Project No.
Book No.
TITLE

From Page No.

2. Elemental concentration data

a) Specimen 11a

Etch Time (sec)	C 1s %	Cr 2p %	Mo 3d %	Ni 2p %	O 1s %	Si 2p3 %	W 4d5 %
0.00	12.35	0.00	0.00	0.00	57.79	29.64	0.23
60.00	7.15	0.00	0.00	0.00	62.03	30.41	0.41
120.00	5.53	0.00	0.00	0.00	62.69	31.59	0.20
180.00	6.04	0.00	0.00	0.00	62.40	31.37	0.19
240.00	3.31	0.00	0.00	0.00	65.51	30.93	0.25
300.00	3.47	0.00	0.00	0.00	63.77	32.60	0.16
360.00	5.34	0.00	0.00	0.00	63.06	31.29	0.31
420.00	3.60	0.00	0.00	0.00	63.35	32.92	0.13
480.00	2.24	0.00	0.00	0.00	64.20	33.28	0.28
540.00	1.98	0.00	0.00	0.00	65.07	32.72	0.22
600.00	1.35	0.00	0.00	0.00	65.09	33.38	0.18
660.00	3.66	0.00	0.00	0.00	62.69	33.36	0.30
720.00	1.78	0.00	0.00	0.00	64.25	33.57	0.40
780.00	2.56	0.00	0.00	0.00	64.46	32.79	0.19
840.00	0.78	0.00	0.00	0.00	64.86	34.06	0.31
900.00	2.21	0.00	0.00	0.00	65.09	32.48	0.22
1140.00	2.54	0.00	0.00	0.00	65.08	32.20	0.19
1380.00	1.12	0.00	0.00	0.00	64.76	33.84	0.28
1620.00	0.00	0.00	0.00	0.00	65.65	34.10	0.25
1860.00	0.00	0.00	0.00	0.00	65.17	34.61	0.23
2100.00	0.00	0.00	0.00	0.00	65.98	33.75	0.28
2340.00	0.00	0.00	0.00	0.00	65.43	34.34	0.23
2580.00	0.00	0.00	0.00	0.00	65.43	34.30	0.27
2820.00	0.00	0.00	0.00	0.00	65.82	33.89	0.28
3060.00	0.00	0.00	0.00	0.00	65.17	34.47	0.37
3300.00	0.00	0.00	0.00	0.00	65.64	34.24	0.12
3540.00	0.00	0.00	0.00	0.00	65.21	34.57	0.23
3780.00	0.00	0.00	0.00	0.00	65.93	33.95	0.12
4020.00	0.00	0.00	0.00	0.00	65.74	34.09	0.17
4260.00	0.00	0.00	0.00	0.00	65.04	34.76	0.20
4860.00	0.00	0.00	0.00	0.00	65.94	33.74	0.32
5460.00	0.00	0.00	0.00	0.00	65.43	34.14	0.43
6060.00	0.00	0.00	0.00	0.00	67.03	32.71	0.26
6660.00	0.00	0.00	0.00	0.12	66.96	32.42	0.49
7260.00	0.00	0.00	0.00	0.13	69.20	30.42	0.25
7860.00	0.00	1.04	0.19	0.99	67.68	29.58	0.53
8460.00	0.00	2.52	0.89	4.11	66.80	24.99	0.68
9060.00	0.00	8.41	4.11	16.39	54.65	15.18	1.25
9660.00	0.00	14.71	8.69	32.75	34.04	6.94	2.88
10260.00	0.00	20.13	11.33	42.43	21.08	0.67	4.36
10860.00	0.00	21.39	13.02	48.72	12.29	0.00	4.58
11460.00	0.00	23.07	13.57	49.13	9.69	0.00	4.54
12060.00	0.00	22.97	14.57	50.39	7.64	0.00	4.43
12660.00	0.00	22.07	13.75	54.21	5.26	0.00	4.71
13260.00	0.00	22.76	13.84	54.26	5.47	0.00	3.67
13860.00	0.00	23.63	14.28	54.22	3.28	0.00	4.60
14460.00	0.00	25.08	16.16	51.34	3.08	0.00	4.34
15060.00	0.00	24.40	15.05	53.74	2.58	0.00	4.23
15660.00	0.00	24.88	15.54	53.07	2.32	0.00	4.19
16260.00	0.00	23.92	14.66	54.90	2.09	0.00	4.44
16860.00	0.00	24.10	15.05	54.00	1.70	0.00	5.14
17460.00	0.00	23.36	14.96	55.69	1.10	0.00	4.90

To Page No.

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Date 7/15/04

TITLE
Project No.
Book No.

From Page No.

b) Specimen 11b

Etch Time (sec)	C 1s %	Cr 2p %	Mo 3d %	Ni 2p %	O 1s %	Si 2p3 %	W 4d5 %
0.00	57.55	0.00	0.00	0.00	31.25	11.20	0.00
240.00	10.07	0.00	0.00	0.00	59.46	30.27	0.21
480.00	8.86	0.00	0.00	0.00	59.67	31.34	0.12
720.00	5.17	0.00	0.00	0.00	62.23	32.55	0.05
960.00	4.10	0.00	0.00	0.00	63.97	31.85	0.09
1200.00	2.71	0.00	0.00	0.00	63.31	33.83	0.15
1440.00	1.98	0.00	0.00	0.00	64.45	33.46	0.11
1680.00	0.96	0.00	0.00	0.00	65.28	33.64	0.12
1920.00	0.71	0.00	0.00	0.00	65.49	33.77	0.04
2160.00	0.00	0.00	0.00	0.00	66.43	33.52	0.05
2400.00	0.00	0.00	0.00	0.00	65.39	34.47	0.14
2640.00	0.00	0.00	0.00	0.00	65.98	33.91	0.11
2880.00	0.00	0.00	0.00	0.00	65.53	34.30	0.16
3000.00	0.00	0.00	0.00	0.00	65.50	34.30	0.19
3120.00	0.00	0.00	0.00	0.00	66.14	33.65	0.21
3240.00	0.00	0.00	0.00	0.00	66.64	33.09	0.27
3360.00	0.00	0.00	0.00	0.00	66.41	33.47	0.12
3480.00	0.00	0.00	0.00	0.00	66.18	33.62	0.20
3600.00	0.00	0.00	0.00	0.00	66.02	33.83	0.15
3720.00	0.00	0.00	0.00	0.00	65.42	34.35	0.23
3840.00	0.00	0.00	0.00	0.00	65.90	33.91	0.19
3960.00	0.00	0.00	0.00	0.00	65.98	33.82	0.20
4080.00	0.00	0.00	0.00	0.00	65.80	33.92	0.27
4200.00	0.00	0.00	0.00	0.00	65.97	33.85	0.18
4320.00	0.00	0.00	0.00	0.00	65.73	34.02	0.26
4440.00	0.00	0.00	0.00	0.00	66.28	33.49	0.23
4560.00	0.00	0.00	0.00	0.00	66.05	33.70	0.25
4680.00	0.00	0.00	0.00	0.00	65.22	34.56	0.23
4800.00	0.00	0.00	0.00	0.00	66.16	33.64	0.21
4920.00	0.00	0.00	0.00	0.00	66.42	33.34	0.24
5040.00	0.00	0.00	0.00	0.00	66.45	33.20	0.34
5160.00	0.00	0.00	0.00	0.00	66.47	33.31	0.22
5280.00	0.00	0.00	0.00	0.00	66.37	33.47	0.16
5400.00	0.00	0.00	0.00	0.00	66.55	33.21	0.24
5520.00	0.00	0.00	0.00	0.00	67.50	32.27	0.24
5640.00	0.00	0.00	0.00	0.00	66.21	33.58	0.21
5760.00	0.00	0.00	0.00	0.00	67.25	32.50	0.25
5880.00	0.00	0.00	0.00	0.00	68.14	31.55	0.32
6000.00	0.00	0.00	0.00	0.00	67.87	31.89	0.24
6120.00	0.00	0.00	0.00	0.07	67.54	32.11	0.29
6240.00	0.00	0.00	0.00	0.11	68.18	31.45	0.27
6360.00	0.00	0.00	0.00	0.11	68.49	30.99	0.42
6480.00	0.00	0.00	0.00	0.12	68.17	31.19	0.52
6600.00	0.00	0.00	0.00	0.18	68.12	31.23	0.47
6720.00	0.00	0.00	0.01	0.09	68.40	31.10	0.47
6840.00	0.00	0.00	0.00	0.09	68.60	30.90	0.41
6960.00	0.00	0.00	0.01	0.11	68.70	30.80	0.37
7080.00	0.00	0.00	0.02	0.18	69.10	30.30	0.42
7200.00	0.00	0.00	0.02	0.18	70.30	28.90	0.57
7320.00	0.00	0.00	0.03	0.34	69.00	30.20	0.43
7440.00	0.00	0.00	0.02	0.38	69.70	29.40	0.46
7560.00	0.00	0.00	0.02	0.67	69.70	29.20	0.39
7680.00	0.00	0.39	0.03	0.88	68.70	29.40	0.54
7800.00	0.00	0.51	0.05	0.70	68.80	29.50	0.46
7920.00	0.00	1.14	0.07	1.50	69.00	27.80	0.51
8040.00	0.00	1.52	0.10	1.57	68.10	28.30	0.41
8160.00	0.00	1.49	0.13	1.98	68.20	27.80	0.44
8280.00	0.00	1.91	0.17	2.59	67.40	27.40	0.54
8400.00	0.00	2.88	0.22	3.33	66.20	26.60	0.69
8520.00	0.00	3.07	0.29	4.64	64.90	26.50	0.59
8640.00	0.00	3.44	0.43	5.51	64.30	25.40	0.90
8760.00	0.00	4.52	0.55	7.34	64.30	22.40	0.89
8880.00	0.00	5.21	0.62	8.18	62.60	22.50	0.94
9000.00	0.00	5.84	0.76	10.30	60.10	21.70	1.29
9120.00	0.00	6.11	0.88	12.40	57.70	21.60	1.21
9240.00	0.00	7.01	1.08	13.90	57.00	19.40	1.58
9360.00	0.00	7.79	1.18	16.70	53.70	18.90	1.67
9480.00	0.00	7.90	1.32	18.10	52.20	18.80	1.70
9600.00	0.00	9.56	1.46	20.70	51.00	15.50	1.78
9720.00	0.00	10.30	1.69	22.10	46.90	17.10	1.88
9840.00	0.00	10.60	1.92	23.00	45.80	16.60	2.08
9960.00	0.00	11.40	1.93	24.50	45.10	15.40	1.60
10080.00	0.00	12.30	2.06	28.20	42.40	13.10	2.04
10200.00	0.00	12.50	2.14	27.10	42.00	13.50	2.71
10320.00	0.00	14.60	2.35	30.90	37.30	12.50	2.32
10440.00	0.00	14.10	2.50	34.30	36.00	10.60	2.47
10560.00	0.00	14.60	2.51	31.20	35.60	12.50	3.61
10680.00	0.00	15.60	2.65	35.30	33.30	10.20	2.93
10800.00	0.00	15.60	2.76	37.70	31.00	10.40	2.57
10920.00	0.00	16.20	2.77	38.70	30.70	7.98	3.73
11040.00	0.00	17.20	2.91	40.10	30.60	6.59	2.59
11160.00	0.00	16.80	3.13	41.00	27.50	8.22	3.41
11280.00	0.00	18.80	3.19	38.70	29.20	6.66	3.41
11400.00	0.00	17.90	3.14	42.80	28.00	4.34	3.84
11520.00	0.00	19.40	3.52	42.00	27.10	4.57	3.37
11640.00	0.00	19.90	3.50	43.60	24.90	4.73	3.33
11760.00	0.00	20.90	3.54	45.70	22.60	3.74	3.50
11880.00	0.00	20.40	3.71	45.80	22.10	4.72	3.23
12000.00	0.00	21.50	3.69	46.10	21.40	2.88	4.39
12120.00	0.00	19.40	3.58	48.00	20.50	4.97	3.53
12240.00	0.00	22.40	3.96	46.70	21.20	1.91	3.76
12360.00	0.00	22.20	3.84	46.40	19.20	4.55	3.69
12480.00	0.00	21.10	3.97	49.70	18.10	2.83	4.21
12600.00	0.00	22.40	4.22	48.50	17.70	2.59	4.64
12720.00	0.00	23.00	4.06	50.60	15.50	3.04	3.91
12840.00	0.00	23.30	4.11	54.00	13.70	0.00	4.90
12960.00	0.00	22.30	4.44	55.30	13.50	0.00	4.53
13080.00	0.00	22.80	4.43	53.10	14.60	0.00	4.99
13200.00	0.00	24.90	4.34	52.00	14.30	0.00	4.46
13320.00	0.00	24.50	4.04	54.30	12.30	0.00	4.79
13440.00	0.00	24.10	4.12	53.40	13.50	0.00	4.87
13560.00	0.00	25.00	4.29	54.30	11.70	0.00	4.66
13680.00	0.00	25.60	4.40	54.70	11.10	0.00	4.24
13800.00	0.00	23.80	4.42	55.80	11.10	0.00	4.85
13920.00	0.00	24.80	4.27	55.50	10.30	0.00	5.07
14040.00	0.00	23.50	4.42	56.10	11.20	0.00	4.74
14160.00	0.00	25.10	4.38	54.70	10.60	0.00	5.23
14280.00	0.00	25.60	4.35	56.30	9.40	0.00	4.32

To Page No.

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Recorded by
Date 7/15/04

Project No.
Book No.
TITLE

From Page No.

c) Specimen 12a

Etch Time (sec)	C 1s %	Cr 2p %	Mo 3d %	Ni 2p %	O 1s %	Si 2p3 %	W 4d5 %
0.00	55.80	0.00	0.00	0.00	33.79	10.41	0.00
240.00	13.15	0.00	0.00	0.00	60.82	25.95	0.08
480.00	7.58	0.00	0.00	0.00	62.84	29.36	0.22
720.00	6.41	0.00	0.00	0.00	63.99	29.02	0.58
960.00	5.19	0.00	0.00	0.00	65.02	29.39	0.41
1200.00	5.36	0.00	0.00	0.00	63.48	30.90	0.26
1440.00	2.58	0.00	0.00	0.00	65.49	31.65	0.28
1680.00	2.42	0.00	0.00	0.00	65.33	32.06	0.19
1920.00	2.23	0.00	0.00	0.00	66.87	30.49	0.41
2160.00	1.66	0.00	0.00	0.00	67.01	31.04	0.28
2400.00	1.29	0.00	0.00	0.00	67.23	31.11	0.37
2640.00	1.29	0.00	0.00	0.00	67.54	30.86	0.30
2880.00	0.00	0.00	0.00	0.00	67.19	32.37	0.45
3120.00	0.00	0.00	0.00	0.00	68.48	31.08	0.44
3360.00	0.00	0.00	0.00	0.69	67.81	31.11	0.39
3600.00	0.00	0.00	0.06	0.39	68.71	30.37	0.47
3840.00	0.00	1.14	0.11	0.40	67.78	30.35	0.22
4080.00	0.00	1.62	0.33	1.27	67.78	28.81	0.20
4320.00	0.00	1.77	0.50	2.60	66.72	27.82	0.59
4560.00	0.00	2.71	0.99	3.96	64.21	27.29	0.83
4800.00	0.00	4.98	1.63	7.51	61.37	23.73	0.78
5040.00	0.00	4.90	2.41	10.65	57.21	23.21	1.61
5280.00	0.00	7.49	3.82	15.22	53.18	18.53	1.75
5520.00	0.00	9.18	4.75	19.12	49.17	16.23	1.55
5760.00	0.00	10.21	6.15	24.42	44.17	12.60	2.46
6000.00	0.00	11.27	7.71	28.65	39.09	10.92	2.35
6240.00	0.00	14.74	8.71	31.65	32.65	9.82	2.42
6480.00	0.00	16.69	8.99	37.56	28.46	5.49	2.81
6720.00	0.00	16.91	9.96	40.89	25.00	4.81	2.43
6960.00	0.00	17.65	11.30	43.43	21.71	2.97	2.93
7200.00	0.00	19.55	10.86	42.48	19.58	3.81	3.72
7440.00	0.00	21.11	11.43	45.05	16.78	1.62	4.02
7680.00	0.00	21.07	13.19	46.59	14.58	1.66	2.90
7920.00	0.00	20.38	11.53	50.29	12.59	1.06	4.15
8160.00	0.00	21.64	13.29	49.35	9.89	1.30	4.54
8400.00	0.00	21.22	13.52	51.58	8.97	1.00	3.70
8640.00	0.00	24.97	13.22	48.21	8.36	1.02	4.22
8880.00	0.00	22.59	13.07	51.72	8.00	0.00	4.62
9120.00	0.00	24.16	13.04	50.19	8.50	0.00	4.12
9360.00	0.00	22.47	13.28	53.05	5.73	0.00	5.47
9600.00	0.00	24.70	14.42	52.11	5.27	0.00	3.50
9840.00	0.00	24.29	14.27	52.26	5.25	0.00	3.93
10080.00	0.00	23.74	13.77	54.59	4.40	0.00	3.51
10320.00	0.00	23.03	14.29	55.81	3.43	0.00	3.43
10560.00	0.00	23.36	14.59	53.99	4.16	0.00	3.89
10800.00	0.00	22.80	13.89	55.70	3.42	0.00	4.19
11040.00	0.00	22.90	14.43	54.29	4.44	0.00	3.95
11280.00	0.00	23.45	14.05	55.91	2.20	0.00	4.40
11520.00	0.00	24.90	14.43	54.63	2.78	0.00	3.27
11760.00	0.00	25.03	14.23	54.12	3.01	0.00	3.61
12000.00	0.00	24.18	15.12	53.36	2.61	0.00	4.74
12240.00	0.00	23.92	13.76	55.88	2.61	0.00	3.83
12480.00	0.00	24.52	13.47	55.79	3.08	0.00	3.15
12720.00	0.00	24.52	14.99	53.68	2.55	0.00	4.25
12960.00	0.00	25.45	14.80	53.51	1.96	0.00	4.28

To Page No.

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Date 7/15/04

TITLE
Project No.
Book No.

From Page No.

d) Specimen 12b

Etch Time (sec)	C 1s %	Cr 2p %	Mo 3d %	Ni 2p %	O 1s %	Si 2p3 %	W 4d5 %
0.00	76.78	0.00	0.00	0.00	17.28	5.94	0.00
240.00	21.42	0.00	0.00	0.00	51.95	26.24	0.39
480.00	11.47	0.00	0.00	0.00	59.51	28.54	0.48
720.00	7.82	0.00	0.00	0.00	61.79	29.99	0.40
960.00	5.16	0.00	0.00	0.00	63.60	30.89	0.36
1200.00	4.98	0.00	0.00	0.00	63.08	31.72	0.22
1440.00	2.63	0.00	0.00	0.00	63.95	33.09	0.34
1680.00	2.06	0.00	0.00	0.00	65.18	32.41	0.35
1920.00	0.76	0.00	0.00	0.00	65.51	33.42	0.31
2160.00	0.28	0.00	0.00	0.00	65.39	33.93	0.42
2400.00	0.56	0.00	0.00	0.00	65.07	33.95	0.42
2460.00	0.00	0.00	0.00	0.00	67.08	32.66	0.26
2520.00	0.00	0.00	0.00	0.00	67.24	32.54	0.23
2580.00	0.00	0.00	0.00	0.00	66.64	33.03	0.32
2640.00	0.00	0.00	0.00	0.00	66.32	33.28	0.40
2700.00	0.00	0.00	0.00	0.00	66.56	33.12	0.31
2760.00	0.00	0.00	0.00	0.00	65.65	33.95	0.40
2820.00	0.00	0.00	0.00	0.00	66.62	33.13	0.25
2880.00	0.00	0.00	0.00	0.00	66.34	33.44	0.22
2940.00	0.00	0.00	0.00	0.00	66.78	32.92	0.30
3000.00	0.00	0.00	0.00	0.00	67.13	32.47	0.40
3060.00	0.00	0.00	0.00	0.00	66.93	32.69	0.37
3120.00	0.00	0.00	0.00	0.00	67.79	31.99	0.22
3180.00	0.00	0.00	0.00	0.00	66.97	32.70	0.33
3240.00	0.00	0.00	0.00	0.00	67.24	32.33	0.43
3300.00	0.00	0.00	0.00	0.00	67.48	32.20	0.31
3360.00	0.00	0.00	0.00	0.00	66.34	33.25	0.41
3420.00	0.00	0.00	0.00	0.00	68.10	31.62	0.29
3480.00	0.00	0.00	0.00	0.00	66.04	33.55	0.42
3540.00	0.00	0.00	0.00	0.00	67.19	32.48	0.33
3600.00	0.00	0.00	0.00	0.00	66.80	32.84	0.36
3660.00	0.00	0.00	0.00	0.00	66.62	33.04	0.35
3720.00	0.00	0.00	0.00	0.00	67.41	32.22	0.37
3780.00	0.00	0.00	0.00	0.00	67.17	32.44	0.39
3840.00	0.00	0.00	0.00	0.00	67.17	32.55	0.28
3900.00	0.00	0.00	0.00	0.00	67.86	31.82	0.32
3960.00	0.00	0.00	0.00	0.00	67.22	32.37	0.41
4020.00	0.00	0.00	0.00	0.00	67.36	32.17	0.47
4080.00	0.00	0.00	0.00	0.00	66.60	33.02	0.38
4140.00	0.00	0.00	0.00	0.09	67.23	32.23	0.45
4200.00	0.00	0.00	0.00	0.05	69.00	30.52	0.43
4260.00	0.00	0.00	0.00	0.06	68.58	30.92	0.44
4320.00	0.00	0.00	0.00	0.08	68.05	31.36	0.51
4380.00	0.00	0.00	0.00	0.08	68.61	30.85	0.46
4440.00	0.00	0.00	0.00	0.33	68.16	31.03	0.48
4500.00	0.00	0.00	0.00	0.38	68.11	31.10	0.41
4560.00	0.00	0.00	0.07	0.52	68.06	30.89	0.46
4620.00	0.00	0.00	0.12	0.78	67.77	30.90	0.43
4680.00	0.00	0.00	0.15	0.09	68.59	30.65	0.52
4740.00	0.00	0.00	0.08	0.85	68.55	30.17	0.35
4800.00	0.00	0.00	0.16	1.07	67.84	30.71	0.19
4860.00	0.00	0.00	0.12	0.96	68.70	29.82	0.40
4920.00	0.00	0.70	0.23	1.05	68.79	28.70	0.53
4980.00	0.00	1.12	0.21	1.29	66.74	30.11	0.54
5040.00	0.00	0.85	0.32	1.43	66.76	29.84	0.80
5100.00	0.00	1.32	0.35	1.38	67.52	28.88	0.56
5160.00	0.00	1.04	0.32	2.20	68.26	27.64	0.55
5220.00	0.00	1.48	0.57	2.79	67.83	26.54	0.80
5280.00	0.00	1.83	0.49	2.60	67.67	26.76	0.65
5340.00	0.00	2.12	0.63	2.73	68.04	27.92	0.56
5400.00	0.00	2.31	0.74	3.95	66.13	26.23	0.64
5460.00	0.00	2.23	0.94	3.71	65.50	26.74	0.89
5520.00	0.00	2.89	0.95	4.82	65.37	25.44	0.73
5580.00	0.00	3.24	1.02	5.13	64.53	25.19	0.88
5640.00	0.00	2.96	1.29	5.90	65.04	23.98	0.83
5700.00	0.00	3.49	1.24	6.96	62.53	25.05	0.73
5760.00	0.00	3.62	1.66	8.39	61.87	23.74	0.72
5820.00	0.00	4.08	1.86	8.43	62.28	22.67	0.68
5880.00	0.00	4.30	2.00	9.59	60.46	22.59	1.03
5940.00	0.00	4.85	2.36	10.21	60.01	21.59	0.99
6000.00	0.00	5.78	2.43	11.11	58.53	21.19	0.97
6060.00	0.00	5.88	2.58	11.72	56.75	21.76	1.31
6120.00	0.00	6.57	2.97	12.62	57.46	18.96	1.42
6180.00	0.00	6.10	3.10	13.95	56.11	19.55	1.19
6240.00	0.00	6.61	3.36	14.81	56.01	18.30	0.91
6300.00	0.00	7.44	3.70	15.49	55.08	16.88	1.41
6360.00	0.00	8.31	4.03	18.01	54.39	13.90	1.35
6420.00	0.00	7.90	4.18	17.79	52.26	16.69	1.17
6480.00	0.00	8.19	4.62	16.80	51.54	16.86	1.99
6540.00	0.00	7.97	5.01	19.71	52.27	13.55	1.50
6600.00	0.00	9.75	5.01	23.51	47.70	12.30	1.73
6660.00	0.00	9.65	5.54	21.72	47.74	13.56	1.79
6720.00	0.00	10.10	5.86	21.92	46.74	13.89	1.51
6780.00	0.00	10.25	5.94	23.31	46.83	11.83	1.84
6840.00	0.00	9.82	6.13	24.50	44.85	12.46	2.25
6900.00	0.00	10.19	6.44	27.73	42.31	11.43	1.90
6960.00	0.00	11.74	6.65	28.00	41.95	9.54	2.11
7020.00	0.00	11.94	7.07	27.05	39.71	12.10	2.12
7080.00	0.00	13.05	7.34	29.00	38.74	9.43	2.44
7140.00	0.00	12.43	7.51	29.00	38.78	9.58	2.70
7200.00	0.00	13.13	7.98	30.01	38.30	8.16	2.44

To Page No.

Witnessed & Understood by me,
Date
Invented by
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Date 7/15/04

Project No.
Book No.
TITLE

From Page No.

d) Specimen 12b (continued)

7260.00	0.00	12.38	7.94	32.27	36.02	8.39	3.01
7320.00	0.00	13.25	8.02	32.72	34.65	8.81	2.55
7380.00	0.00	12.59	8.03	33.85	33.67	8.83	3.03
7440.00	0.00	12.85	9.05	33.09	31.86	10.41	2.74
7500.00	0.00	13.34	8.51	35.56	31.00	8.40	3.19
7560.00	0.00	14.01	9.31	33.99	30.68	9.46	2.55
7620.00	0.00	14.52	9.10	36.54	28.32	8.36	3.17
7680.00	0.00	14.79	9.34	37.34	30.64	5.43	2.46
7740.00	0.00	15.28	10.66	34.97	30.08	5.67	3.36
7800.00	0.00	14.80	10.44	38.38	26.38	6.67	3.33
7860.00	0.00	15.13	10.24	39.56	26.82	4.85	3.38
7920.00	0.00	16.09	9.81	40.34	26.10	3.95	3.71
7980.00	0.00	16.47	10.25	39.63	24.45	5.85	3.34
8040.00	0.00	16.60	10.75	40.28	24.62	4.46	3.30
8100.00	0.00	16.19	10.27	44.61	20.31	5.51	3.12
8160.00	0.00	15.64	11.30	41.73	24.41	3.05	3.88
8220.00	0.00	16.32	10.77	43.89	22.93	2.70	3.38
8280.00	0.00	17.25	11.32	40.77	22.76	4.02	3.89
8340.00	0.00	16.97	10.94	44.25	20.27	3.60	3.98
8400.00	0.00	18.25	11.67	42.74	20.06	3.67	3.61
8460.00	0.00	18.14	11.61	45.04	18.75	2.41	4.06
8520.00	0.00	18.12	11.34	44.28	20.82	1.88	3.55
8580.00	0.00	18.11	11.49	42.39	21.05	3.29	3.67
8640.00	0.00	18.90	11.31	46.02	16.04	4.16	3.57
8700.00	0.00	18.12	11.35	48.13	16.19	3.15	3.07
8760.00	0.00	20.24	12.53	43.35	17.08	2.80	4.00
8820.00	0.00	18.62	11.85	47.86	15.90	2.01	3.76
8880.00	0.00	17.75	12.14	48.16	14.48	3.61	3.86
8940.00	0.00	18.90	12.41	48.38	14.05	3.02	3.24
9000.00	0.00	19.91	12.32	47.55	13.49	2.98	3.75
9060.00	0.00	20.08	12.37	46.92	14.67	2.27	3.68
9120.00	0.00	19.12	13.16	48.66	14.77	0.00	4.29
9180.00	0.00	19.70	13.97	48.96	13.65	0.00	3.74
9240.00	0.00	20.54	14.07	48.91	12.35	0.00	4.14
9300.00	0.00	20.68	12.89	49.85	12.09	0.00	4.49
9360.00	0.00	20.61	13.17	48.11	14.04	0.00	4.06
9420.00	0.00	21.82	13.91	48.92	10.87	0.00	4.49
9480.00	0.00	21.43	14.03	50.77	9.05	0.00	4.72
9540.00	0.00	21.87	13.68	49.09	11.72	0.00	3.64
9600.00	0.00	20.99	13.58	50.12	11.36	0.00	3.96
9660.00	0.00	20.04	13.26	49.51	11.83	0.00	5.37
9720.00	0.00	21.66	13.27	51.79	9.33	0.00	3.95
9780.00	0.00	22.86	13.85	51.18	8.28	0.00	3.84
		22.07	13.62	49.70	10.08	0.00	4.53

To Page No.

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Project No.
TITLE
Book No.

From Page No.

3. Chemical state data

a) Specimen 11b

Etch Time (sec)	Cr metal %	Cr2O3 %	O (H2O) %	Mo O2 %	Mo metal %	Ni metal %	NiO %	O (O2-) %	O (OH-) %	Si (SiO2) %
6720.00	0.00	0.00	1.83	0.00	0.00	0.13	0.04	13.50	51.80	32.70
6840.00	0.00	0.00	2.49	0.00	0.00	0.44	0.05	12.80	52.70	31.50
6960.00	0.00	0.00	3.35	0.00	0.00	0.45	0.08	12.10	52.20	31.80
7080.00	0.00	0.00	3.96	0.00	0.00	0.22	0.05	11.00	53.00	31.70
7200.00	0.00	0.00	4.74	0.00	0.00	0.39	0.09	11.20	52.50	31.00
7320.00	0.00	0.00	7.54	0.05	0.06	0.28	0.04	8.85	51.70	31.40
7440.00	0.37	0.26	9.79	0.00	0.09	0.39	0.02	7.04	51.40	30.60
7560.00	0.45	0.25	13.00	0.02	0.10	0.40	0.04	5.48	49.90	30.40
7680.00	0.48	0.33	13.80	0.04	0.18	0.64	0.08	4.31	50.20	30.00
7800.00	0.52	0.35	20.40	0.01	0.16	0.71	0.16	2.99	45.60	29.10
7920.00	0.59	0.29	22.10	0.05	0.24	0.75	0.13	1.32	45.20	29.30
8040.00	0.75	0.47	23.90	0.04	0.30	0.76	0.20	0.93	43.40	29.30
8160.00	1.02	0.45	26.50	0.03	0.37	1.33	0.22	0.25	40.90	28.90
8280.00	1.20	0.50	27.70	0.07	0.45	1.77	0.33	0.15	39.90	27.90
8400.00	1.63	1.03	28.30	0.04	0.70	2.09	0.23	0.36	39.20	26.50
8520.00	1.60	0.78	28.20	0.22	0.88	3.78	0.53	0.55	36.80	26.70
8640.00	2.09	0.64	29.80	0.08	1.23	4.45	0.65	0.41	36.20	24.50
8760.00	2.83	1.29	28.00	0.21	1.62	5.18	0.65	0.38	36.60	23.20
8880.00	3.27	1.29	26.40	0.27	1.94	6.59	1.03	0.65	34.50	24.10
9000.00	3.54	1.43	24.20	0.25	2.36	9.02	1.24	0.67	34.30	23.00
9120.00	4.36	1.58	24.10	0.28	2.78	10.10	1.28	1.41	32.90	21.20
9240.00	5.73	1.52	21.10	0.44	3.29	11.70	1.63	0.36	35.10	19.00
9360.00	5.57	1.91	19.70	0.36	3.79	13.20	1.72	0.17	34.10	19.50
9480.00	5.78	1.83	18.30	0.20	4.22	14.10	1.71	0.26	34.20	19.40
9600.00	7.16	2.22	16.30	0.42	4.94	15.60	1.93	0.82	34.40	16.20
9720.00	8.40	2.62	16.10	0.37	5.34	16.90	2.26	0.00	31.90	16.00
9840.00	7.96	1.90	14.40	0.50	6.02	18.40	2.40	0.00	33.70	14.70
9960.00	9.08	2.58	14.70	0.46	6.24	19.80	2.74	0.00	31.50	13.00
10080.00	9.27	2.14	13.70	0.60	7.14	22.50	2.76	0.00	30.40	11.50
10200.00	10.10	2.68	13.50	0.38	7.37	22.30	2.88	0.00	28.20	12.60
10320.00	11.50	2.90	13.40	0.46	7.76	23.40	2.83	0.01	27.70	10.10
10440.00	11.70	2.55	12.30	0.55	8.40	24.90	3.14	0.01	27.40	9.01
10560.00	12.00	2.70	13.40	0.68	8.77	27.70	3.77	0.06	23.90	6.97
10680.00	11.90	2.05	10.80	0.91	9.05	27.70	3.44	0.01	24.30	9.87
10800.00	12.70	2.46	10.50	0.68	9.38	29.70	3.65	0.01	24.00	6.93
10920.00	13.20	2.76	9.23	0.58	9.77	29.30	3.31	0.13	24.60	7.09
11040.00	13.70	3.01	8.98	0.69	10.00	30.10	3.60	0.01	22.10	7.82
11160.00	13.50	2.34	7.49	0.70	10.20	29.40	3.58	0.01	22.30	10.40
11280.00	14.70	3.64	7.28	0.77	10.20	31.20	3.90	0.01	21.60	6.66
11400.00	14.70	2.65	6.86	1.06	10.90	35.00	3.65	0.01	20.30	5.07
11520.00	15.20	3.42	7.30	0.72	10.90	34.00	4.12	0.01	19.20	5.03
11640.00	16.20	3.68	6.53	0.67	11.40	35.40	4.38	0.01	17.90	3.85
11760.00	17.10	3.67	6.42	0.71	11.70	35.00	4.09	0.01	18.60	2.77
11880.00	16.90	2.73	4.78	0.71	12.00	35.40	4.15	0.01	18.40	4.95
12000.00	16.90	2.72	6.01	0.53	12.50	35.20	4.36	0.01	17.40	4.35
12120.00	16.90	2.50	5.07	0.78	12.20	38.50	4.29	0.01	15.10	4.57
12240.00	17.50	2.63	3.63	0.67	12.70	39.20	4.74	0.01	17.50	1.44
12360.00	17.10	2.78	3.05	0.91	12.60	38.70	4.54	0.01	16.10	4.14
12480.00	18.30	3.02	3.74	0.85	13.20	38.20	4.49	0.01	14.70	3.52
12600.00	18.20	3.47	3.88	1.09	12.90	38.30	4.26	0.01	13.10	4.86
12720.00	19.40	3.63	4.00	0.86	13.70	39.40	4.75	0.03	14.20	0.00
12840.00	19.40	3.78	5.05	0.63	13.60	39.60	5.24	0.23	12.40	0.00
12960.00	19.00	2.21	2.77	0.94	13.90	41.90	5.04	0.12	14.10	0.00
13080.00	19.90	2.68	3.06	0.60	14.30	41.60	4.95	0.01	12.90	0.00
13200.00	19.80	2.79	3.10	1.02	14.20	41.50	5.28	0.01	12.40	0.00
13320.00	20.30	2.38	3.49	0.61	14.90	41.30	4.92	0.35	11.80	0.00
13440.00	21.50	3.86	2.77	0.80	14.70	40.20	4.75	0.01	11.40	0.00
13560.00	20.70	2.65	1.76	1.03	14.60	43.40	4.85	0.38	10.60	0.00
13680.00	20.90	3.91	3.06	0.95	14.60	43.20	4.80	0.01	8.59	0.00
13800.00	20.80	3.75	3.40	1.17	14.50	42.90	5.29	0.37	7.80	0.00
13920.00	20.50	2.52	2.68	1.06	14.80	44.40	4.91	0.05	9.02	0.00
14040.00	20.60	2.46	1.81	0.89	14.70	44.00	5.55	0.03	10.00	0.00
14160.00	21.30	3.20	2.30	0.86	14.70	42.80	5.59	1.73	7.46	0.00
14280.00	21.10	3.17	1.08	0.91	14.80	44.30	5.48	0.01	9.17	0.00

To Page No.

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From Page No.

b) specimen 12b

Etch Time (sec)	Cr metal %	Cr2O3 %	O (H2O) %	Mo O2 %	Mo metal %	Ni metal %	NiO %	O (O2-) %	O (OH-) %	Si (SiO2) %
2460.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	12.90	49.40	33.80
2520.00	0.00	0.00	1.48	0.00	0.00	0.00	0.00	12.00	52.80	33.80
2580.00	0.00	0.00	1.55	0.00	0.00	0.00	0.00	12.30	52.40	33.80
2640.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00	11.50	54.00	34.00
2700.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	12.40	52.30	34.70
2760.00	0.00	0.00	2.16	0.00	0.00	0.00	0.00	13.30	51.10	33.40
2820.00	0.00	0.00	1.18	0.00	0.00	0.00	0.00	12.90	52.20	33.70
2880.00	0.00	0.00	0.86	0.00	0.00	0.00	0.00	13.60	51.70	33.90
2940.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00	13.60	52.40	33.10
3000.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	13.90	51.40	33.70
3060.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	14.60	51.60	33.20
3120.00	0.00	0.00	1.10	0.00	0.00	0.00	0.00	14.80	51.40	32.80
3180.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	14.20	52.10	33.50
3240.00	0.00	0.00	1.39	0.00	0.00	0.00	0.00	15.00	50.70	32.90
3300.00	0.00	0.00	1.07	0.00	0.00	0.00	0.00	14.90	50.90	33.10
3360.00	0.00	0.00	1.95	0.00	0.00	0.00	0.00	15.80	49.90	32.40
3420.00	0.00	0.00	1.36	0.00	0.00	0.00	0.00	14.40	50.80	33.40
3480.00	0.00	0.00	2.24	0.00	0.00	0.00	0.00	16.60	48.90	32.20
3540.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	14.80	51.30	33.80
3600.00	0.00	0.00	0.77	0.00	0.00	0.00	0.00	15.20	51.00	33.10
3660.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00	16.10	50.30	32.60
3720.00	0.00	0.00	1.38	0.00	0.00	0.00	0.00	15.10	50.90	32.60
3780.00	0.00	0.00	3.39	0.00	0.00	0.00	0.00	15.50	48.60	32.50
3840.00	0.00	0.00	4.08	0.00	0.00	0.00	0.00	14.80	48.40	32.70
3900.00	0.00	0.00	3.29	0.00	0.00	0.00	0.00	14.30	49.60	32.80
3960.00	0.00	0.00	7.92	0.00	0.00	0.00	0.00	13.00	46.20	32.90
4020.00	0.00	0.00	6.36	0.00	0.00	0.00	0.00	12.10	48.30	33.20
4080.00	0.00	0.00	6.24	0.00	0.00	0.00	0.00	12.10	48.80	32.90
4140.00	0.00	0.00	7.53	0.00	0.00	0.00	0.00	11.80	49.10	31.60
4200.00	0.00	0.00	8.26	0.00	0.00	0.00	0.00	10.90	49.50	31.30
4260.00	0.17	0.09	8.95	0.00	0.00	0.00	0.00	10.30	48.50	32.00
4320.00	0.30	0.16	12.20	0.00	0.00	0.23	0.03	10.10	45.20	31.90
4380.00	0.13	0.05	11.90	0.00	0.00	0.31	0.07	8.71	46.40	32.40
4440.00	0.47	0.22	16.00	0.00	0.00	0.33	0.07	7.85	43.20	31.90
4500.00	0.27	0.11	18.50	0.00	0.00	0.50	0.05	7.47	41.50	31.50
4560.00	0.31	0.20	12.30	0.00	0.00	0.20	0.00	6.83	48.10	32.00
4620.00	0.37	0.21	17.70	0.00	0.00	0.35	0.05	6.23	43.90	31.20
4680.00	0.48	0.45	22.10	0.00	0.11	0.23	0.08	5.24	39.50	31.80
4740.00	0.52	0.27	24.90	0.04	0.12	0.55	0.04	5.58	35.90	32.00
4800.00	0.56	0.32	27.40	0.01	0.19	0.62	0.04	5.29	34.20	31.40
4860.00	0.57	0.27	33.30	0.01	0.25	0.44	0.11	4.56	29.90	30.60
4920.00	0.70	0.29	38.60	0.00	0.19	0.90	0.20	5.76	23.10	30.30
4980.00	0.56	0.37	39.60	0.12	0.27	0.79	0.18	5.08	22.80	30.20
5040.00	1.02	0.36	44.30	0.10	0.33	1.13	0.20	4.39	17.70	30.50
5100.00	0.69	0.28	50.60	0.02	0.35	1.36	0.16	6.33	11.20	28.90
5160.00	0.85	0.21	49.90	0.14	0.40	1.66	0.34	5.41	11.70	29.40
5220.00	1.08	0.40	54.30	0.06	0.53	2.07	0.44	6.37	5.82	28.90
5280.00	1.05	0.33	55.90	0.04	0.59	2.14	0.32	6.64	4.56	28.40
5340.00	1.37	0.47	56.90	0.19	0.68	2.24	0.37	6.30	4.71	26.80
5400.00	1.33	0.68	56.00	0.23	0.72	2.34	0.46	6.01	4.54	27.70
5460.00	1.98	0.70	55.70	0.06	0.88	3.44	0.60	5.82	3.56	27.30
5520.00	2.24	0.75	55.90	0.14	1.00	3.39	0.40	5.38	3.63	27.20
5580.00	2.55	0.97	56.70	0.17	1.18	4.33	0.46	4.40	3.51	25.80
5640.00	2.46	0.70	55.50	0.07	1.34	4.40	0.57	4.93	3.74	26.30
5700.00	2.89	1.02	53.80	0.30	1.41	5.51	0.72	4.86	3.64	25.80
5760.00	3.02	1.01	56.90	0.30	1.61	6.35	0.80	3.91	3.21	22.90
5820.00	3.39	1.34	52.70	0.20	1.92	6.24	0.80	3.13	6.18	24.10
5880.00	3.66	0.94	54.40	0.23	2.15	6.55	0.90	3.62	3.50	24.00
5940.00	3.42	1.11	53.30	0.36	2.28	7.43	0.85	4.33	4.78	22.10
6000.00	4.39	1.26	52.70	0.45	2.54	8.62	1.04	3.64	5.01	20.40
6060.00	4.12	1.11	50.70	0.27	2.83	8.86	1.08	3.54	5.05	22.40
6120.00	5.22	1.73	48.50	0.32	2.98	9.43	1.48	3.23	6.07	21.10
6180.00	5.00	1.24	47.70	0.37	3.33	10.20	1.38	2.10	8.20	20.50
6240.00	5.77	1.19	46.80	0.45	3.50	10.90	1.44	1.49	10.10	18.30
6300.00	5.41	1.69	44.50	0.52	3.72	12.90	1.49	1.96	9.06	18.80
6360.00	5.73	1.52	42.90	0.54	4.08	12.80	1.94	1.59	11.40	17.50
6420.00	6.56	1.63	38.90	0.42	4.37	14.10	1.66	2.72	12.00	17.60
6480.00	6.22	1.61	39.30	0.46	4.65	14.60	2.27	0.66	13.50	16.70
6540.00	7.68	1.74	36.60	0.43	4.90	15.70	2.20	0.87	13.60	16.30
6600.00	7.88	1.72	36.60	0.46	5.35	15.50	2.08	1.56	13.50	15.30
6660.00	7.79	2.12	33.40	0.75	5.42	18.00	2.34	0.01	14.50	15.70
6720.00	7.70	1.53	33.50	0.59	5.62	18.50	2.39	1.69	14.20	14.30
6780.00	9.85	2.44	30.90	0.64	6.13	18.50	2.62	0.77	14.90	13.30
6840.00	8.51	1.84	28.40	0.80	6.57	19.90	2.56	0.38	17.00	14.00
6900.00	9.10	1.68	28.00	0.50	6.76	19.50	2.91	0.72	18.20	12.60
6960.00	10.30	2.23	26.60	0.57	6.94	21.20	2.96	1.07	15.80	12.30
7020.00	9.51	2.34	28.10	0.80	7.00	23.30	2.81	1.39	15.40	9.37
7080.00	9.92	2.11	24.30	0.76	7.54	24.10	3.04	0.52	17.10	10.60
7140.00	11.00	2.59	23.90	0.64	7.53	25.50	3.09	0.01	16.10	9.62
7200.00	11.30	2.42	21.50	0.91	7.98	25.10	3.11	0.01	18.10	9.64
7260.00	11.20	2.66	20.20	0.83	7.90	26.20	3.47	0.32	17.70	9.55
7320.00	11.10	2.52	20.90	0.83	8.51	26.30	3.49	1.36	14.90	10.10
7380.00	11.30	2.20	19.00	0.49	8.50	25.70	3.52	0.01	16.60	12.70
7440.00	12.00	2.48	18.80	0.87	8.68	26.60	3.27	2.32	14.60	10.30
7500.00	11.90	2.82	19.40	0.75	8.83	27.80	3.49	0.79	13.70	10.50
7560.00	12.60	2.85	17.50	1.11	9.52	28.10	3.66	0.09	15.70	8.89
7620.00	13.30	2.88	14.40	1.06	9.55	29.80	4.07	0.15	16.70	7.97
7680.00	13.90	3.45	16.40	1.12	9.61	30.00	3.89	1.64	14.40	5.63
7740.00	13.10	2.94	14.80	0.81	10.00	30.60	3.90	0.01	15.90	7.86
7800.00	13.20	2.31	14.50	0.94	10.10	31.30	3.91	1.26	14.80	7.50
7860.00	13.60	2.60	14.30	1.18	10.20	33.10	3.78	0.01	15.20	6.15
7920.00	14.70	3.23	14.80	1.25	10.50	32.60	4.22	0.01	13.90	4.79
7980.00	14.60	3.25	13.00	1.46	10.60	33.10	4.20	0.65	14.00	5.02
8040.00	14.30	2.92	12.70	1.05	10.40	32.50	4.01	0.40	13.50	8.27
8100.00	14.70	2.97	10.50	0.92	11.00	36.20	4.28	0.01	14.00	5.37
8160.00	15.40	3.37	10.60	0.87	10.90	36.70	4.91	0.01	12.70	4.52
8220.00	16.10	3.72	11.10	0.86	11.30	34.10	3.97	0.01	12.60	6.15
8280.00	15.90	3.45	9.85	0.56	11.10	36.10	4.00	0.67	12.20	6.16
8340.00	14.50	2.81	10.90	1.16	11.20	37.00	4.09	0.87	12.40	5.17
8400.00	16.60	2.97	8.69	0.72	12.40	37.20	4.36	0.13	13.50	3.43
8460.00	16.00	3.47	10.10	0.95	12.00	35.70	4.21	0.39	11.40	5.83
8520.00	16.50	3.00	8.41	1.27	12.60	38.00	4.55	0.01	12.30	3.36
8580.00	17.20	3.74	7.67	1.38	12.40	37.70	4.69	0.01	12.20	2.91
8640.00	17.10	3.49	6.72	1.18	12.80	36.60	5.09	0.01	12.70	4.30
8700.00	16.70	2.70	7.49	0.72	12.30	38.50	4.81	0.57	10.80	5.36
8760.00	17.80	3.60	6.17	1.39	12.30	40.40	4.47	0.01	11.80	2.11
8820.00	16.90	3.32	9.53	1.34	12.70	39.00	4.89	0.01	8.43	3.89
8880.00	17.10	3.08	6.76	1.84	12.60	38.60	4.55	0.74	9.60	5.11
8940.00	17.20	3.13	5.67	1.03	13.00	41.60	4.74	0.18	10.70	2.84
9000.00	18.10	3.13	7.28	1.03	13.20	42.20	4.60	0.05	10.40	0.00
9060.00	18.90	3.23	5.78	1.68	13.90	43.70	4.60	0.01	8.09	0.00
9120.00	18.90	3.36	6.44	1.28	14.20	39.90	5.03	1.23	9.63	0.00
9180.00	18.80	2.20	5.30	0.99	14.30	44.10	4.76	0.28	9.36	0.00
9240.00	18.80	3.78	5.22	1.28	14.20	40.80	5.61	0.34	9.99	0.00
9300.00	18.80	3.09	4.15	1.32	13.90	44.00	4.80	0.71	9.15	0.00
9360.00	19.00	2.93	4.57	1.49	14.50	45.50	4.85	0.01	7.14	0.00
9420.00	19.30	4.00	4.93	0.96	14.50	43.60	4.93	0.35	7.48	0.00
9480.00	19.50	3.23	6.17	1.34	14.50	42.90	5.76	0.01	6.57	0.00
9540.00	18.90	3.48	6.49	1.20	13.90	44.50	5.21	0.66	5.70	0.00
9600.00	19.40	3.14	4.81	1.08	14.70	43.80	4.77	1.01	7.26	0.00
9660.00	19.90	3.52	4.03	1.39	14.10	44.20	4.76	0.62	7.49	0.00
9720.00	20.00	3.57	3.12	1.43	14.90	43.40	5.74	0.64	7.24	0.00
9780.00	19.80	4.52	4.64	1.27	14.10	43.70	5.13	0.11	6.71	0.00

To Page No.

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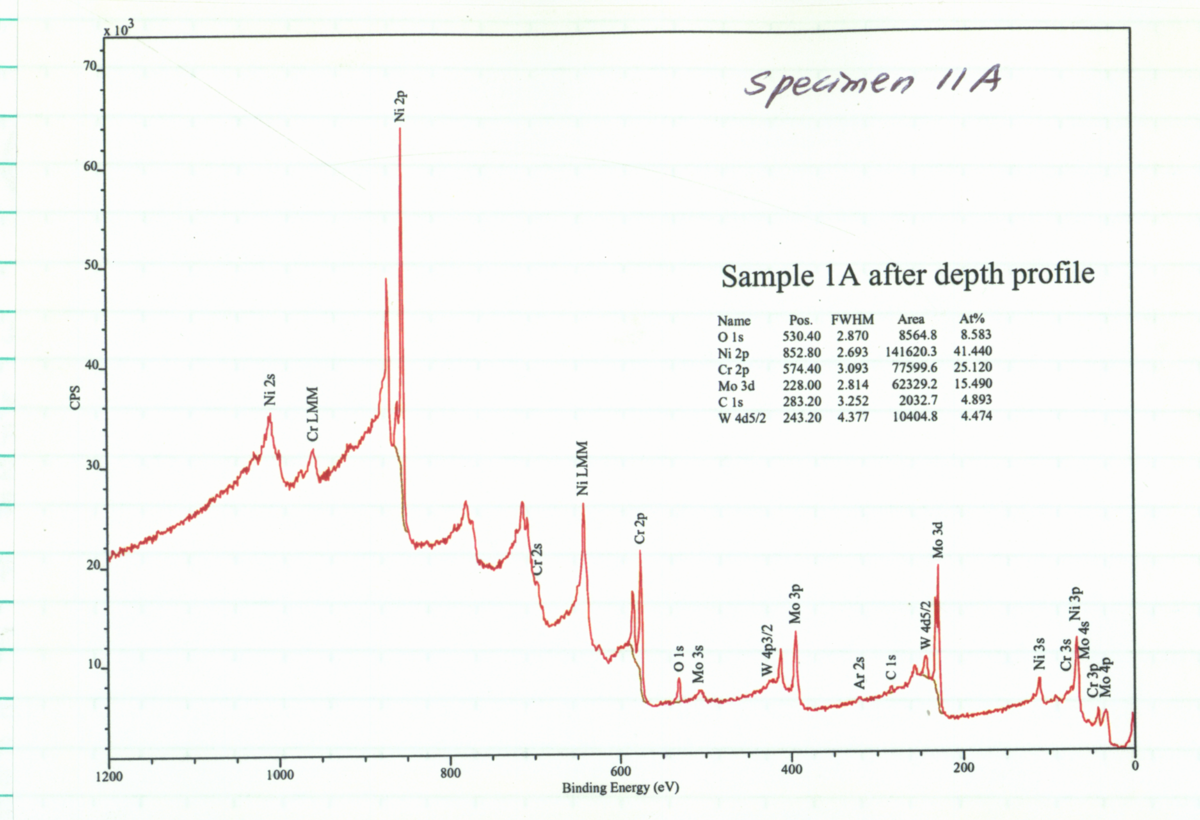
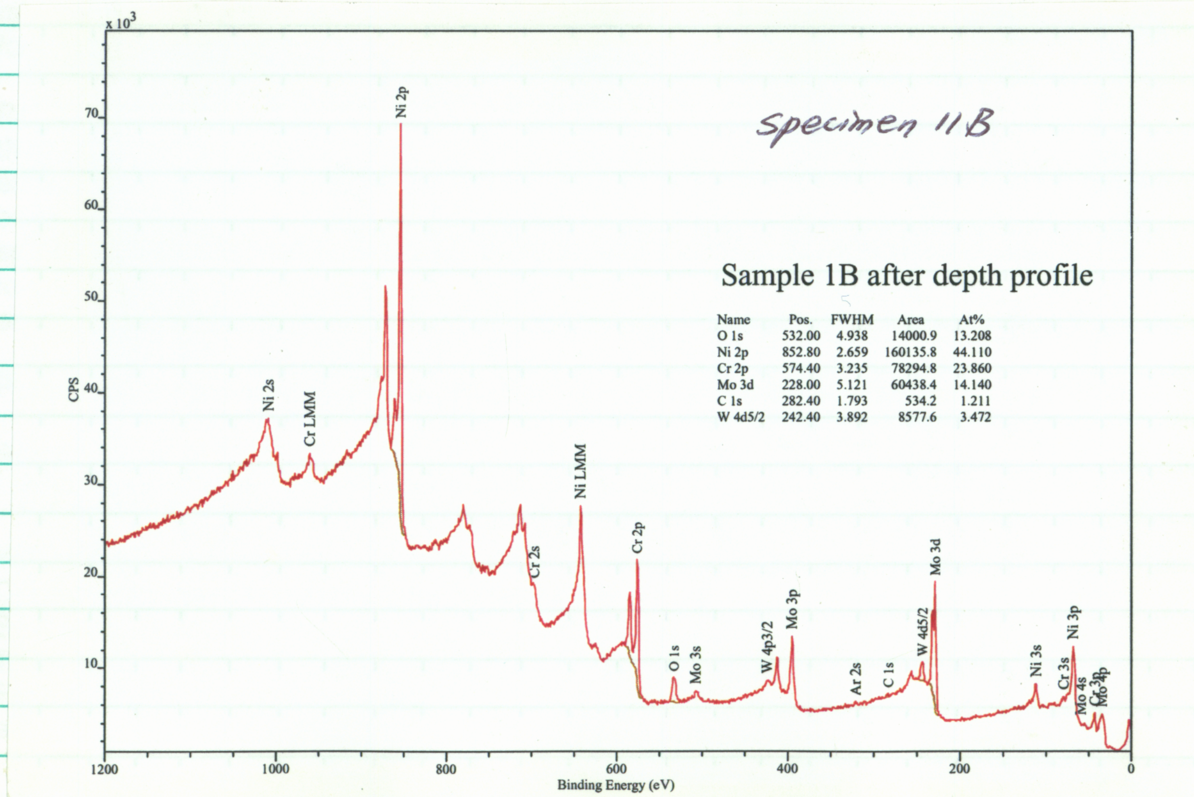
From Page No.

4. Wide-energy survey after depth profiling





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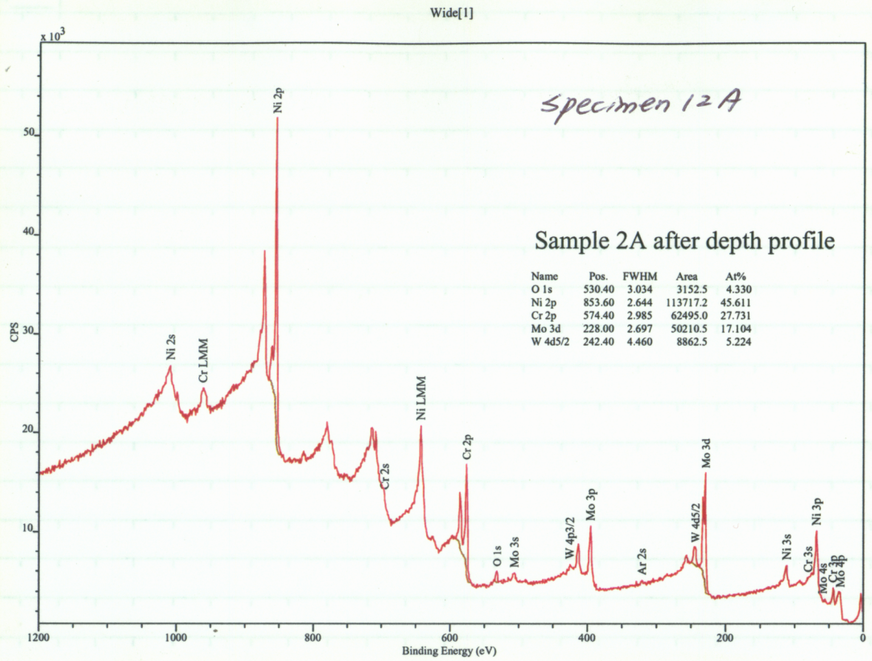
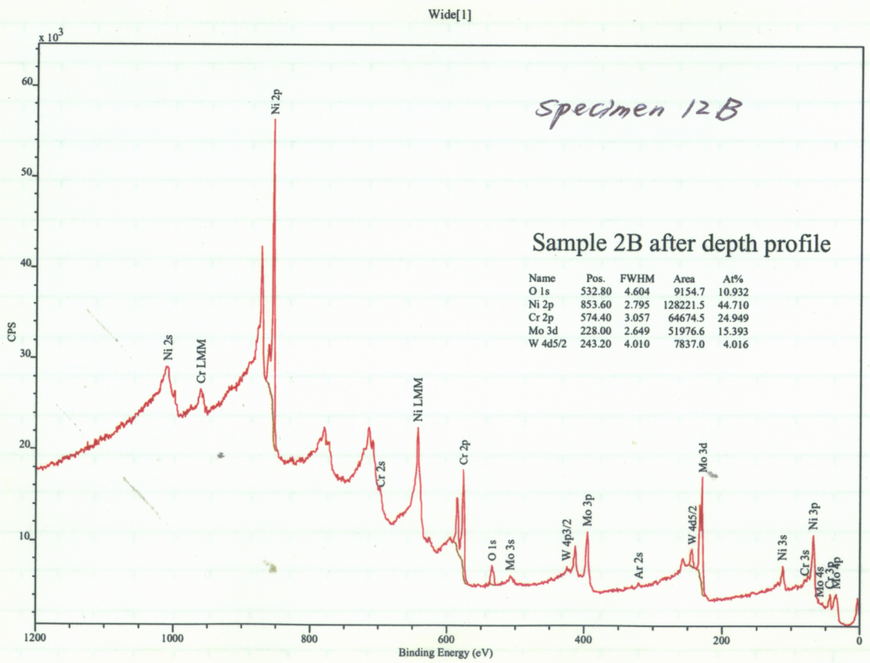




CNWRA *A center of excellence in earth sciences and engineering*
6220 Culebra Road · San Antonio · Texas, U.S.A. 78228-5166

July 2, 2004

Mr. Carl Steinke
RBD Enterprises
2437 NW Twin Knolls Drive
Bend, OR 97701

Reference: Requisition # 04018867

Dear Carl:

Enclosed please find two types of Alloy 22 specimens in duplicate (XPS #11c&d and 12c&d) submitted for surface analyses with x-ray photoelectron spectroscopy. The objective of this investigation is to characterize the passive films formed on the triangular crevice sites. The XPS analyses will be conducted on specific crevice sites, as marked on the specimens, near the base of the triangles and away from areas with pits. Please verify the areas of analysis using the optical microscope attached to the XPS. Since the crevice sites were covered under the crevice formers, formation of thinner oxide films is expected.

Per our previous phone conversation, I need to have the specimens analyzed for determination of the thickness, composition, and oxidation state of the passive film. For each specimen, a wide-energy survey will be conducted on the as-received surface to determine surface elemental composition. The survey will be followed by high resolution scans combined with in-depth ion sputtering to determine concentration depth profile. The high-resolution spectra will be curve fitted to determine the oxidation state of nickel, chromium, and molybdenum, and the chemical-bonding environment for oxygen.

Please call me if you have any questions. Thank you for your assistance.

Sincerely,

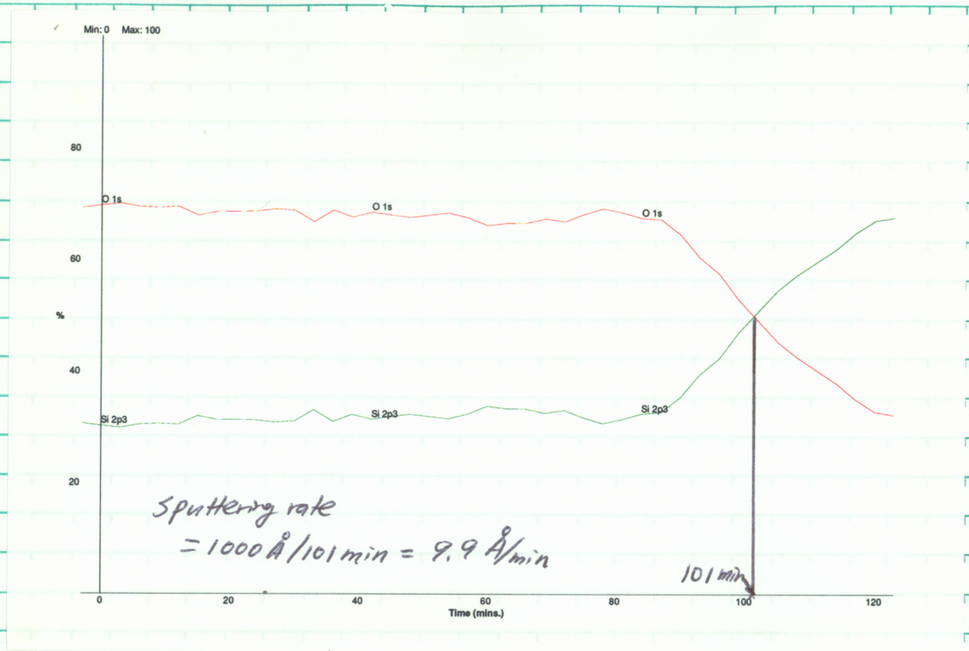
Yiming Pan
Center for Nuclear Waste Regulatory Analyses
Southwest Research Institute
Tel: 210-522-6640
Fax: 210-522-5184
e-mail: ypan@swri.org

Project No.

Book No.

TITLE XPS Sputtering Rate Calibration

From Page No.



To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by Zij Pan	10/11/04

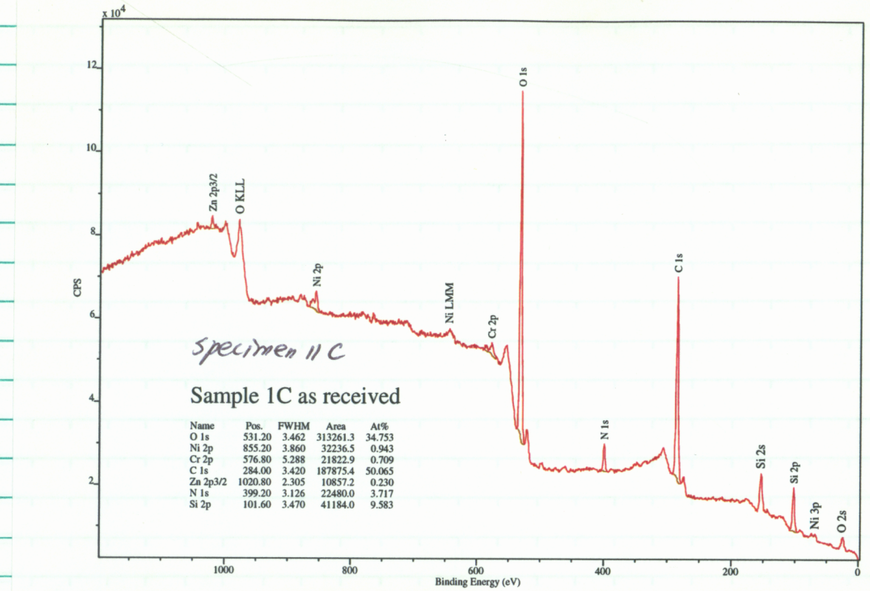
Project No.

Book No.

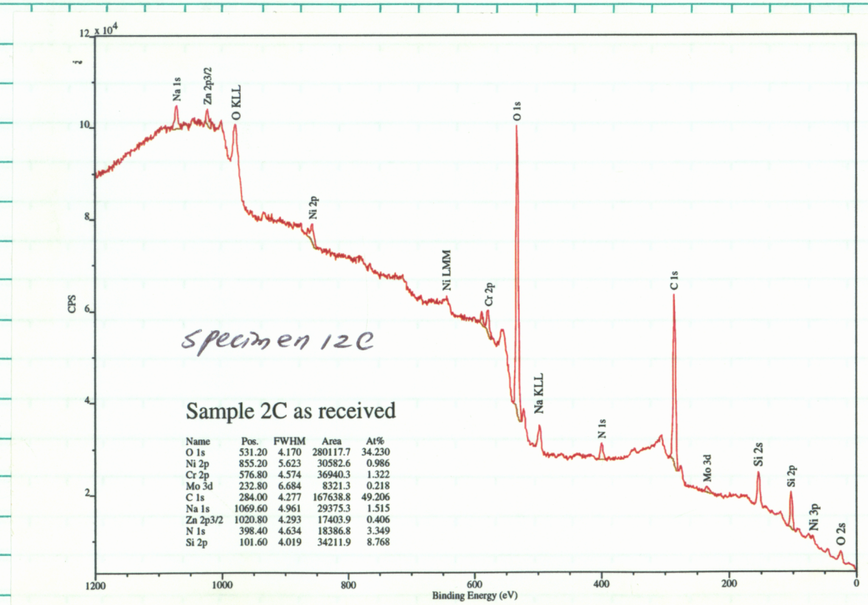
TITLE XPS Analysis of Alloy 22 Specimens #1 & 12 in the Crevice Area

From Page No.

1. Wide-energy survey of the as-received surfaces



Name	Pos.	FWHM	Area	At%
O 1s	531.20	4.462	313261.3	34.753
Ni 2p	855.20	3.860	32236.5	0.943
Cr 2p	576.80	5.288	21822.9	0.709
C 1s	284.00	3.420	187875.4	50.065
Zn 2p3/2	1020.80	2.305	10857.2	0.230
N 1s	399.20	3.126	22480.0	3.717
Si 2p	101.60	3.470	41184.0	9.583



Name	Pos.	FWHM	Area	At%
O 1s	531.20	4.170	280117.7	34.230
Ni 2p	855.20	5.623	30582.6	0.986
Cr 2p	576.80	4.574	36940.3	1.322
Mo 3d	232.80	6.684	8321.3	0.218
C 1s	284.00	4.277	167638.8	49.206
Na 1s	1069.60	4.961	29375.3	1.515
Zn 2p3/2	1020.80	4.293	17403.9	0.406
N 1s	398.40	4.634	18386.8	3.349
Si 2p	101.60	4.019	34211.9	8.768

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by Zij Pan	10/11/04