

Appendix A

SEM/EDS Data for Test-2 Day-15 High-Volume Filter

List of Figures

Figure A-1. SEM image at 120× magnification for a Test-2 Day-15 sample of particles on the high-volume filter (T2D15_HiVol027).	A-3
Figure A-2. Backscatter SEM image at 800× magnification for a Test-2 Day-15 sample of particles on a high-volume filter (T2D15_HiVol028).....	A-3
Figure A-3. EDS counting spectrum for the darker filtrate material shown in Figure A-2 indicating that the dark material is rich in Ca and P (T2D15EDS1~Dark Filter Particle).	A-4
Figure A-4. EDS counting spectrum for bright flecks on BSE image shown in Figure A-2 suggesting that they are rich in Fe, O, and Si (T2D15EDS2-Light Spot on Filter).....	A-6

List of Tables

Table A-1. Chemical Composition for T2D15EDS1	A-5
Table A-2. Chemical Composition for T2D15EDS2	A-7

This page is intentionally blank.

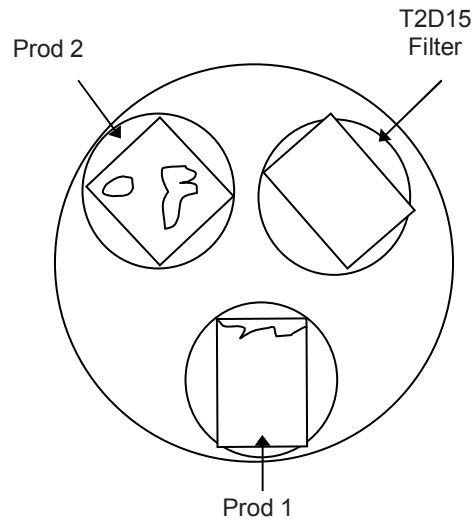
During ICET Test #2, work was continued for the purpose of identifying the origin and composition of chemical products that may form in the realistic reactor containment environments that are simulated in the ICET circulation tank. One question of interest is the composition of debris that collects on fiberglass and the composition of particulate substances suspended in the test solution. To partially address this question, a high-volume (1.0 liter) filter extracted on Day 15 was examined by SEM/EDS.

A Test-2, Day-15, high-volume filter sample was extracted from the tank on February 20, 2005. The sample was obtained by filtering 1.0 liter of test solution through a 0.7- μm fiberglass filter to retain particulates that were present in the solution. The SEM/EDS data presented here are for the cake layer retained on the filter paper. These examinations were performed on March 7, 2005. Transcribed logbook entries are provided that document the examination sequence and improve the traceability of sample designations.

Transcribed Laboratory Log

Laboratory session from March 7, 2005

T2D15 Samples—NRC



Conditions: 15-kV, 1-nA beam current, Aperture = 2

Sample T2D15 High-Volume Filter

Image:	T2D15_HiVol027	120 ×	SE image	Figure A-1
	T2D15_HiVol028	800 ×	BSE image	Figure A-2
EDS:	T2D15EDS1		Dark filtrate material	Figure A-3
	T2D15EDS2		Bright flecks on filtrate	Figure A-4

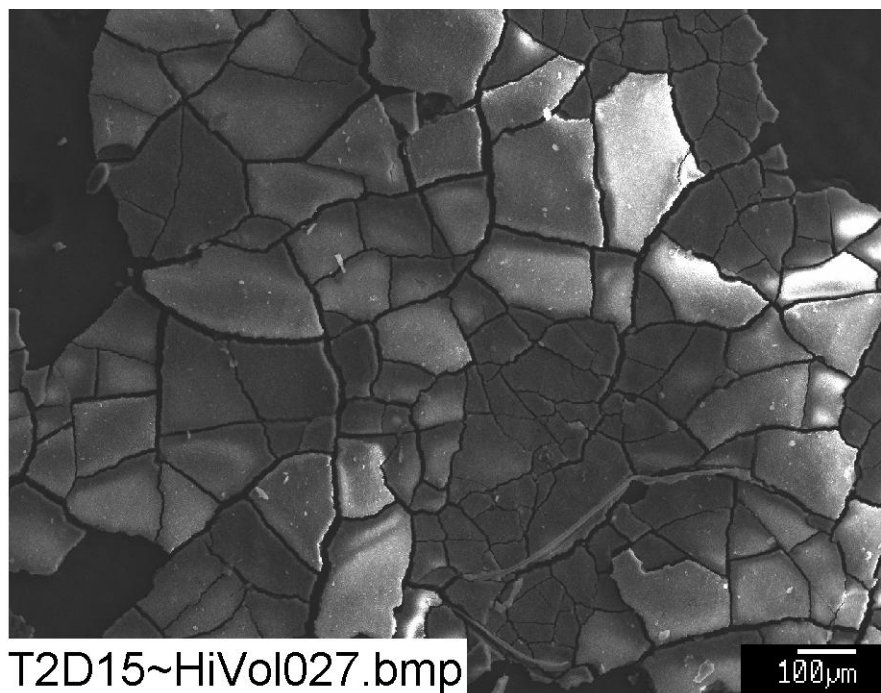


Figure A-1. SEM image at 120 \times magnification for a Test-2 Day-15 sample of particles on the high-volume filter (T2D15_HiVol027).

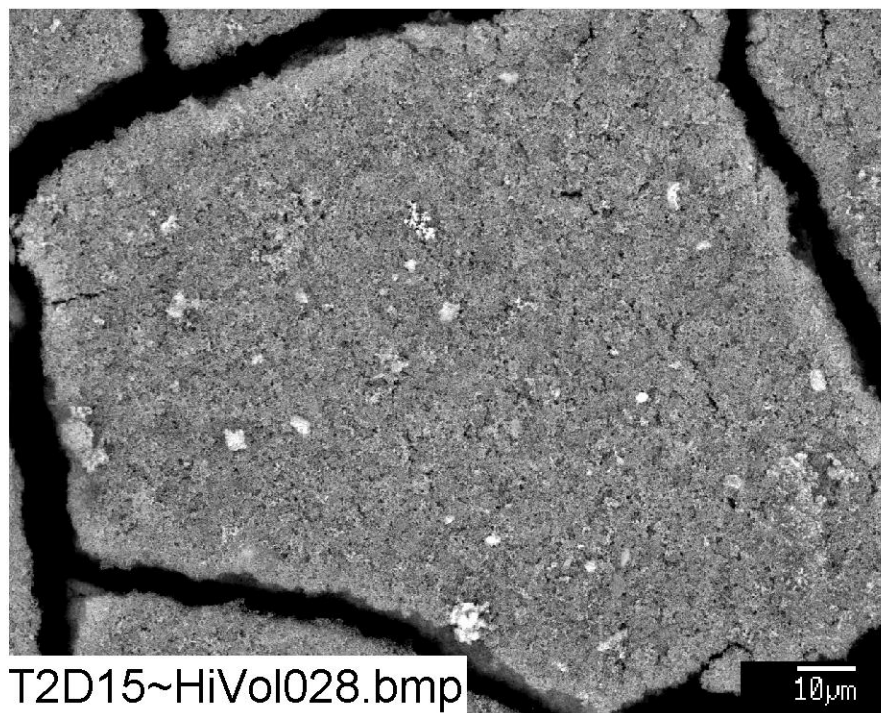


Figure A-2. Backscatter SEM image at 800 \times magnification for a Test-2 Day-15 sample of particles on a high-volume filter (T2D15_HiVol028).

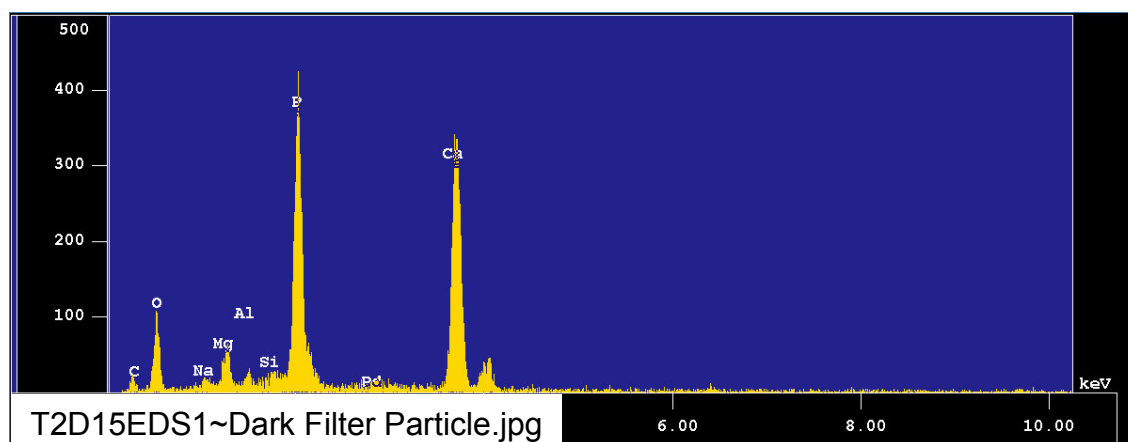


Figure A-3. EDS counting spectrum for the darker filtrate material shown in Figure A-2 indicating that the dark material is rich in Ca and P (T2D15EDS1~Dark Filter Particle).

The results from the chemical composition analysis for T2D15EDS1 are given in Table A-1.

Table A-1. Chemical Composition for T2D15EDS1

Mar 7 18:03 2005 /tmp/eds_pout.log Page 1

Group : NRC
Sample : T2D15 ID# : 1
Comment : dark filter material
Condition : Full Scale : 20KeV(10eV/ch,2Kch)
Live Time : 60.000 sec Aperture # : 1
Acc. Volt : 20.0 KV Probe Current : 3.145E-10 A
Stage Point : X=71.012 Y=58.486 Z=10.558
Acq. Date : Mon Mar 7 18:00:46 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	14.1777	0.0024	857 /	16
Na K	Normal	0.81- 1.27	0.3823	0.0006	89 /	36
Mg K	Normal	0.97- 1.57	1.1233	0.0002	464 /	11
Al K	Normal	1.19- 1.83	0.3982	0.0002	168 /	22
Si K	Normal	1.50- 2.05	0.1620	0.0002	66 /	146
P K	Normal	1.75- 2.38	19.7310	0.0044	4243 /	20
Ca K	Normal	3.39- 4.30	19.8726	0.0022	4688 /	11

Chi_square = 2.5662

Element	Mass%	Atomic%	ZAF	Z	A	F
O	43.999	62.7558	2.0884	0.9756	2.1406	1.0000
Na	0.929	0.9225	1.6358	1.0261	1.5950	0.9996
Mg	2.960	2.7785	1.7733	0.9692	1.8325	0.9985
Al	0.901	0.7616	1.5219	1.0006	1.5272	0.9960
Si	0.306	0.2489	1.2731	0.9767	1.3168	0.9899
P	21.210	15.6257	0.7234	1.1558	0.6272	0.9978
Ca	29.695	16.9070	1.0055	0.9946	1.0110	1.0000

Total 100.000 100.0000
Normalization factor = 1.4860

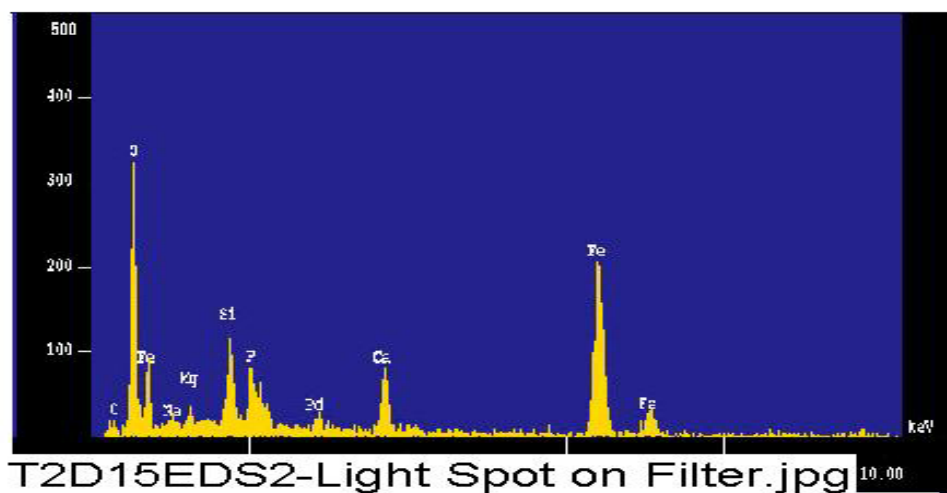


Figure A-4. EDS counting spectrum for bright flecks on BSE image shown in Figure A-2 suggesting that they are rich in Fe, O, and Si (T2D15EDS2-Light Spot on Filter).

The results from the chemical composition analysis for T2D30EDS2 are given in Table A-2.

Table A-2. Chemical Composition for T2D15EDS2

Mar 7 18:07 2005 /tmp/eds_pout.log Page 1

Group : NRC
Sample : T2D15 ID# : 2
Comment : light spot on filter material
Condition : Full Scale : 20KeV(10eV/ch,2Kch)
Live Time : 60.000 sec Aperture # : 1
Acc. Volt : 20.0 KV Probe Current : 3.100E-10 A
Stage Point : X=71.012 Y=58.486 Z=10.558
Acq. Date : Mon Mar 7 18:05:09 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	53.5124	0.0046	3188 / 16
Si K	Normal	1.50- 2.05	2.7900	0.0003	1114 / 52
Ca K	Normal	3.39- 4.30	4.2434	0.0012	987 / 11
Fe K	Normal	6.00- 7.44	27.6226	0.0029	3385 / 3
P K	Normal	1.75- 2.38	3.2410	0.0025	687 / 66

Chi_square = 3.3144

Element	Mass%	Atomic%	ZAF	Z	A	F
O	49.185	73.9782	0.7642	0.9424	0.8110	0.9998
Si	5.060	4.3355	1.5079	0.9431	1.6008	0.9989
Ca	4.869	2.9234	0.9540	0.9595	1.0034	0.9909
Fe	37.573	16.1896	1.1309	1.1328	0.9983	1.0000
P	3.312	2.5732	0.8497	1.1159	0.7617	0.9996

Total 100.000 100.0000
Normalization factor = 1.2028