarization of Air cell ~~coupon~~ RJD wire
file name LPR_Data_03_May27d.cor
See page 225

3:29 pm Linear polarization of N2 test cell wire
file name LPR_Data_03_May27e.cor
See page 206

3:48 pm Linear polarization of N2 test cell control coupon
file name LPR_Data_03_May27f.cor
See page 215

3:50 Repassivization test of Pt wire in Air cell
file name 03_May27a Rep See page 146.

5/28/03 Repassivization test of control coupon in Air cell
0809 file name 03_May28a Rep
See page 147

J. Yr 10/3/03

5/28/03

	wire	control	Test	n_1	n_2	Pt wire	Pt counter
n_2 test	-337mV	-336mV	-222mV	-340mV	-336mV	-337mV	-447mV
Air	-94mV	-180mV	~~-77mV~~ N/A RSD	-70mV	-77mV	+180mV	+114mV
			coil #3 = -221mV	coil 1:2 = -247mV			
n_2 control	-276mV	-279mV	-217mV	-275mV	-276mV	-274mV	-474mV

n_2 test Ref to Air Ref = -13mV

n_2 test Ref to n_2 control = -3mV

5/28/03 12:41 Repassivation test on wire in n_2 test cell
File 03_May 28b Rep see page 148

5/29/03 0800

	wire	control	Test	n_1	n_2	Pt wire	Pt counter
n_2 test	-362mV	-358mV	-238mV	-359mV	-358mV	-360mV	-436mV
Air	-81mV	-174mV	N/A	-64mV	-60mV	+183mV	+122mV
			coil #3 = -220mV	coil 1:2 = -240mV			
n_2 control	-289mV	-293mV	-229mV	-289mV	-290mV	-288mV	-466mV

n_2 test Ref to Air Ref = -17mV

n_2 test Ref to n_2 control = -7mV

08:55 a.m Repassivation test on control coupon in n_2 test cell
File 03_May 29a Rep see page 149

1:30 p.m Repassivaction test on n_2 control cell wire
File 03_May 29b Rep see page 150

J. [signature] 10/3/03

5/29/03 GNS

Harvest of 5/27 | Vibrio | SRB | no SRB

1500	Test	control		Test	control
agar	$10^0 - 10^6$ (+)	$10^0 - 10^5$ (+)	agar	ng 48 hr.	~~ng 48 hr.~~ error GNS 5/29
broth	10^8 (+)	10^7 (+)	broth	(+) 10^3	

Aseptic technique followed in all steps.
Harvest brine from all three cells, approximately 10 ml each.
Inoculate approximately 10 ml sterile Baar's broth into each of the three cells - Test, Control, Dummy.
Perform cultures of brine harvest from each cell using serial dilution technique.
Plan is to perform another harvest in 3-4 days. 5/29/03 [initials]

5/30/03 0800

	wire	control	Test	n_1	n_2	Pt wire	Pt counter
n_2 test	-365mV	-362mV	-237mV	-365mV	-363mV	-364mV	-422mV
Air	-83mV	-169mV	N/A	-65mV	-59mV	+176mV	+122mV
			coil #3 = -220mV	coil #1:2 = -240mV			
n_2 control	-300mV	-302mV	-230mV	-298mV	-300mV	-298mV	-540mV

n_2 test Ref to Air Ref = -15.9mV

n_2 test Ref to n_2 Control = -5.3mV

6/2/03 GNS → second read of Harvest of 5/27

	SRB	Vibrio
Test cell	10^5 - no change 6/9 GNS - no change 6/17 GNS - no change 7/14 GNS	10^8 no change 6/9 GNS no change 6/17 GNS no change 7-14 GNS
Control cell		10^7 10^8 cfu/ml - 6/9/03 ~~GNS~~ no change - 6/17/03 GNS no change 7-14 GNS

J. [signature] 10/3/03

6/2/03 Late Entry — Repassivization test of coupon in N_2 control cell
File name 03 May 30a Rep
see page ~~150~~ 151
RJD 6/2/03

staveleyservices MATERIALS TESTING

ACCREDITED
Certificate # 286.01
Certificate # 286.02

192 Internationale Blvd.
Glendale Heights, IL 60139
Telephone 630-681-0008
Facsimile 630-871-5520
www.staveleymt.com

TEST REPORT

SOUTHWEST RESEARCH INST. 7010
6220 CULEBRA RD
P.O. DRAWER 28510
SAN ANTONIO TX 78284
LIETAI YANG

P.O.# 50138

DESCR 08/21/03
HEAT R254

REPORT DATE: 08/25/2003

LAB NO: 0822-020 / 01 RECEIVED DATE: 08/22/2003 JOB NO: 08/25 #V1

TYPE 304L SS

CHEMICAL ANALYSIS

Si	.43	Mn	1.36	C	.020
P	.026	S	.010	Ni	8.29
Cr	18.15	Mo	.39	Cu	.26
Al	.04	Ti	<.01	Cb	<.01

THE ABOVE CHEMICAL TEST RESULT CONFORMS TO 304L STAINLESS STEEL

TEST METHODS: ASTM E-1019 LATEST REVISION ; ASTM E-1086 LATEST REVISION ;

Confirmatory Analysis for 9/5/03
PO# 182930S line 1. J. Yang
see page 31-1 of Book 423.

Q.A. INSPECTOR

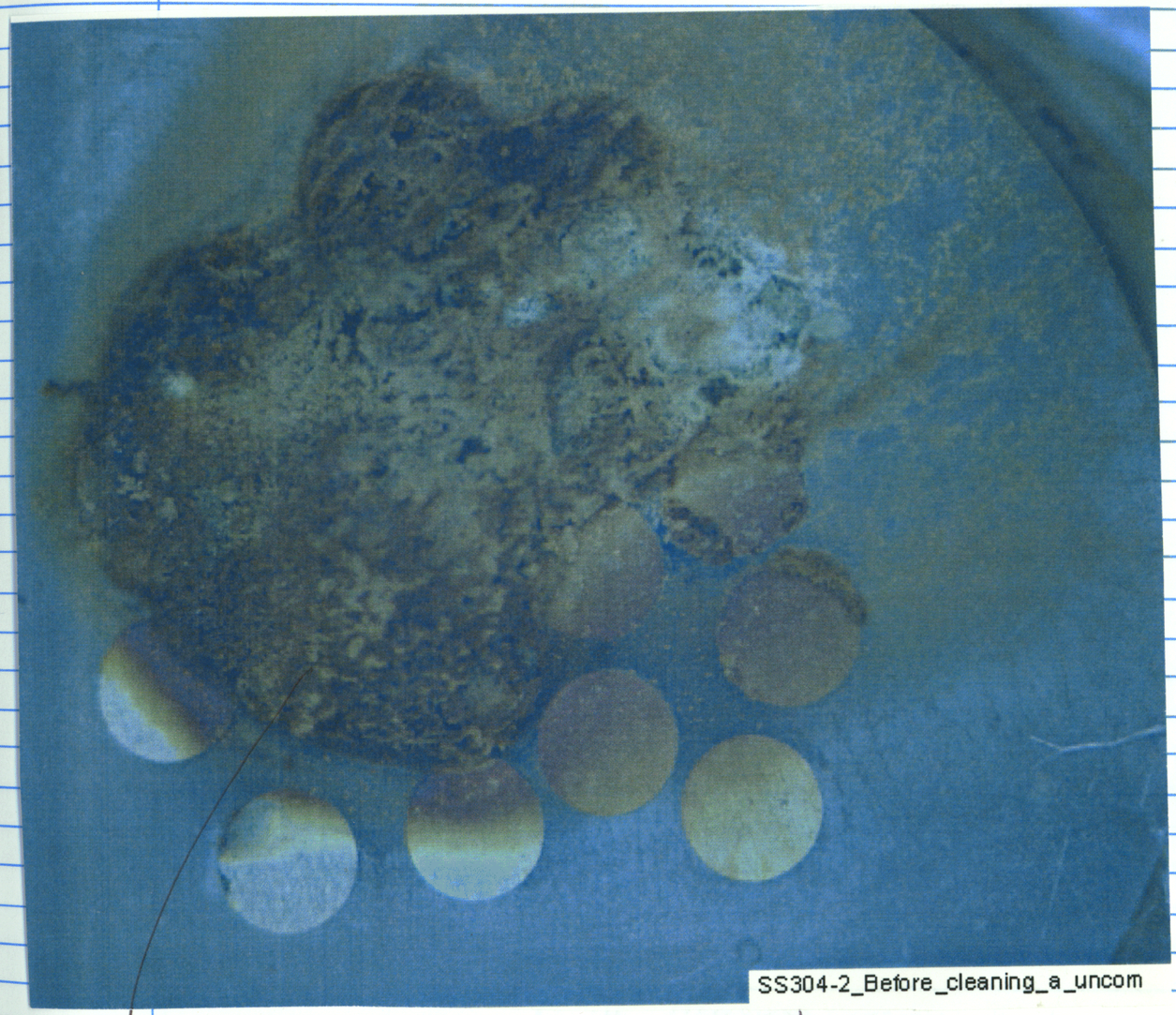
ALL CHEMICAL TEST RESULTS ARE REPORTED IN WEIGHT PERCENT UNLESS OTHERWISE NOTED.

PAGE 1 OF 1

J. Yang 9/5/03

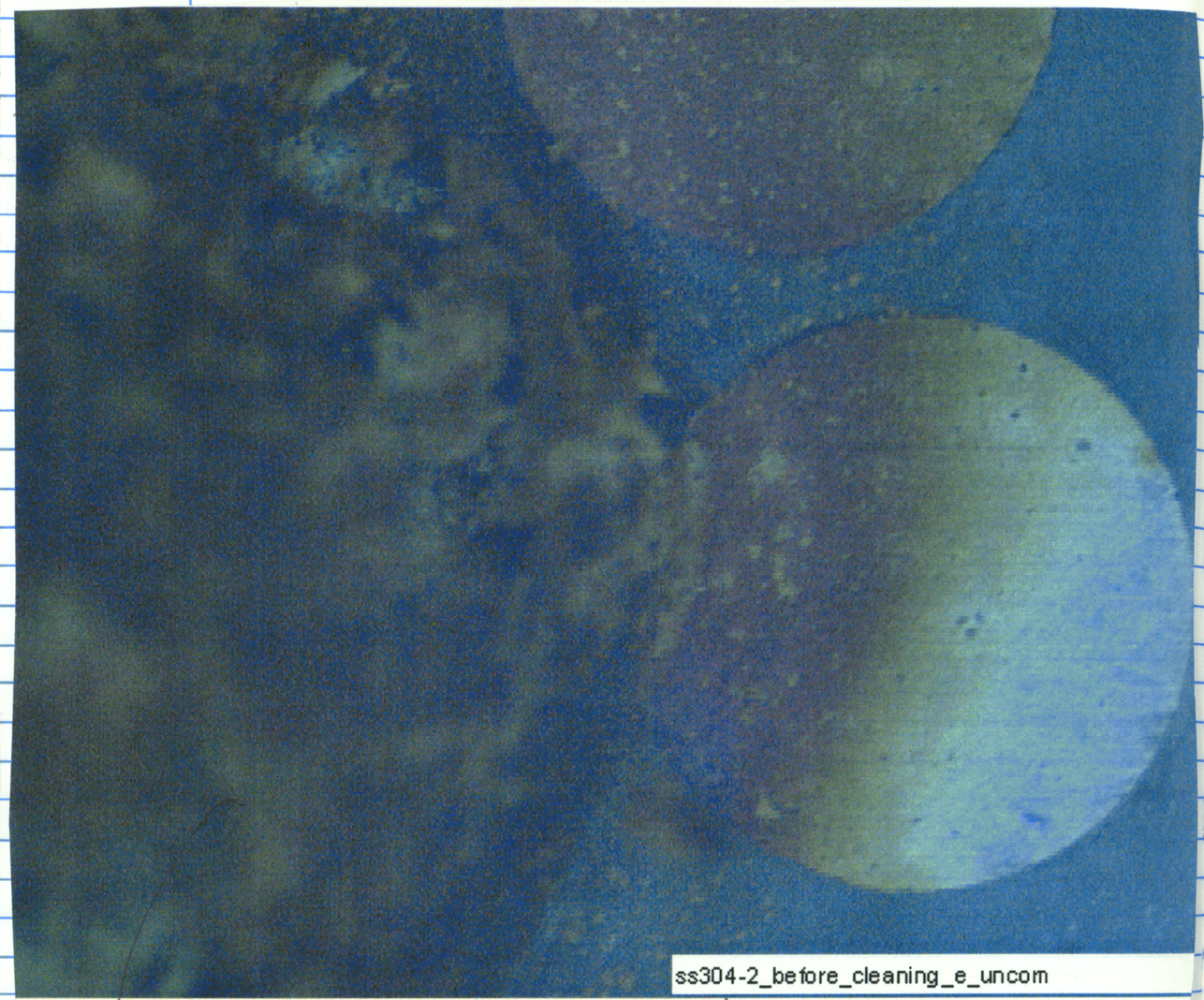
From page 68.

Characterization of surfaces of sensors and coupons.



SS304-2_Before_cleaning_a_uncom

File Name:
sensor in test cell, before cleaning.
thick deposits. (loose)
Deposit sent for EDS Analysis. see page 124. J. Yang 5/30/03

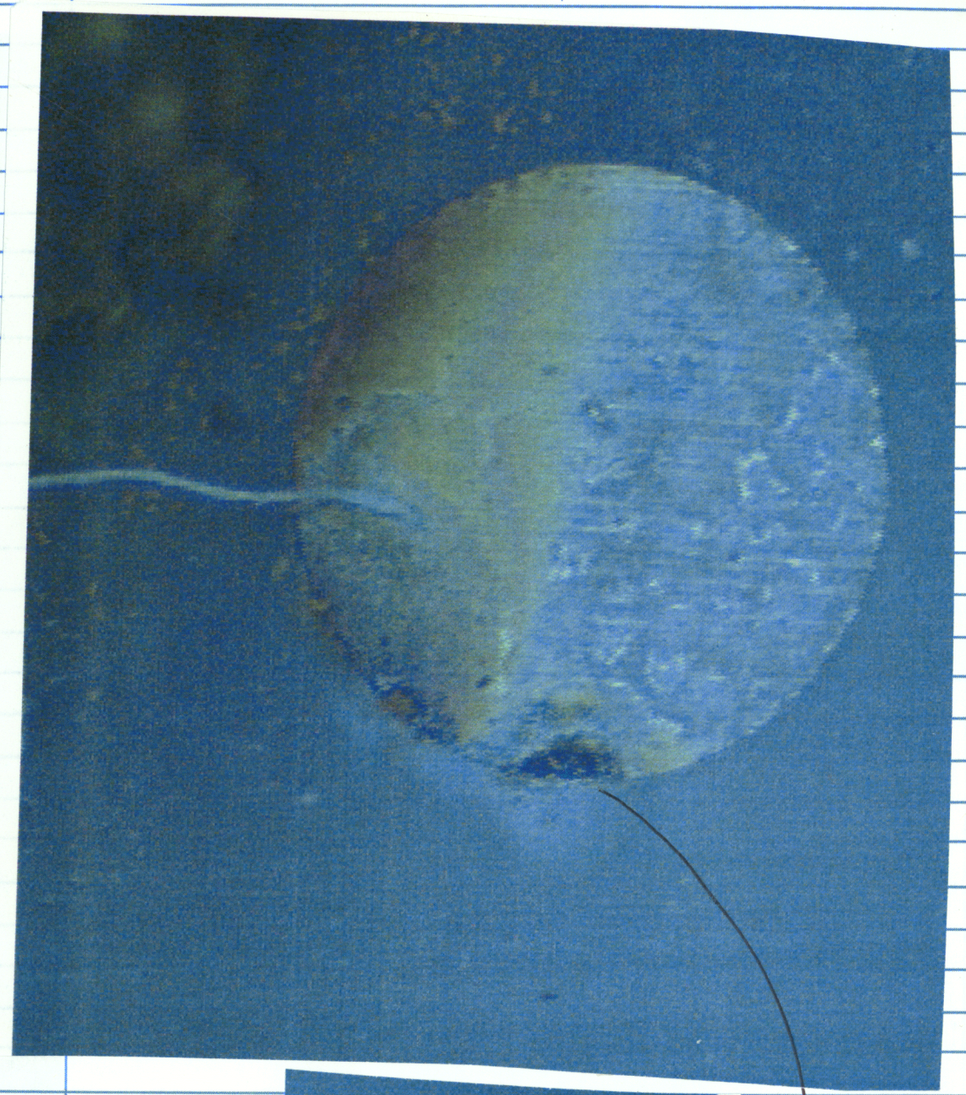


File name:

Sensor in test cell, before cleaning.

thick corrosion products (or deposits).

J. Y. 5/30/03

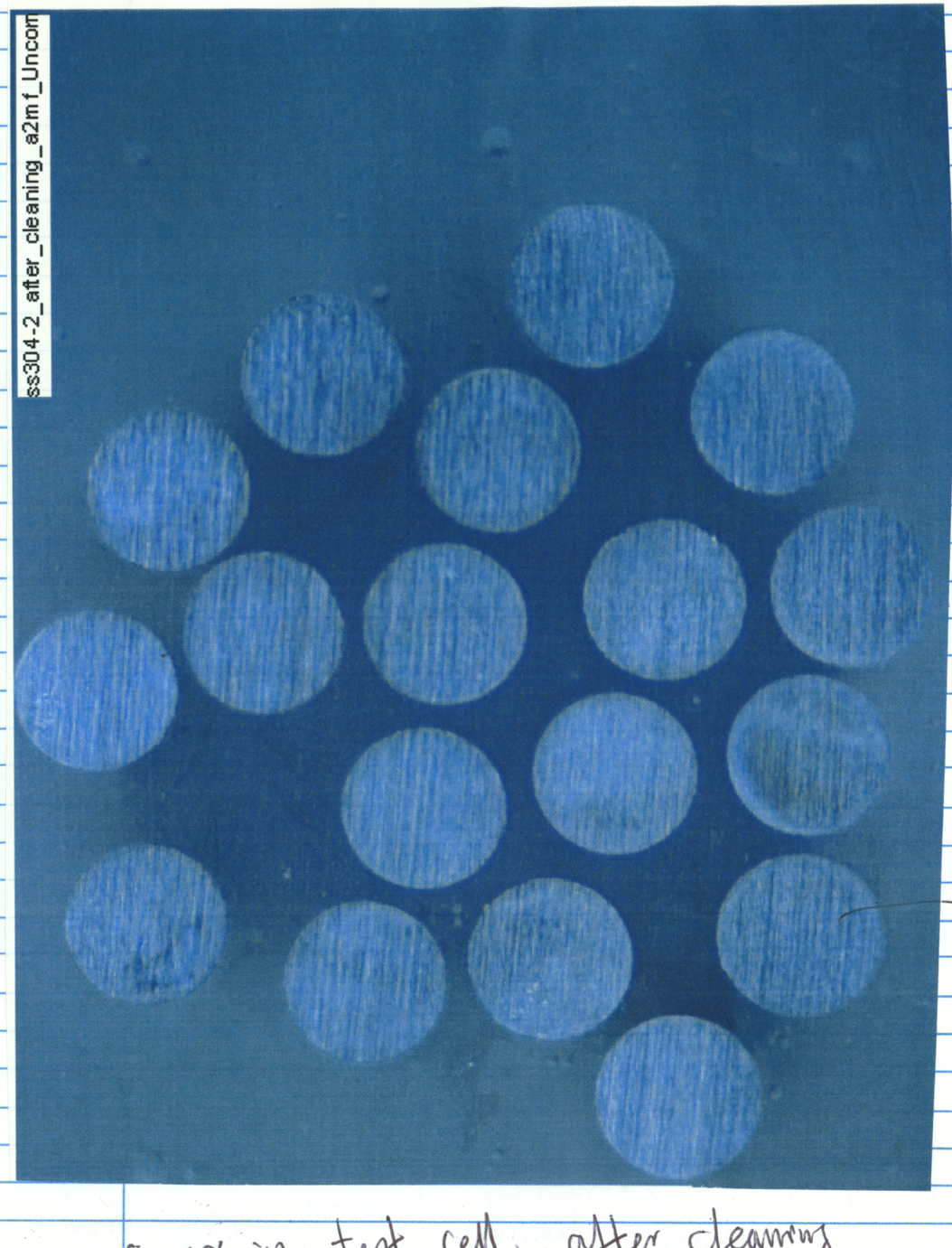


File: ss304-2_before_cleaning_c_uncom

Sensor in test cell. before cleaning.

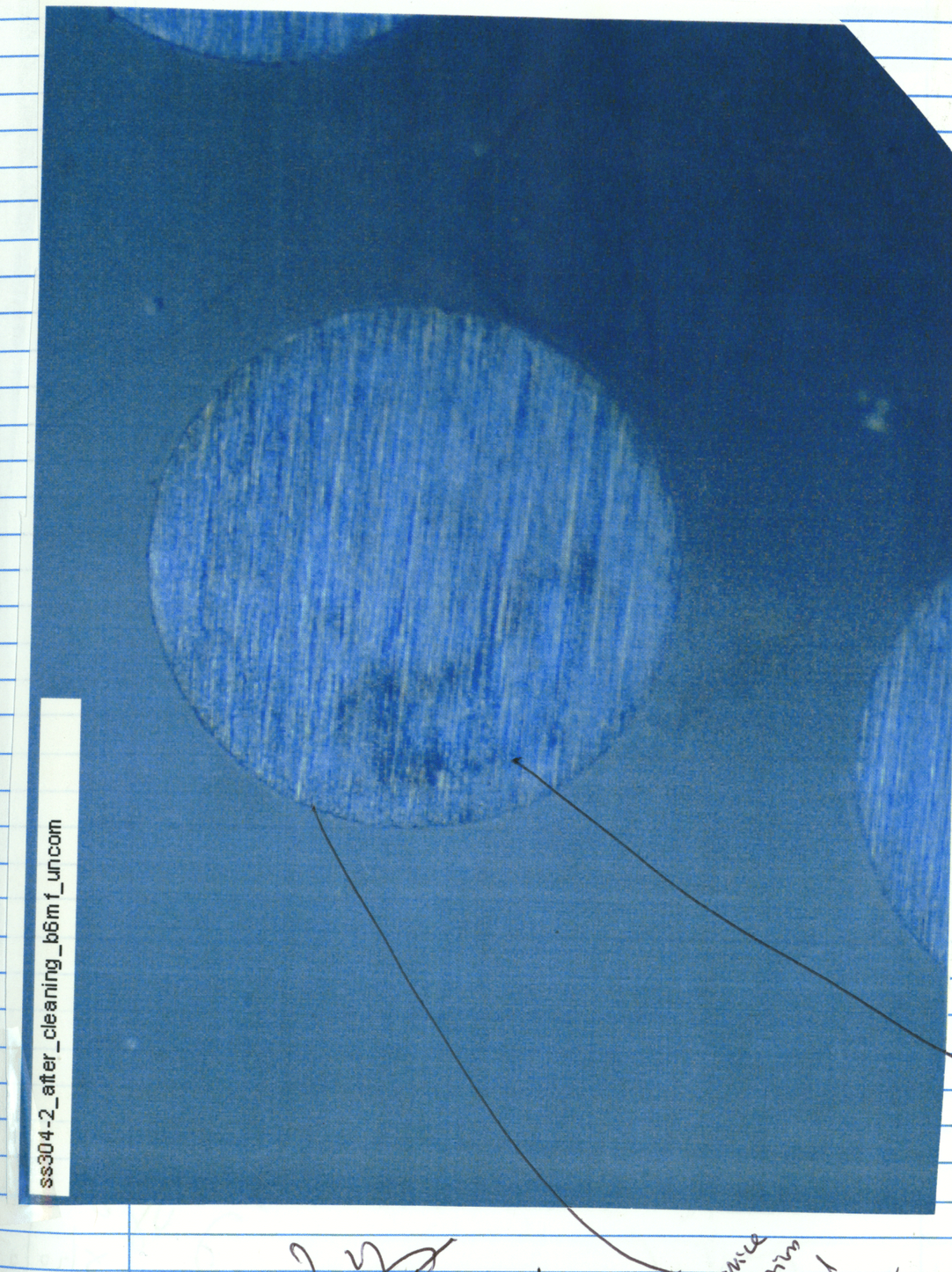
J. Y. 5/30/03

indication of some crevice corrosion.



machine marks still here.

sensor in test cell after cleaning with soft brush. — [signature] 5/30/03

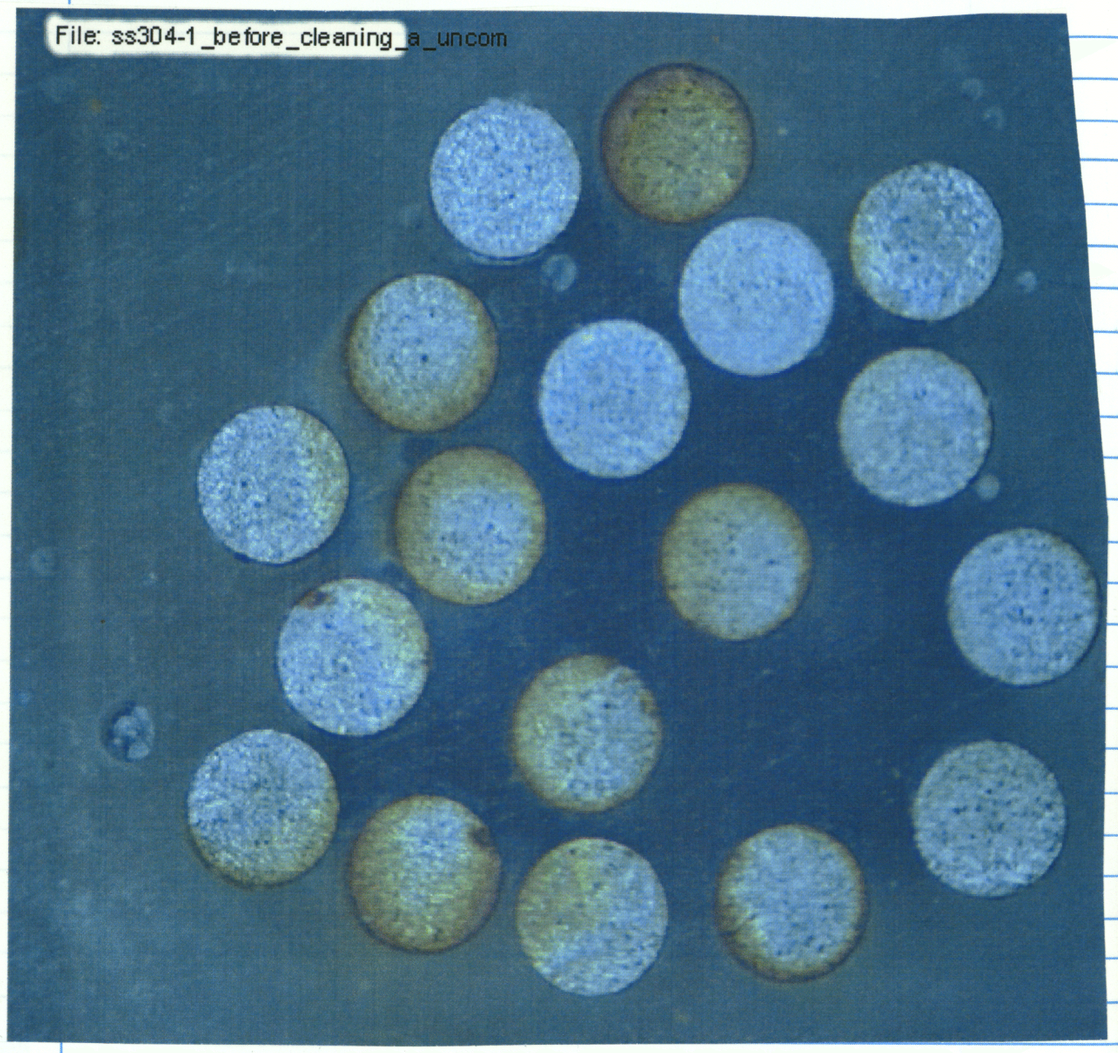


Sensor in test cell.

some pitting.

crevice corrosion found under microscope. Also picture taken

[signature] 5/30/03



Sensor tested in control cell, before cleaning.

No thick deposit found.

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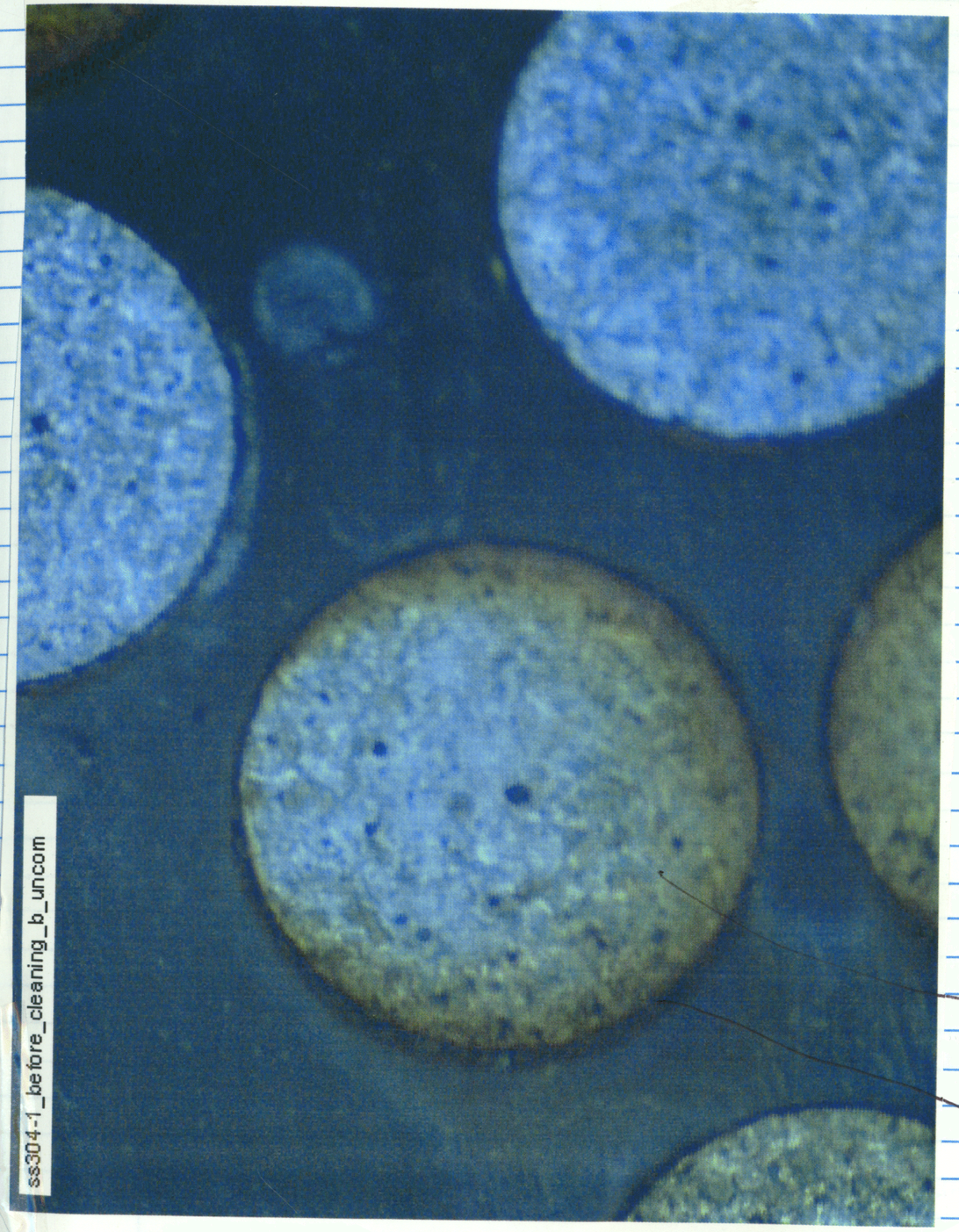

Sensor tested in control cell, before cleaning

severe pitting and crevice corrosion.

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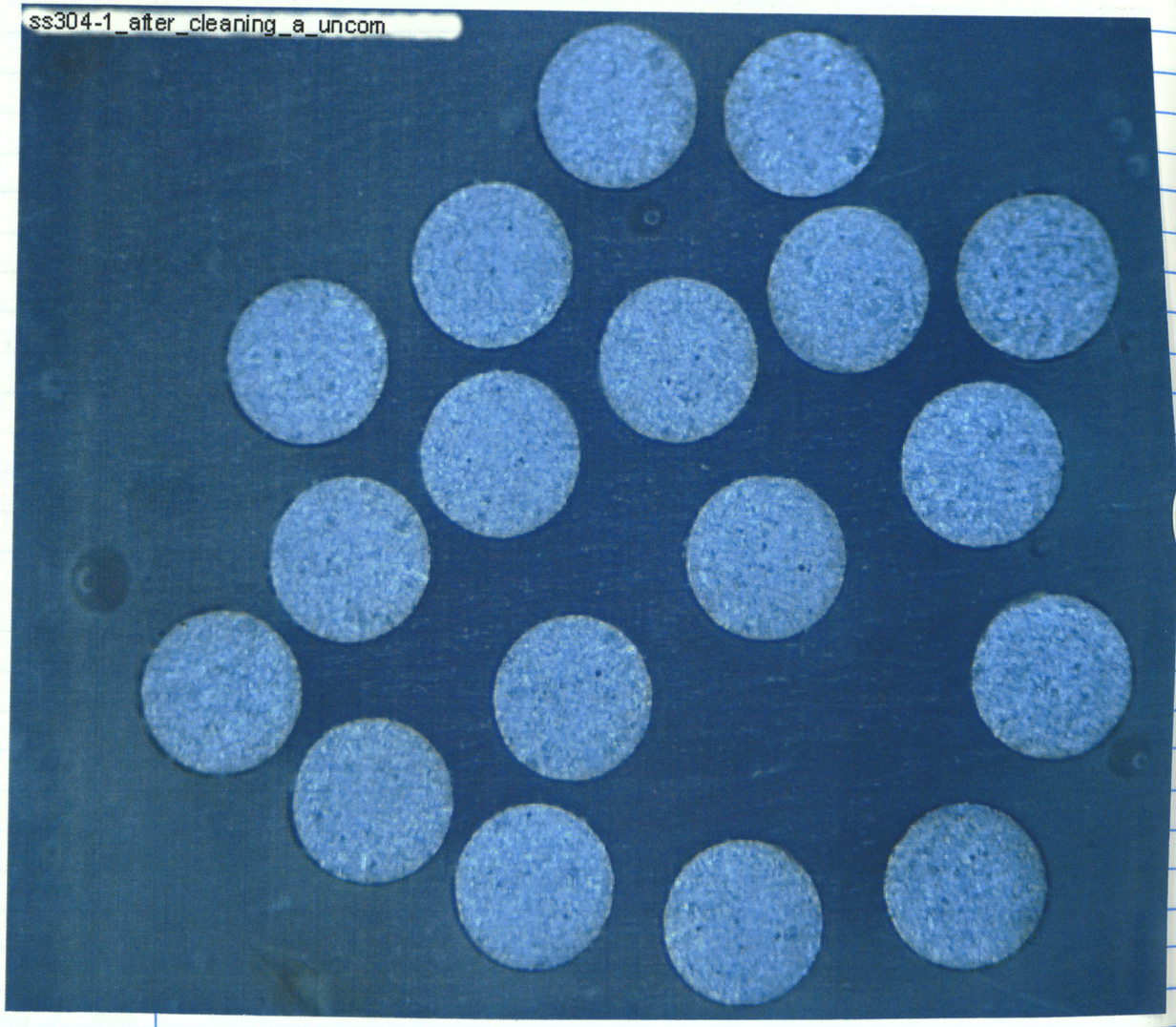

After cleaning, sensor tested in control cell

severe pitting and crevice corrosion.

No machine marks left.

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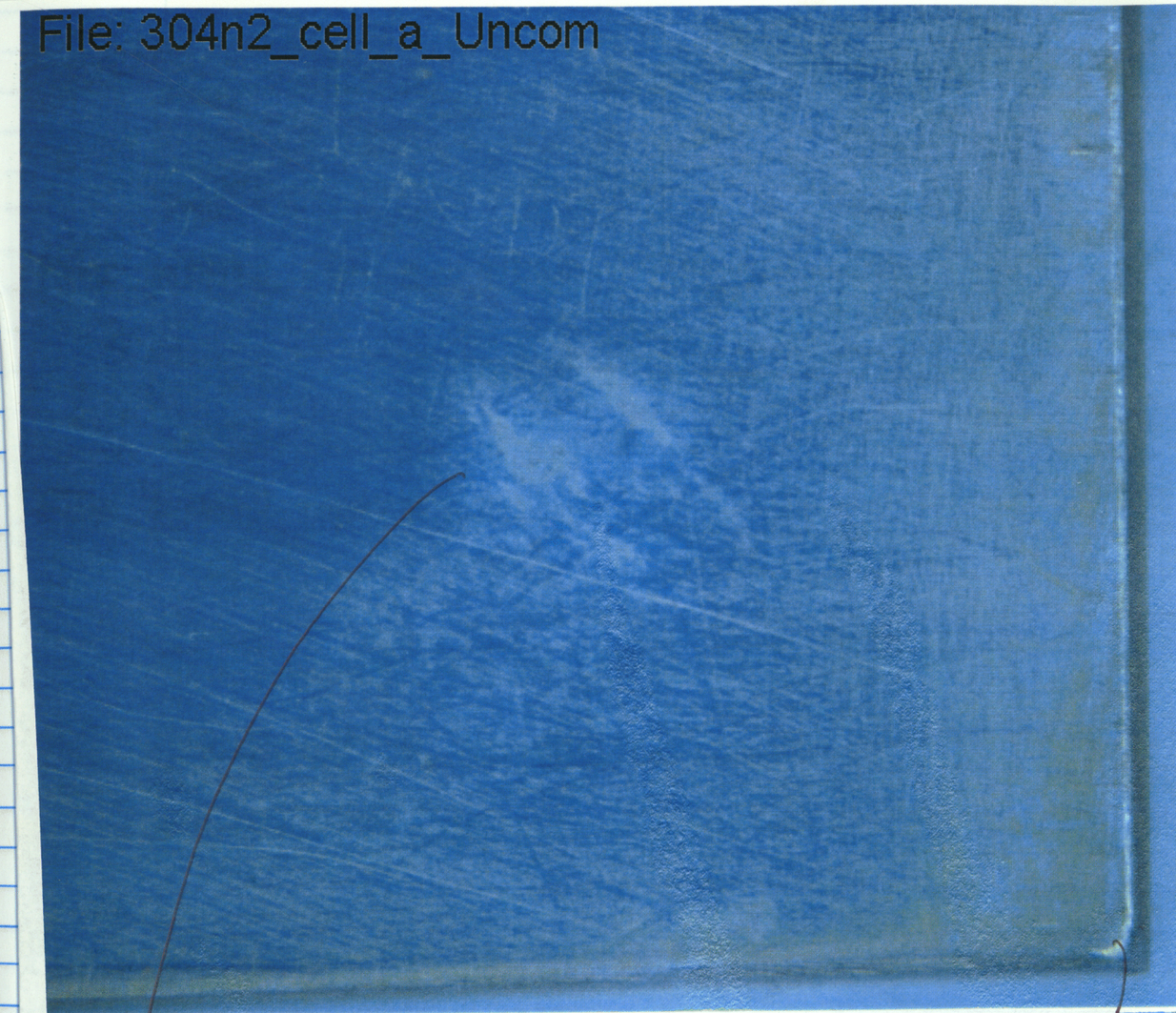

Coupon used in test cell.

edge corroded

seems to have found localized corrosion with Gustavo under microscope. This is the only spots. all other spots examined, no pitting found.

J.Y. 5/30/03