Appendix F

SEM/EDS Data for Test #3 Day-30 Flow Meter

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In ICET Test #3, significant amounts of debris and precipitates were found within the flow meter. SEM/EDS analysis was performed to examine the composition of the debris trapped in the flow meter as well as the white precipitates deposited on the inner wall of the flow meter. The debris and the precipitates were collected on May 5, 2005, the date Test #3 was shut down. The samples were dried in air before being coated with Au/Pd for SEM examination. Available logbook entries for this laboratory session are included in this appendix as transcribed notes.

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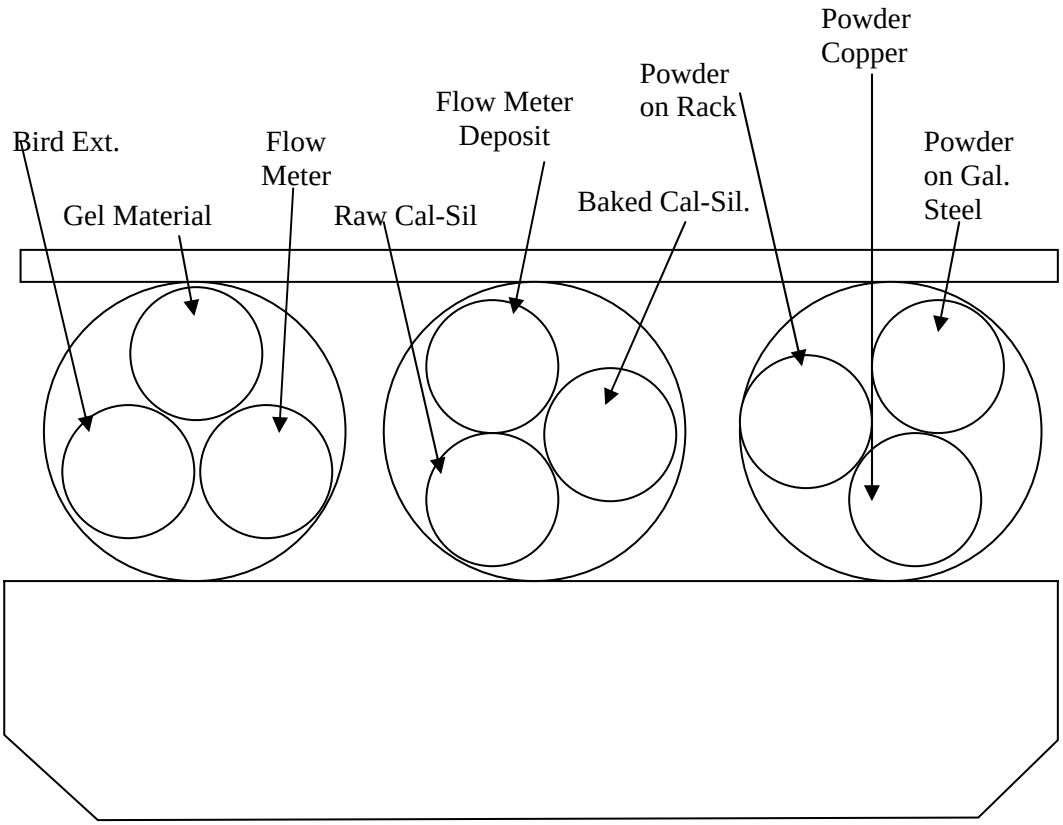
Transcribed Laboratory Log

Laboratory session from May 9, 2005.
Test #3 Day-30 Flow Meter



Flow Meter Debris

Image:	T3D30FlwMetrDebris005	80 ×	Figure F-1
	T3D30FlwMetrDebris006	600 ×	Figure F-2
EDS:	T3D30FlwDebris03		Figure F-3

Flow Meter Deposits

Image:	T3~Flow Meter	200 ×	Figure F-4
EDS:	T3Deposits08		Figure F-5

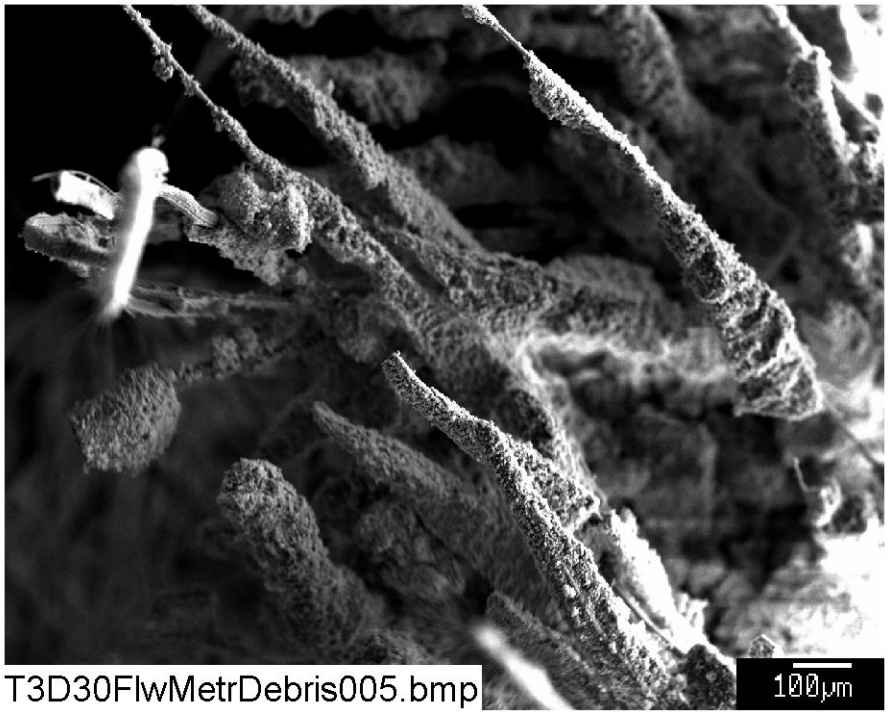


Figure F-1: SEM image magnified 80 times for Test #3 Day-30 debris within the flow meter. (T3D30FlwMetrDebris005)

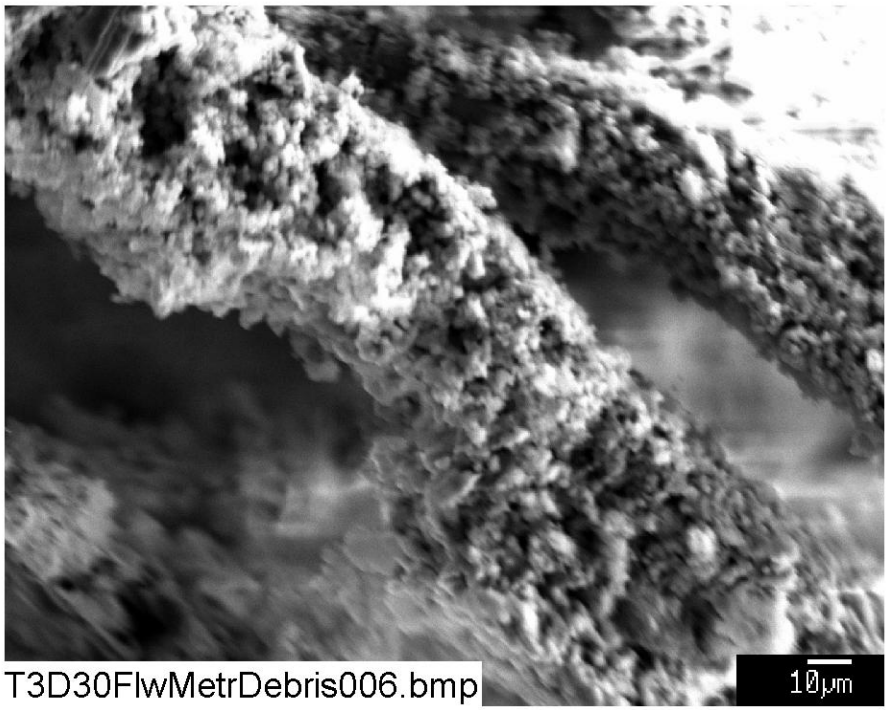


Figure F-2: SEM image magnified 600 times for Test #3 Day-30 debris within the flow meter. (T3D30FlwMetrDebris006)

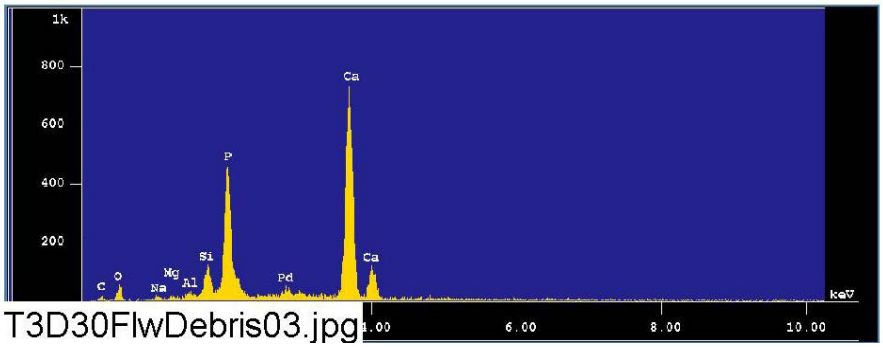


Figure F-3: EDS counting spectrum for the coatings on the fibers shown in Figure F-2. (T3D30FlwDebris03)

The results from the chemical composition analysis for T3D30FlwDebris03 are given in Table F-1.

Table F-1. Chemical Compositions for T3D30FlwDebris03, Figure F-3.

May 9 2005

Group : NRC
Sample : T3D30 ID# : 3
Comment : Flowmeter Debris
Condition : Full Scale : 20KeV(10eV/ch,2Kch)
Live Time : 60.000 sec Aperture # : 1
Acc. Volt : 15.0 KV Probe Current : 1.596E-09 A
Stage Point : X=77.422 Y=68.992 Z=12.516
Acq. Date : Mon May 9 12:10:19 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	1.1291	0.0010	422 / 12
Si K	Normal	1.50- 2.05	0.6220	0.0004	899 / 142
P K	Normal	1.75- 2.38	4.6152	0.0040	4117 / 58
Ca K	Normal	3.39- 4.30	12.9947	0.0033	9129 / 16
C K	Normal	0.09- 0.46	0.1025	0.0001	57 / 9
Pd L	Normal	2.22- 3.81	0.5748	0.0010	419 / 35
Al K	Normal	1.19- 1.83	0.0834	0.0002	129 / 24
Na K	Normal	0.81- 1.27	0.0806	0.0004	86 / 10
Mg K	Normal	0.97- 1.57	0.0536	0.0001	84 / 15

Chi_square = 8.9413

Element	Mass%	Atomic%	ZAF	Z	A	F
O	15.028	28.4942	2.9323	0.9460	3.0996	1.0000
Si	3.174	3.4286	1.1244	0.9475	1.1960	0.9922
P	17.384	17.0260	0.8298	1.1366	0.7330	0.9960
Ca	57.802	43.7487	0.9799	0.9630	1.0176	1.0000
C	1.833	4.6300	3.9385	0.9925	3.9689	0.9999
Pd	3.395	0.9679	1.3011	1.3345	0.9949	0.9799
Al	0.487	0.5473	1.2851	0.9696	1.3304	0.9962
Na	0.538	0.7099	1.4707	0.9973	1.4750	0.9999
Mg	0.359	0.4474	1.4751	0.9384	1.5740	0.9987
Total	100.000	100.0000				

Normalization factor = 4.5392

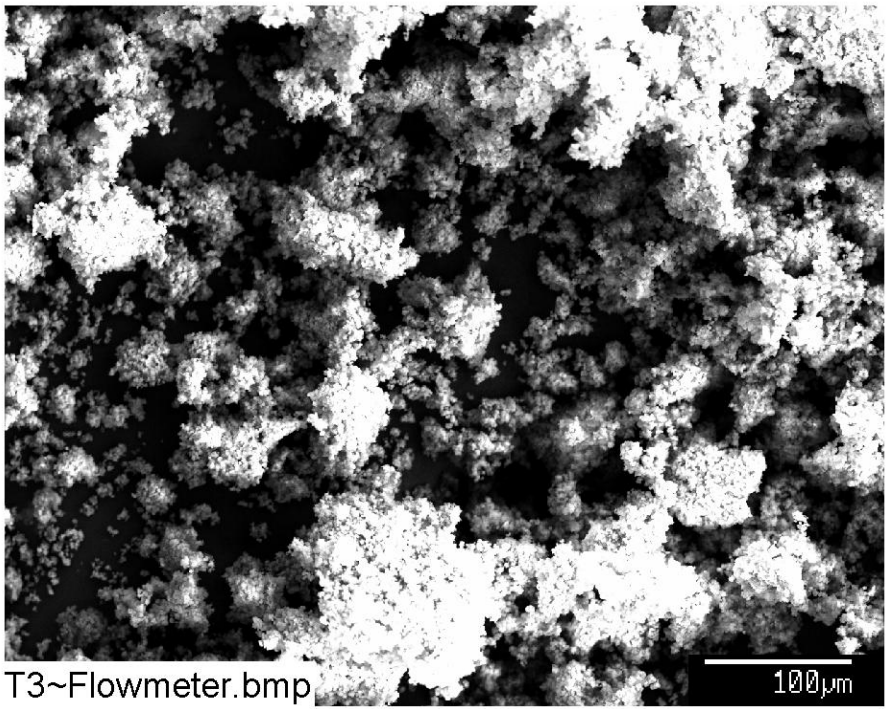


Figure F-4: SEM image magnified 200 times for Test #3 Day-30 deposits on the inner wall of the flow meter. (T3~Flow Meter)

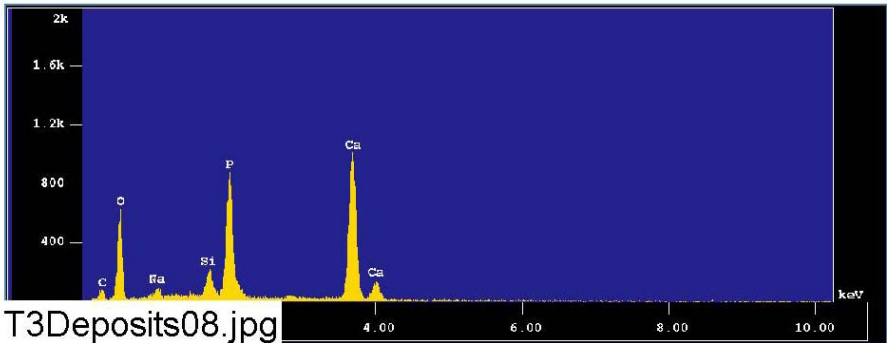


Figure F-5: EDS counting spectrum for the large masses of particulate deposits shown in Figure F-4. (T3Deposits08)

The results from the chemical composition analysis for T3Deposits08 are given in Table F-2.

Table F-2. Chemical Compositions for T3Deposits08, Figure F-5.

May 9 2005

Group : NRC
Sample : T3D30 ID# : 8
Comment : Flowmeter Deposits
Condition : Full Scale : 20KeV(10eV/ch,2Kch)
Live Time : 60.000 sec Aperture # : 1
Acc. Volt : 15.0 KV Probe Current : 1.607E-09 A
Stage Point : X=47.897 Y=71.447 Z=12.516
Acq. Date : Mon May 9 14:45:11 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
C K	Normal	0.09- 0.46	0.5235	0.0004	292 / 100
O K	Normal	0.25- 0.77	10.8619	0.0030	4085 / 54
Na K	Normal	0.81- 1.27	0.2843	0.0009	307 / 44
Si K	Normal	1.50- 2.05	1.0559	0.0005	1537 / 258
P K	Normal	1.75- 2.38	8.7448	0.0054	7854 / 123
Ca K	Normal	3.39- 4.30	17.8554	0.0039	12630 / 21

Chi_square = 35.5886

Element	Mass%	Atomic%	ZAF	Z	A	F
C	3.939	7.2812	3.8083	1.0178	3.7418	0.9999
O	43.460	60.3090	2.0251	0.9706	2.0865	1.0000
Na	0.842	0.8134	1.4997	1.0240	1.4645	1.0000
Si	2.376	1.8782	1.1389	0.9739	1.1772	0.9933
P	14.513	10.4028	0.8400	1.1688	0.7203	0.9976
Ca	34.870	19.3155	0.9884	0.9928	0.9956	1.0000

Total 100.000 100.0000
Normalization factor = 1.9758
Total 100.000 100.0000
Normalization factor = 2.1120