

## Appendix D

### SEM/EDS Data for White Precipitate, Day-30 Fiberglass, Drain Screen Debris, Pipe Residue, Tank Sediment, Concrete Sample, Latent Debris Baselines, Test #1 Day-30 High-Volume Filtrate

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Following the conclusion of the 30-day period for Test #1, work was continued for the purpose of identifying the origin and chemical composition of the products that were formed during the test. One question of concern is whether the composition of the white precipitate evolved over the course of the study. To address this question partially, a set of precipitate samples was obtained from archival solutions representing three different time points. The first sample was obtained from unfiltered solution extracted on December 7, 2004, near the middle of the test. The second sample was obtained from an unfiltered solution extracted on November 26, 2004, near the beginning of the test. The third sample was obtained from an unfiltered solution that was archived in 1-l bottles at the end of the test. This appendix contains SEM/EDS data generated on January 18, 2005, for the sampled precipitate.

This appendix also presents additional SEM/EDS data that were generated on January 18, 2005, during a reexamination of Day-30 fiberglass. This analysis was conducted to obtain additional composition spectra and higher-quality images free from streaking caused by charge buildup on the samples.

On January 28, 2005, additional inspections were performed of (1) debris collected from the drain screen, (2) residual deposits scraped from inside the piping after the tank was drained, (3) sediment collected from the bottom of the tank, and (4) concrete chips that were introduced in a SS bag as a unique sample type. In addition, baseline characterizations were obtained for the soil and crushed concrete constituents of the surrogate latent debris.

On December 21, 2004 (termination date for Test 1), a high-volume filter sample was extracted from the tank. SEM/EDS data are presented here for the filtrate that was obtained from that filter paper on February 25, 2005. See Appendix C for optical microscopic characterization of this filtrate.



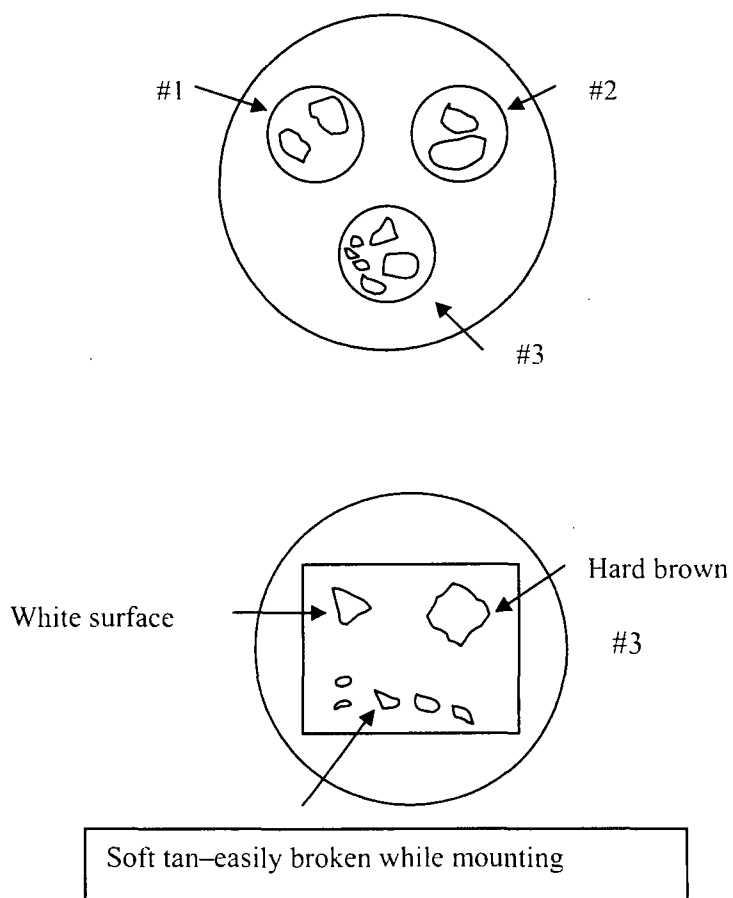
## Transcribed Laboratory Log

### Laboratory session from January 18, 2005

Samples of precipitate from archival bottles at three time points during Test #1.

Sample	#1	ICET-1207-1000-u (from mid-test unfiltered daily water sample)
	#2	ICET-1126-1000-u (from early-test unfiltered daily water sample)
	#3	ICET-12-21-04 #7 (from end-of-test archive bottle #7)

Spatial arrangement of sample material on the SEM sample mounts. Noticeable color variations from cream to brown were evident. Samples arranged to allow examination of entire range.



Instrument Conditions: 15-kV, 1-nA beam current, Aperture 2, EDS = T3, 100 s

#### File: POST-T1\_sample #1

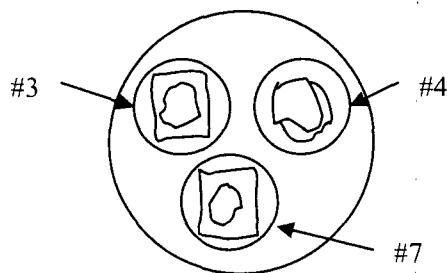
Image:	POST-T1001	40 ×	overview of chip
	POST-T1002	220 ×	on desiccation wrinkle

EDS: 1-1			O > Na > Al >> B, first time that boron has been noted
Image:	POST-T1003		2000 × on granular surface
EDS: 1-2	EDS on area of granular surface		approximately 10- × 10-μm area ~10- × 10-μm area
Image:	POST-T1004		1000 × on coarse granular surface in upper part of photo T1001 above
EDS	1-3		EDS on area (10 × 10 μm) of coarse granular surface
EDS	1-4		particle on surface of image T1004 above
<b>File: POST-T1_sample #2</b>			
Image:	POST-T1005	40 ×	overview of one fragment on mount, coarsely granular structure
EDS	POST-T1006 2-5	1000 ×	on coarse granular surface EDS on area (10 × 10 μm) of granular surface
Image:	POST-T1007	40 ×	overview on other mounted fragment, smooth surface
EDS	POST-T1008 2-6	2000 ×	on smooth granular surface EDS on one area (10 × 10 μm) of the smooth surface
EDS	2-7		on another area of the smooth surface
<b>File: POST-T1_sample #3</b>			
Image:	POST-T1009	65 ×	on white surface
	POST-T1010	1000 ×	on white surface, coarse granular, appears to be on underside of smooth brown fragment
EDS:	3-8		EDS on area (10 × 10 μm) of coarse white surface in image T1010
Image:	POST-T1011	10,000 ×	close-up of image T1010
EDS:	3-9		area analysis (10 × 10 μm) on another area of white surface
Image:	POST-T1012	40 ×	overview of “smooth” hard brown fragment, surface wrinkled
	POST-T1013	500 ×	on wrinkled surface
	POST-T1014	2000 ×	close-up on wrinkled surface in image T1013
EDS:	3-10		area analysis (10 × 10 μm) on wrinkled surface in image T1014

Image:	POST-T1015	40 ×	overview of soft tan particles, concoidal fracturing
EDS:	POST-T1016 3-11 3-12	2000 ×	surface of concoidal fracture area analysis on surface in image T1016 area analysis on another concoidal surface of a different particle

### Reexamine samples from Day 30

Sample Definitions:   #3    High-flow sacrificial fiber from perimeter with dark crust  
                             #4    High-flow sacrificial fiber from perimeter with white deposits  
                                     (visually surveyed but found to be similar to #3, no data saved)  
                             #7    Unsoaked fiberglass to serve as “clean” control sample.



Sample: T1D30 (30 day sample)

#### **File: T1D30\_3, sample #3**

Image:	T1D30_3017	150 ×	overview
EDS:	T1D30_3-1		poor spectrum (not saved)
	T1D30_3-2		web-like film between fibers
	T1D30_3-3		web-like film between fibers
	T1D30_3-4		web-like film between fibers

#### **File: T1D30\_7, sample #7**

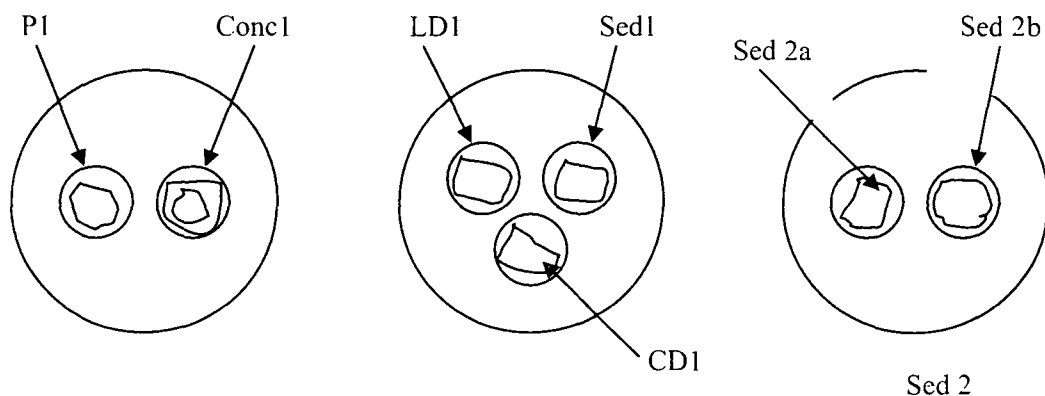
Image:	T1D30_7018	150 ×	overview on clean fiberglass
EDS:	T1D30_7-5		EDS on individual thick fiber
	T1D30_7-6		EDS on individual clump of fiber



**Post-Test Analysis was done on January 28, 2005**

ICET sample mounted:

Sample	#P1	pump suction debris
	#Sed1	sediment inside pipe (loose particles)
	#Sed2	tank sediment
	#Sed2a	one side of flake
	#Sed2b	other side of flake
	#LD1	latent debris (loose particles of sand and soil)
	#CD1	concrete dust (loose particles of crushed concrete)
	#Conc	concrete fragment



Conditions: 15-kV, 1-nA beam current, Aperture = 2, EDS aperture = 1, Process time = T2

<b>File: Post-T1, sample #P1</b>	pump suction debris		
Image:	POST-T1017	35 ×	overview of fibers and other debris
	POST-T1018	220 ×	on larger particle (SEI)
	POST-T1019	220 ×	BSE same field as T1018
EDS:	P1-1		EDS on large flake in T1018
	P1-2		EDS on small cluster to lower left of flake in T1018
Image:	POST-T1020	60 ×	SEI at different area
			too much charging—beam current set to 0.1 nA
	POST-T1021		BSE same field as T1020
	POST-T1022	200 ×	SEI on flake (flake charged and jumped out of view—could not get EDS)
EDS:	P1-3		EDS on particles in foreground, below flake

<b>File: Post-T1, sample conc</b>			concrete fragment
Image:	POST-T1023	43 ×	BSE image overview of portion of concrete fragment. Large aggregate in upper right is quartz.
EDS:	Conc-4		EDS at 5500 × (20 × 20 μm) average on concrete matrix. Aggregate appears to be mostly quartz
Image:	POST-T1024	110 ×	SEI of another area
	POST-T1025	110 ×	BSE on same field as T1024
EDS:	Conc-5		aggregate particle in lower portion of image T1025
	Conc-6		surface granules on or in concrete; mostly carbon
	Conc-7		concrete matrix behind surface granules
<b>File: POST-T1, sample CD1</b>			concrete dust
Image:	POST-T1026	40 ×	SEI overview of dust particles mounted on carbon tape; many large particles
	POST-T1027	40 ×	BSE on same field as T1026; checked particles with EDS; most are quartz
EDS:	CD-8		EDS on particles in lower center of image T1027
Image:	POST-T1028	170 ×	SEI on smaller particles at different area
	POST-T1029	170 ×	BSE on same field as T1028
EDS:	CD-9		EDS on particle in lower right of image T1029; most large particles are quartz
Image:	POST-T1030	400 ×	SEI image of particle in center of image T1029
<b>File: POST-T1, sample LD-1</b>			Latent debris
Image:	POST-T1031	40 ×	SEI overview of dust debris mounted on carbon tape
	POST-T1032	40 ×	BSE image of same field; large particles are quartz as k-feldspar
EDS:	LD-10		EDS on large particle at right side of k-feldspar
	LD-11		EDS on small bright particle in upper center of image T1032
	LD-12		EDS on thin fiber in lower center of image T1032
Image:	POST-T1033	400 ×	SEI of central portion of image T1031
	POST-T1034	400 ×	BSE image of same field as above
EDS:	LD-13		EDS on flake at left center of a Na-feldspar
	LD-14		EDS on large particle at upper center of image T1034

Image:	POST-T1035	40 ×	SEI overview of another area
	POST-T1036	40 ×	BSE of same field as above
EDS:	LD-15		EDS on bright particle in lower right of image T1036
	LD-16		EDS on round particle slightly right center of image T1036
	LD-17		EDS over area (425 × 425 μm) at 250 times; C and Cl in spectrum are from mounting tape

**File: POST-T1, sample Sed1**

			pipe sediment
Image:	POST-T1037	40 ×	SEI image overview of particles
	POST-T1038	40 ×	BSE of same field as above
	POST-T1039	120 ×	SEI close-up
	POST-T1040	120 ×	BSE of same field as above (pretty uniform composition)
	POST-T1041	370 ×	SEI on single particle
	POST-T1042	3000 ×	SEI on small particle
EDS:	SED-18		EDS over particle in image T1042 at 6000 × (18 × 18 μm)

Image:	POST-T1043	300 ×	SEI on another particle
	POST-T1044	300 ×	BSE of same field as above
	POST-T1045	5000 ×	SEI on center of particle
	POST-T1046	10,000 ×	SEI on same particle
	POST-T1047	40 ×	overview of above
EDS:	SED-19		EDS on same field as image T1046 at 10,000 ×

**File: POST-T1, sample Sed-2A**

			Tank sediment
Image:	POST-T1048	100 ×	SEI overview
	POST-T1049	100 ×	BSE same field as above
	POST-T1050		SEI on a representative large particle
	POST-T1051	550 ×	SEI on the same large particle

Note: \*Samples Sed2-A and -B, and P1 were overcharged. Samples were recoated.

Image:	POST-T1052	43 ×	SEI overview
	POST-T1053	370 ×	SEI 2 large particles
	POST-T1054	370 ×	BSE same field as above
	POST-T1055	1000 ×	BSE on fuzzy particle
	POST-T1056	5000 ×	same particle
EDS:	SED-20		EDS on fuzzy particle
	SED-21		EDS on another particle—no Fe, Cu, Zn
Image:	POST-T1057	1000 ×	SEI on particle analyzed
EDS:	SED-22		EDS on large round particle
			K-feldspar, probably from concrete

Image:	POST-T1058	150 ×	SEI of high-Z particles analyzed above (EDS SED-21 and SED-22)
<b>File: POST-T1, sample Sed-2B</b>			Tank sediment, other side of flake from 2A
Image:	POST-T1059	40 ×	SEI overview; number of large particles in view
EDS:	POST-T1060	40 ×	BSE same field as above
	Sed-23		EDS on plate; O>Na>Al; similar to filtrate composition from 1/18/05
	Sed-24		EDS on particle in above plate
Image:	POST-T1061	160 ×	SEI on agglomerate of small particles and fibers at left side of image T1059
EDS:	POST-T1062	160 ×	BSE same field as above
	Sed-25		EDS on particle in agglomerate of image T1062

Note: \*Returned to sample P1 because of bad charging of the previous sample.

<b>File: POST-T1, sample P1</b>			pump suction debris after recoating
Image:	POST-T1063	40 ×	overview, large particles present in sample
EDS:	POST-T1064	40 ×	BSE on same field as above
	P1-26		EDS on large triangular particle
	P1-27		EDS on flat particle at lower right
	P1-28		EDS on bright particle in center

Sample: High-Volume Filter (T1D30) from February 25, 2005

Image:	T1D30_001	40 ×	Overview
	T1D30_002	300 ×	Close-up
EDS:	T1D30-EDS1		On filtrate
	T1D30-EDS2		On filtrate



Figure D-1. Mid-test unfiltered water sample, post-T1 sample #1 SEM image (POST-T1001) magnified 40 times; overview of the white precipitate chip.

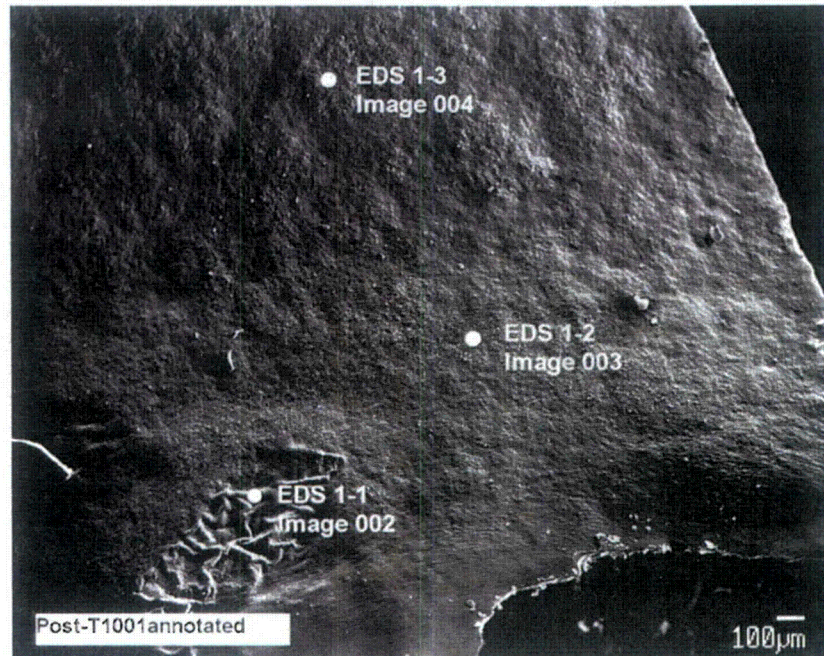
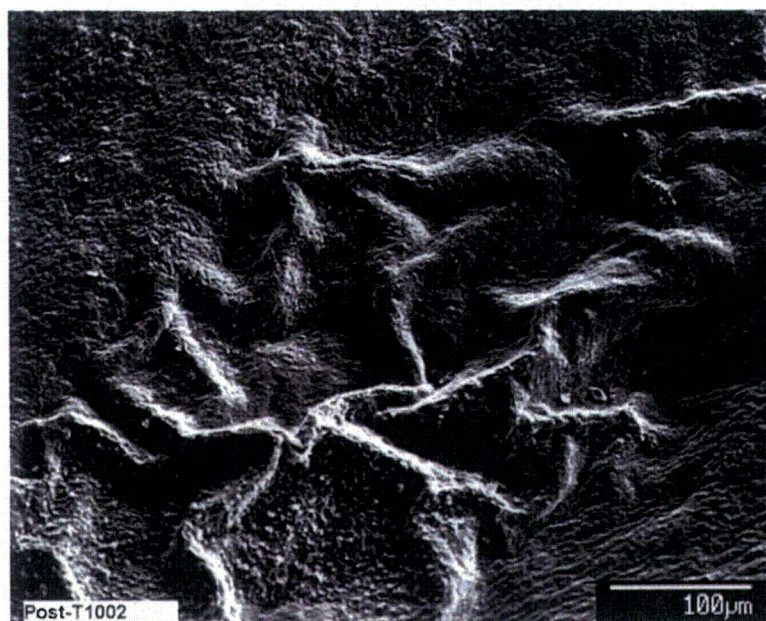
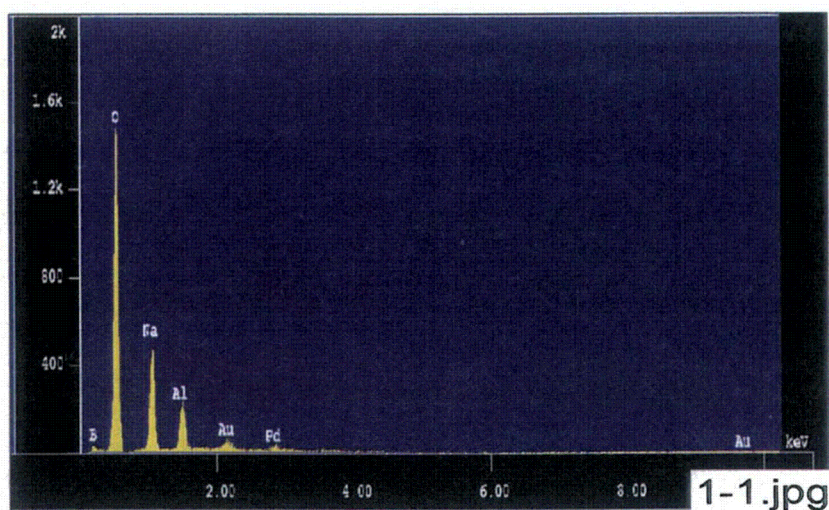


Figure D-2. Mid-test unfiltered water sample, post-T1 sample #1 SEM image (POST-T1001 annotated) annotating the EDS locations.





**Figure D-3.** Mid-test unfiltered water sample, post-T1 sample #1 SEM image (POST-T1002) magnified 220 times on the desiccation wrinkles, as shown in Figure D-2.



**Figure D-4.** Mid-test unfiltered water sample, post-T1 sample #1 counting spectrum (EDS 1-1) for the desiccation wrinkles in Figure D-3, showing the chemical compositions of O, Na, Al, and B (first time that B has been noted).

The results from the chemical composition analysis for EDS 1-1 are given in Table D-1.

**Table D-1. The Chemical Compositions for EDS 1-1**

Jan 18 11:17 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
 Sample : Post-T1 ID# : 1 From SEM#1 (Day 15)  
 Comment : wrinkled surface  
 Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
           Live Time : 100.000 sec Aperture # : 1  
           Acc. Volt : 15.0 KV Probe Current : 8.587E-10 A  
           Stage Point : X=25.049 Y=59.828 Z=10.967  
           Acq. Date : Tue Jan 18 10:46:14 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	35.4629	0.0044	11879 /	17
Na K	Normal	0.81- 1.27	4.5113	0.0016	4342 /	21
Al K	Normal	1.19- 1.83	1.5205	0.0004	2113 /	19
B K	Normal	0.00- 0.36	1.2097	0.0002	169 /	7

Chi\_square = 44.3126

Element	Mass%	Atomic%	ZAF	Z	A	F
O	61.031	58.8793	0.7366	0.9686	0.7604	1.0000
Na	13.715	9.2077	1.3011	1.0231	1.2716	1.0001
Al	4.842	2.7699	1.3629	0.9965	1.3677	1.0000
B	20.413	29.1432	7.2220	1.1244	6.4230	1.0000

Total 100.000 100.0000  
 Normalization factor = 2.3365



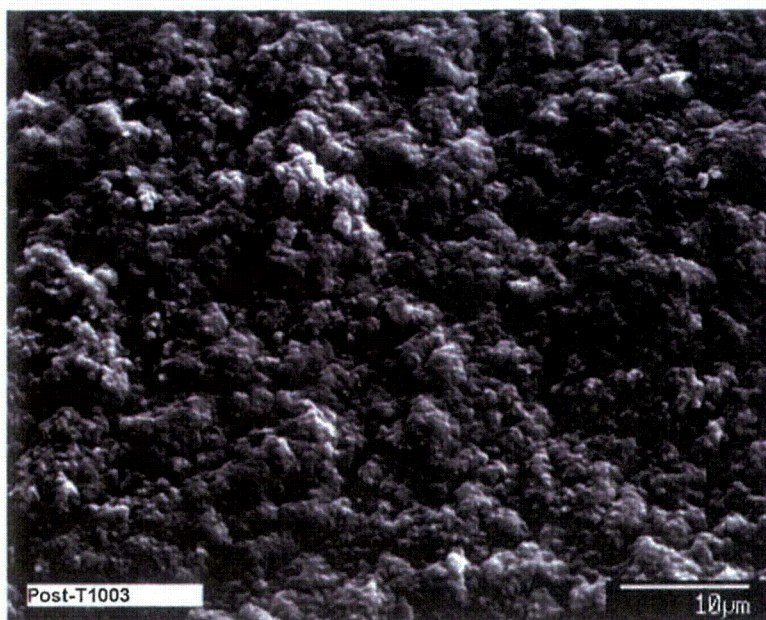


Figure D-5. Mid-test unfiltered water sample, post-T1 sample #1 image (POST-T1003) magnified 2000 times on granular surface, as shown in Figure D-2.

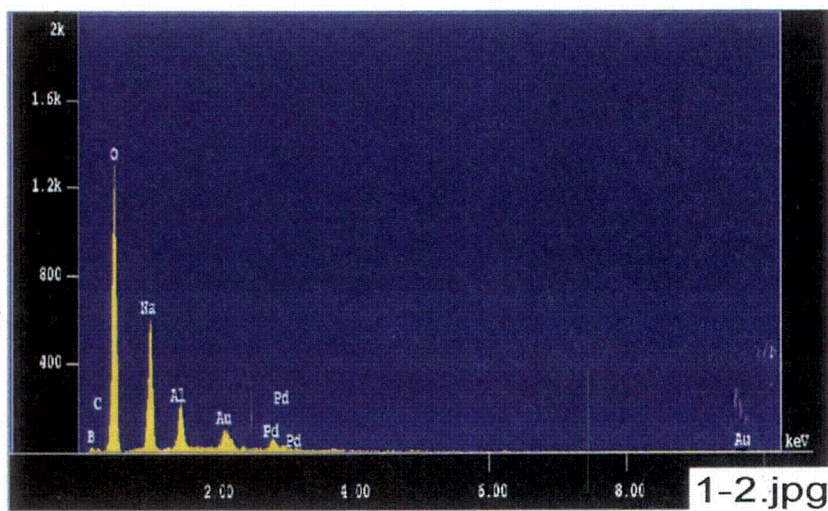


Figure D-6. Mid-test unfiltered water sample, post-T1 sample #1 counting spectrum (EDS 1-2) on the granular surface, as shown in Figure D-5, within an area about  $10 \times 10 \mu\text{m}$ .



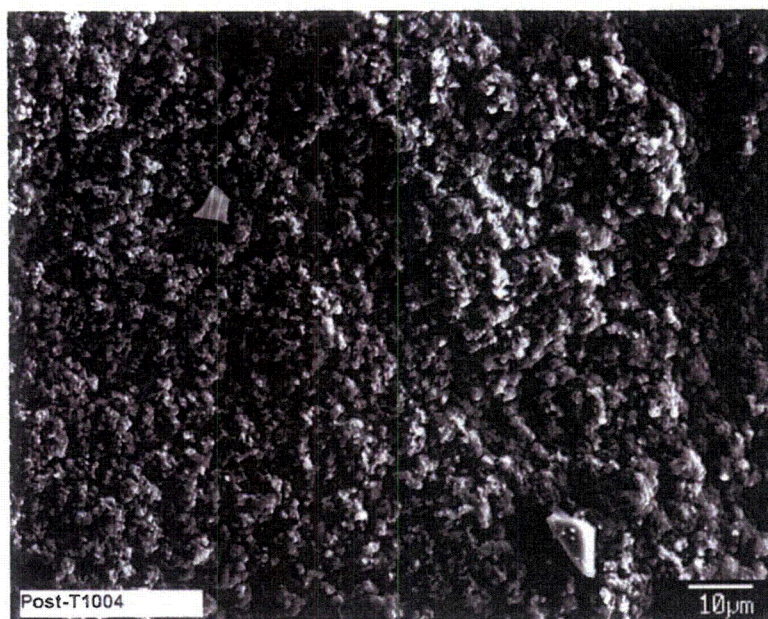


Figure D-7. Mid-test unfiltered water sample, post-T1 sample #1 SEM image (POST-T1004) magnified 1000 times on coarse granular surface in upper part of image (POST-T1001), as shown in Figure D-2.

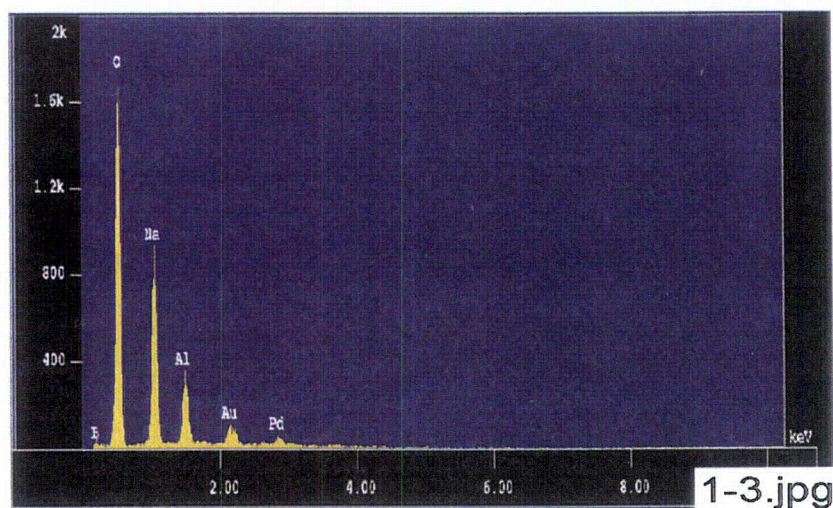


Figure D-8. Mid-test unfiltered water sample, post-T1 sample #1 counting spectrum (EDS 1-3) on an area ( $10 \times 10 \mu\text{m}$ ) of the coarse granular surface, as shown in Figure D-7.

The results from the chemical composition analysis for EDS 1-3 are given in Table D-2.

**Table D-2. The Chemical Compositions for EDS 1-3**

Jan 18 11:18 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : Post-T1 ID# : 3 From SEM#1 (Day 15)  
Comment : coarse granular surface area analysis  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 8.087E-10 A  
Stage Point : X=24.722 Y=58.294 Z=10.967  
Acq. Date : Tue Jan 18 11:00:44 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	44.4103	0.0048	14010 /	20
Na K	Normal	0.81- 1.27	8.5492	0.0020	7749 /	32
Al K	Normal	1.19- 1.83	2.3330	0.0005	3054 /	35
B K	Normal	0.00- 0.36	0.9836	0.0002	129 /	11

Chi\_square = 48.4646

Element	Mass%	Atomic%	ZAF	Z	A	F
O	58.466	59.0811	0.7212	0.9739	0.7406	0.9999
Na	19.871	13.9741	1.2733	1.0285	1.2380	1.0000
Al	6.080	3.6433	1.4278	1.0016	1.4255	1.0000
B	15.582	23.3015	8.6782	1.1306	7.6756	1.0000

Total 100.000 100.0000  
Normalization factor = 1.8254



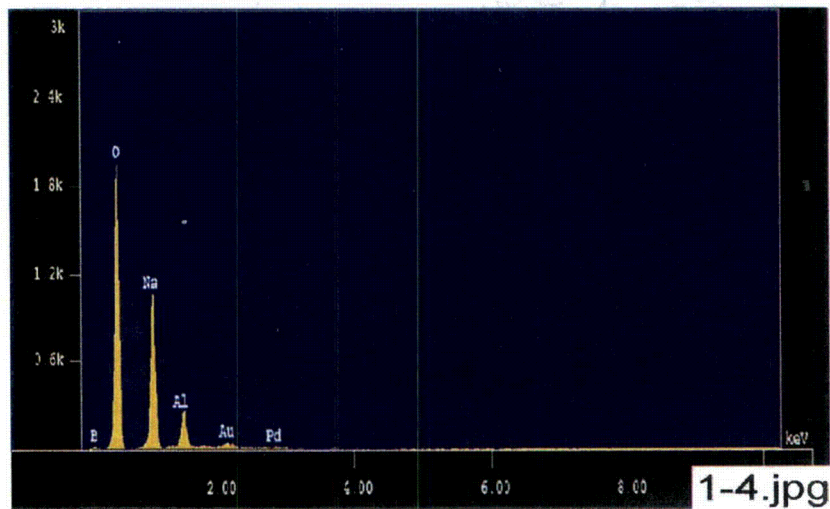


Figure D-9. Mid-test unfiltered water sample, post-T1 sample #1 counting spectrum (EDS 1-4) on the particle on surface of SEM image (POST-T1004), as shown in Figure D-7.

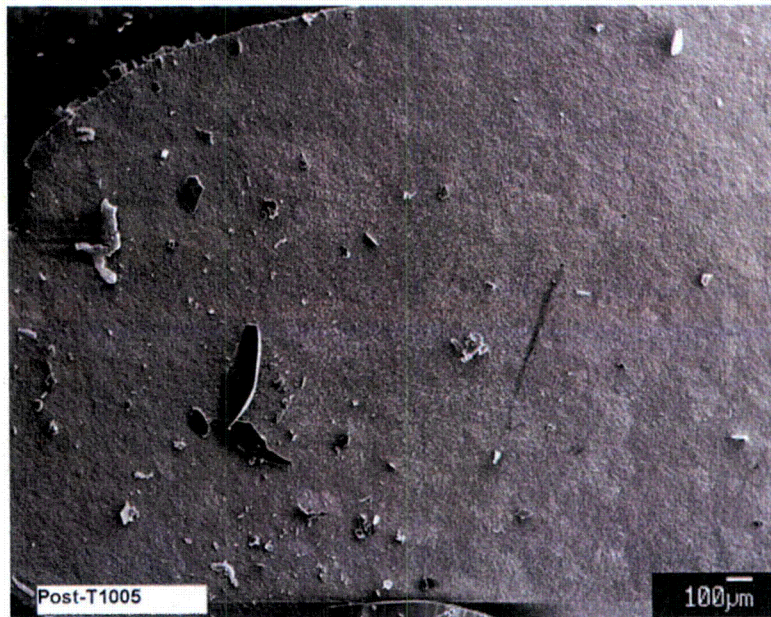


Figure D-10. Mid-test unfiltered water sample, post-T1 sample #2 SEM (POST-T1005) magnified 40 times for the overview of one fragment on mount showing coarsely granular structure.

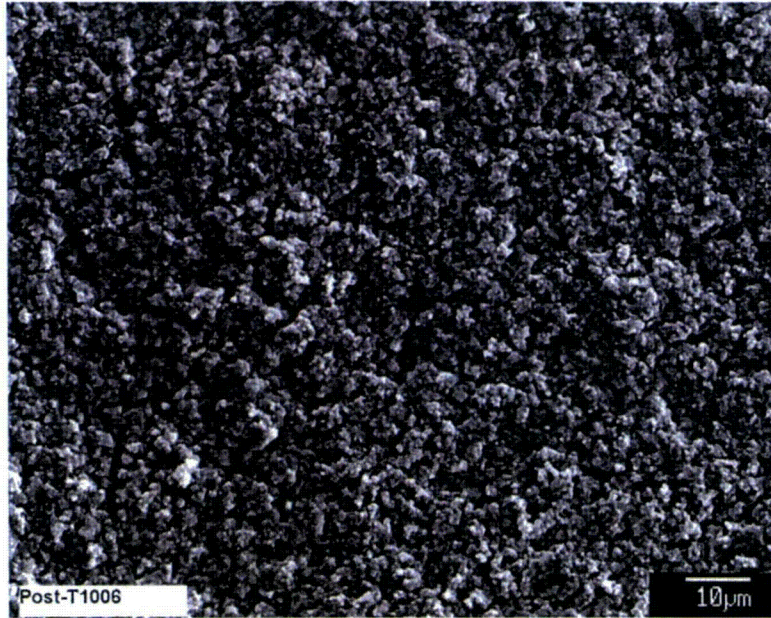


Figure D-11. Mid-test unfiltered water sample, post-T1 sample #2 SEM (POST-T1006) magnified 1000 times on the coarsely granular surface, as shown in Figure D-10.

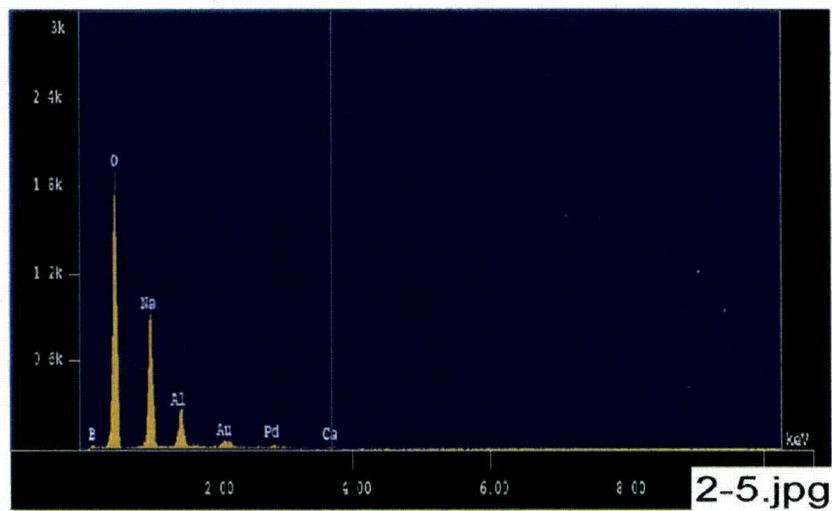


Figure D-12. Mid-test unfiltered water sample, post-T1 sample #2 counting spectrum (EDS 2-5) on the granular surface, as shown in Figure D-11.

The results from the chemical composition analysis for EDS 2-5 are given in Table D-3.

**Table D-3. The Chemical Compositions for EDS 2-5**

Jan 18 11:31 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : Post-T1 ID# : 5 From SEM#2 (beginning)  
Comment : coarse granular surface area analysis  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 7.220E-10 A  
Stage Point : X=10.586 Y=55.990 Z=10.967  
Acq. Date : Tue Jan 18 11:28:48 2005

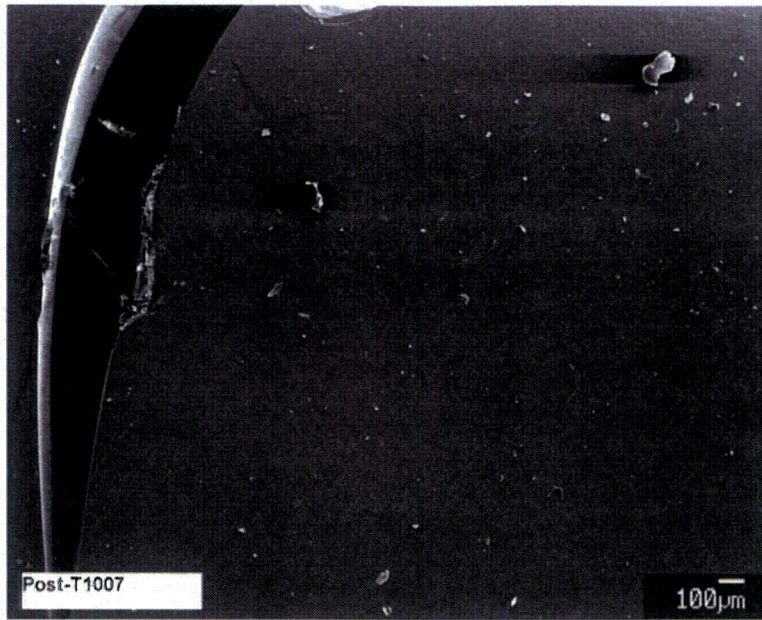
Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	52.9682	0.0049	14918 /	24
Na K	Normal	0.81- 1.27	9.8622	0.0021	7981 /	26
Al K	Normal	1.19- 1.83	2.0175	0.0004	2358 /	32
B K	Normal	0.00- 0.36	1.0850	0.0002	127 /	12
Ca K	Normal	3.39- 4.30	0.3343	0.0009	177 /	13

Chi\_square = 35.4442

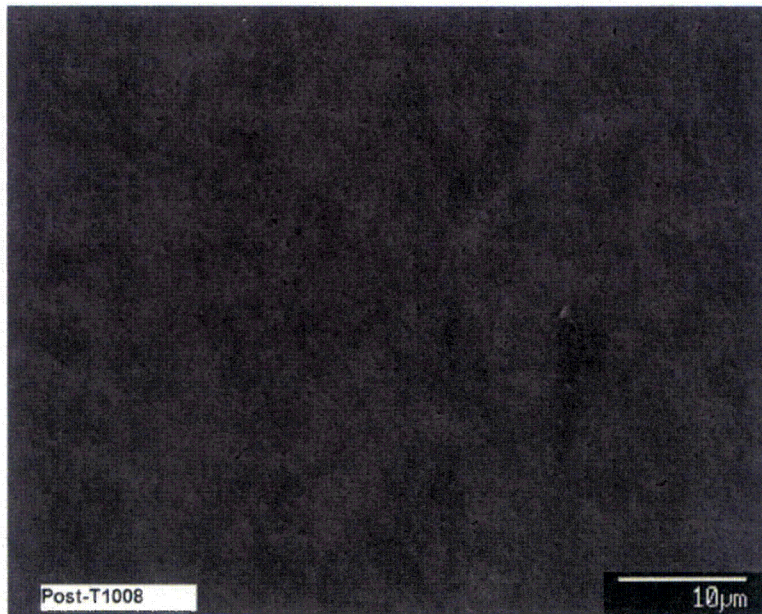
Element	Mass%	Atomic%	ZAF	Z	A	F
O	60.176	61.0351	0.7164	0.9754	0.7344	0.9999
Na	20.230	14.2795	1.2935	1.0302	1.2555	1.0001
Al	4.616	2.7762	1.4427	1.0032	1.4381	1.0000
B	14.456	21.6982	8.4015	1.1325	7.4188	1.0000
Ca	0.521	0.2110	0.9831	1.0039	0.9794	1.0000

Total 100.000 100.0000  
Normalization factor = 1.5859





**Figure D-13.** Begin-test unfiltered water sample, post-T1 sample #2 SEM (POST-T1007) magnified 40 times of the overview on the other mounted fragment with smooth surface.



**Figure D-14.** Begin-test unfiltered water sample, post-T1 sample #2 SEM image (POST-T1008) magnified 2000 times on the smooth surface, as shown in Figure D-13.

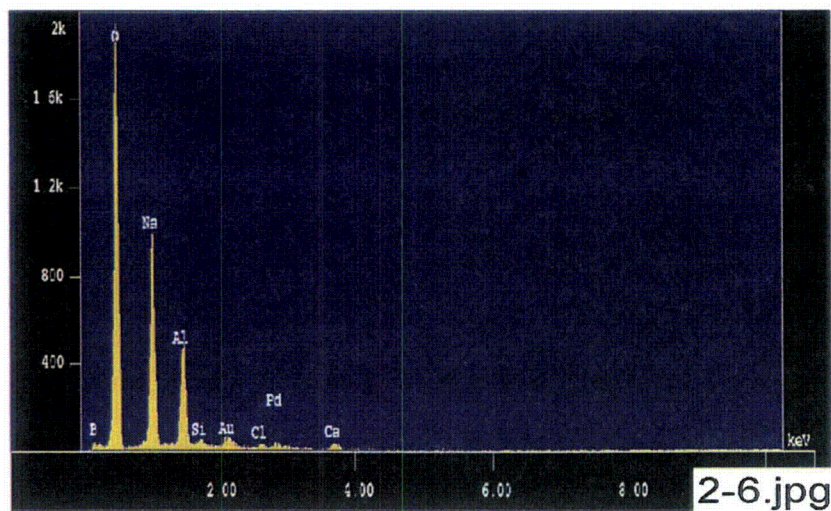


Figure D-15. Begin-test unfiltered water sample, post-T1 sample #2 counting spectrum (EDS 2-6) on one area ( $10 \times 10 \mu\text{m}$ ) of the smooth surface, as shown in Figure D-14.

The results from the chemical composition analysis for EDS 2-6 are given in Table D-4.

**Table D-4. The Chemical Compositions for EDS 2-6**

Jan 18 11:46 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : Post-T1 ID# : 6 SEM#2 (beginning)  
Comment : smooth surface area analysis  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 6.840E-10 A  
Stage Point : X=10.350 Y=59.471 Z=10.967  
Acq. Date : Tue Jan 18 11:43:23 2005

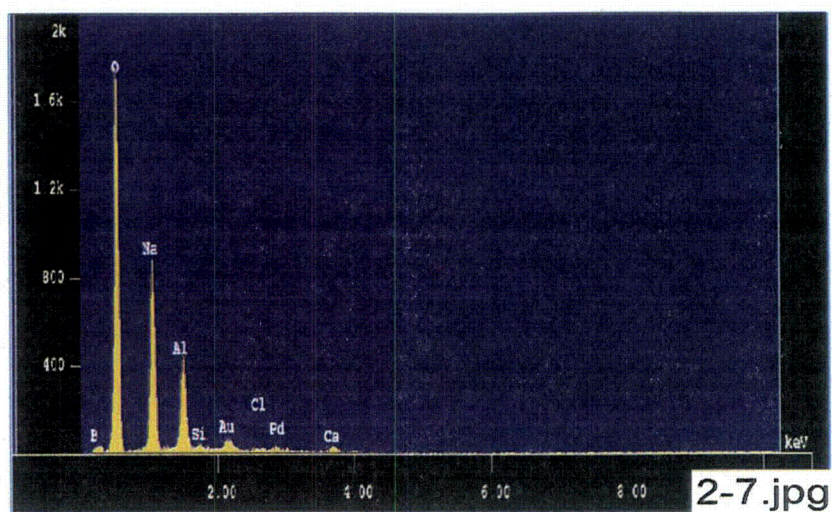
Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
B K	Normal	0.00- 0.36	1.2246	0.0002	136 / 14
O K	Normal	0.25- 0.77	59.8482	0.0051	15969 / 28
Na K	Normal	0.81- 1.27	11.1361	0.0022	8537 / 25
Al K	Normal	1.19- 1.83	4.2719	0.0006	4730 / 32
Si K	Normal	1.50- 2.05	0.1862	0.0003	192 / 267
Cl K	Normal	2.34- 3.06	0.4244	0.0007	300 / 14
Ca K	Normal	3.39- 4.30	0.7458	0.0010	374 / 10

Chi\_square = 26.7443

Element	Mass%	Atomic%	ZAF	Z	A	F
B	14.058	21.4396	8.9766	1.1319	7.9308	1.0000
O	58.125	59.9001	0.7594	0.9749	0.7790	0.9999
Na	18.281	13.1106	1.2836	1.0295	1.2470	0.9999
Al	7.721	4.7183	1.4133	1.0025	1.4099	0.9999
Si	0.310	0.1818	1.3007	0.9804	1.3267	0.9999
Cl	0.565	0.2626	1.0402	1.0342	1.0062	0.9996
Ca	0.941	0.3870	0.9863	1.0030	0.9834	1.0000

Total 100.000 100.0000  
Normalization factor = 1.2789





**Figure D-16.** Begin-test unfiltered water sample, post-T1 sample #2 counting spectrum (EDS 2-7) on another area of the smooth surface, as shown in Figure D-14.

The results from the chemical composition analysis for EDS 2-7 are given in Table D-5.

**Table D-5. The Chemical Compositions for EDS 2-7**

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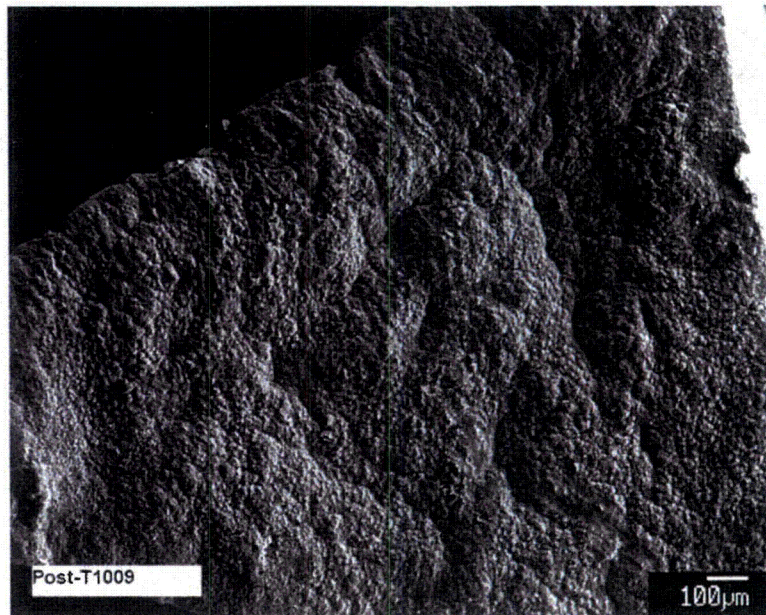
Group : NRC  
Sample : Post-Tl ID# : 7 SEM#2 (beginning)  
Comment : smooth surface area analysis  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 6.705E-10 A  
Stage Point : X=12.518 Y=59.220 Z=10.967  
Acq. Date : Tue Jan 18 11:49:08 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
B K	Normal	0.00- 0.36	0.0000	0.0000	0 / 12
O K	Normal	0.25- 0.77	55.3551	0.0049	14478 / 26
Na K	Normal	0.81- 1.27	10.1545	0.0020	7631 / 26
Al K	Normal	1.19- 1.83	3.8370	0.0005	4164 / 32
Si K	Normal	1.50- 2.05	0.1735	0.0003	176 / 248
Ca K	Normal	3.39- 4.30	0.7780	0.0010	383 / 15

Chi\_square = 31.2526

Element	Mass%	Atomic%	ZAF	Z	A	F
B	0.000	0.0000	11.2455	1.1536	9.7482	1.0000
O	64.445	73.4935	0.6695	0.9934	0.6740	0.9999
Na	23.652	18.7708	1.3394	1.0487	1.2774	0.9998
Al	10.115	6.8395	1.5159	1.0210	1.4849	0.9999
Si	0.422	0.2742	1.3986	0.9983	1.4010	1.0000
Ca	1.366	0.6220	1.0099	1.0202	0.9900	1.0000

Total 100.000 100.0000  
Normalization factor = 1.7390

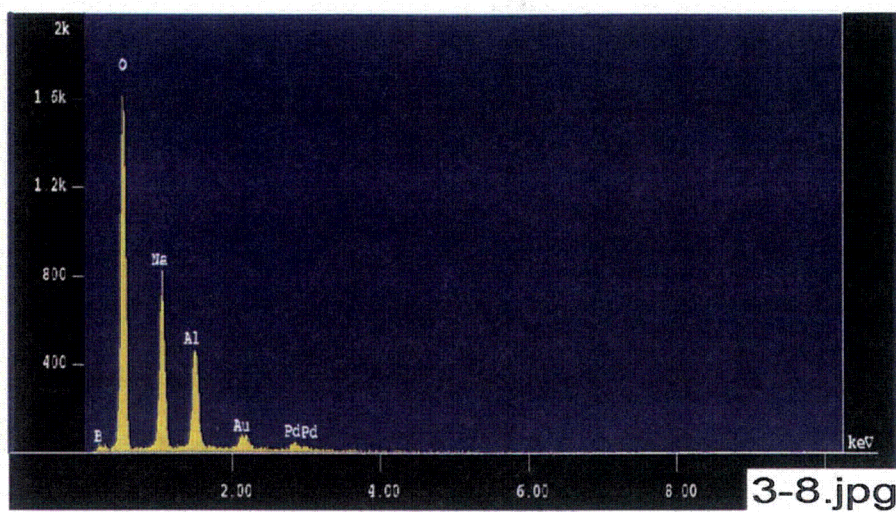


**Figure D-17.** End-test archive, post-T1 sample #3 SEM image (POST-T1009) magnified 65 times on the white surface of the white precipitate.



**Figure D-18.** End-test archive, post-T1 sample #3 SEM image (POST-T1010) magnified 1000 times on the white surface in Figure D-17, showing a coarsely granular structure on the underside of the smooth brown fragments.





**Figure D-19.** End-test archive, post-T1 sample #3 counting spectrum (EDS 3-8) on an area ( $10 \times 10$  m) of the coarse white surface in the image (POST-T1010), as shown in Figure D-18.

The results from the chemical composition analysis for EDS 3-8 are given in Table D-6.

**Table D-6. The Chemical Compositions for EDS 3-8**

Jan 18 12:02 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : Post-T1 ID# : 8 SEM#3 (Day 30)  
Comment : white coarse surface area analysis - bottom of flake  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 6.439E-10 A  
Stage Point : X=16.090 Y=65.380 Z=10.967  
Acq. Date : Tue Jan 18 12:00:59 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	55.1199	0.0048	13845 /	23
Na K	Normal	0.81- 1.27	9.4895	0.0020	6848 /	28
Al K	Normal	1.19- 1.83	4.5307	0.0006	4722 /	28
B K	Normal	0.00- 0.36	0.4438	0.0002	46 /	16

Chi\_square = 49.0164

Element	Mass%	Atomic%	ZAF	Z	A	F
O	61.576	66.1306	0.6849	0.9841	0.6960	0.9999
Na	20.172	15.0761	1.3032	1.0391	1.2545	0.9998
Al	10.726	6.8301	1.4514	1.0117	1.4346	1.0000
B	7.527	11.9632	10.3982	1.1426	9.1004	1.0000

Total 100.000 100.0000  
Normalization factor = 1.6311

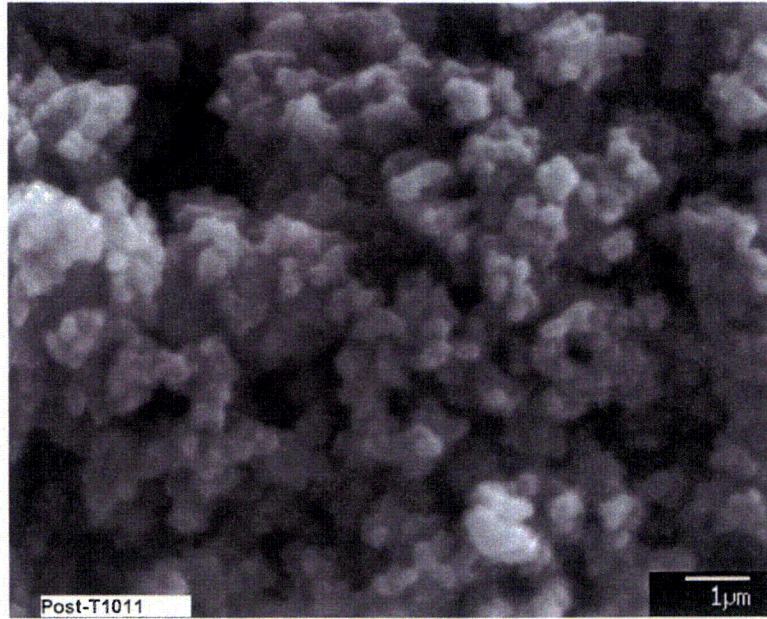


Figure D-20. End-test archive, post-T1 sample #3 SEM (POST-T1011) magnified 10,000 times; close-up of the white surface, as shown in Figure D-18.

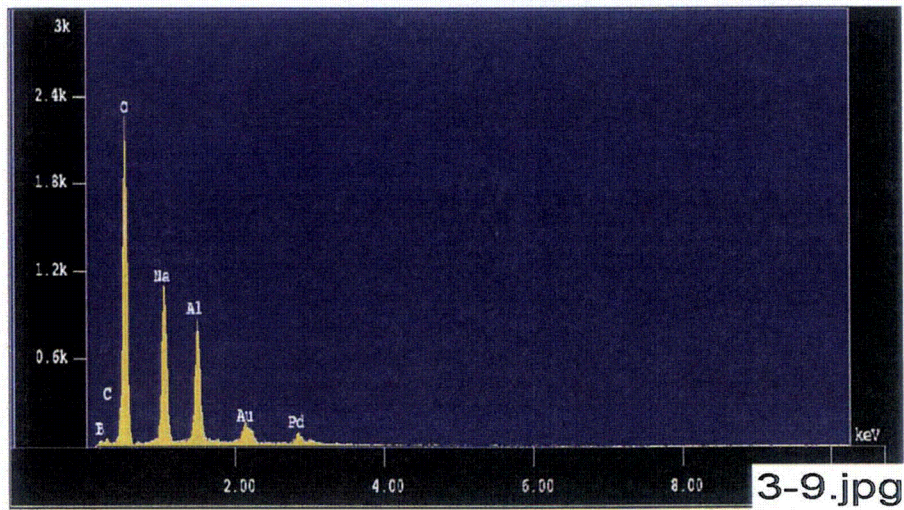


Figure D-21. End-test archive, post-T1 sample #3 counting spectrum (EDS 3-9) on another area of the white surface, as shown in Figure D-20.



The results from the chemical composition analysis for EDS 3-9 are given in Table D-7.

**Table D-7. The Chemical Compositions for EDS 3-9**

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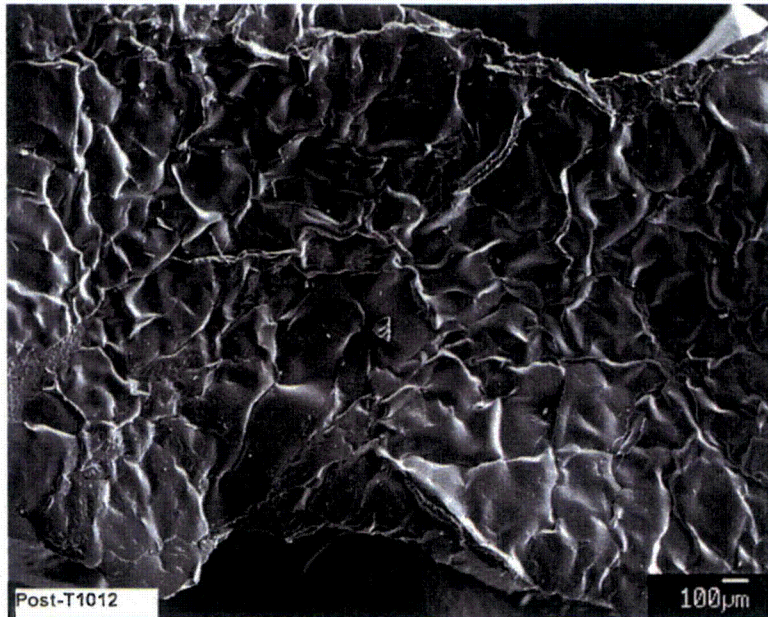
Group : NRC  
 Sample : Post-T1 ID# : 9 SEM# 3 (Day 30)  
 Comment : white coarse surface area analysis -bottom of flake  
 Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
 Live Time : 100.000 sec Aperture # : 1  
 Acc. Volt : 15.0 KV Probe Current : 1.022E-09 A  
 Stage Point : X=16.404 Y=65.334 Z=10.967  
 Acq. Date : Tue Jan 18 12:12:46 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	47.7843	0.0056	19050 / 44
Na K	Normal	0.81- 1.27	8.6181	0.0023	9872 / 42
Al K	Normal	1.19- 1.83	4.8672	0.0007	8052 / 48
B K	Normal	0.00- 0.36	0.8142	0.0003	135 / 16

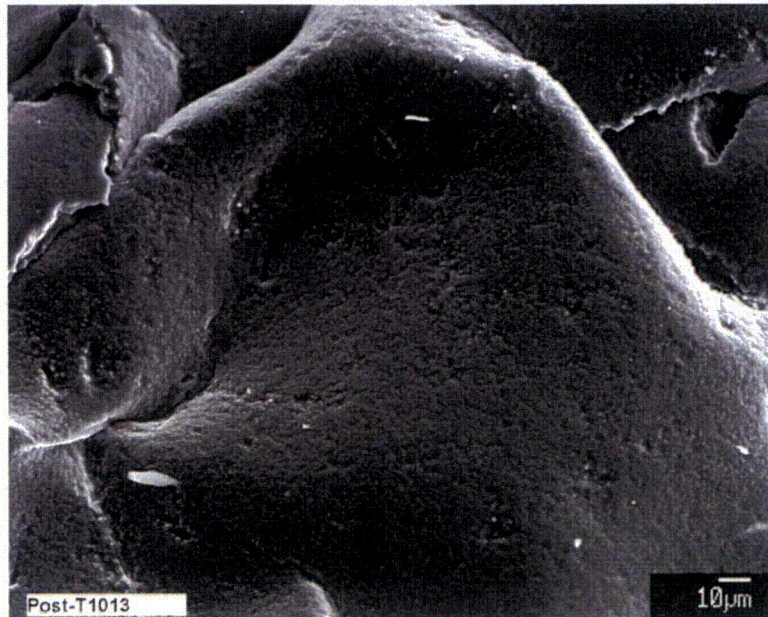
Chi\_square = 59.4370

Element	Mass%	Atomic%	ZAF	Z	A	F
O	57.627	59.8374	0.7343	0.9763	0.7522	0.9999
Na	17.957	12.9762	1.2687	1.0310	1.2309	0.9997
Al	11.219	6.9075	1.4034	1.0039	1.3980	1.0000
B	13.197	20.2790	9.8692	1.1335	8.7068	1.0000

Total 100.000 100.0000  
 Normalization factor = 1.6424



**Figure D-22.** End-test archive, post-T1 sample #3 SEM image (POST-T1012) magnified 40 times; overview of the smooth and hard brown fragment with wrinkled surface.



**Figure D-23.** End-test archive, post-T1 sample #3 SEM image (POST-T10013) magnified 500 times on the wrinkled surface, as shown in Figure D-22.



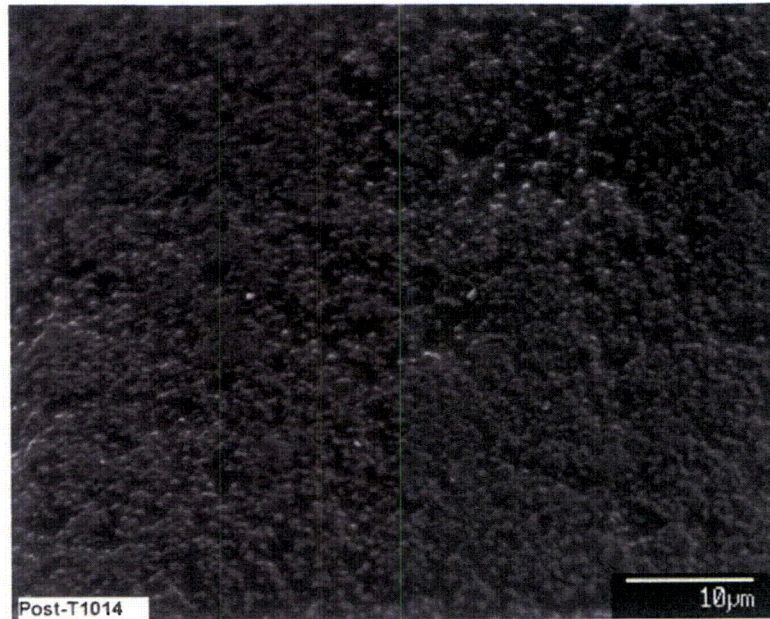


Figure D-24. End-test archive, post-T1 sample #3 SEM image (POST-T1014) magnified 2000 times; close-up on the wrinkled surface in SEM image (POST-T1013), as shown in Figure D-23.

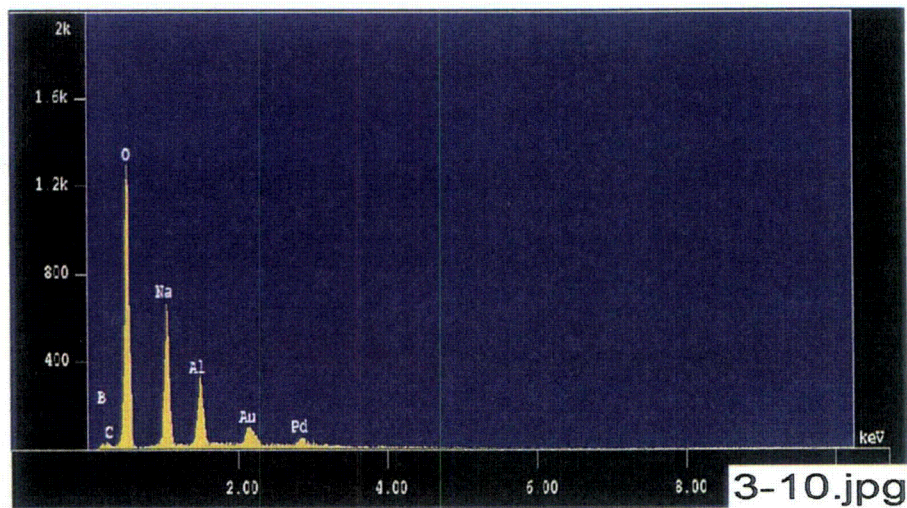


Figure D-25. End-test archive, post-T1 sample #3 counting spectrum (EDS 3-10) on an area ( $10 \times 10 \mu\text{m}$ ) of the wrinkled surface in the SEM image (POST-T1014), as shown in Figure D-24.

The results from the chemical composition analysis for EDS 3-10 are given in Table D-8.

**Table D-8. The Chemical Compositions for EDS 3-10**

Jan 18 12:27 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : Post-T1 ID# : 10 SEM#3 (Day 30)  
Comment : smooth surface area analysis - top of flake  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 9.846E-10 A  
Stage Point : X=14.364 Y=69.744 Z=10.967  
Acq. Date : Tue Jan 18 12:26:01 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	27.4160	0.0042	10530 /	30
Na K	Normal	0.81- 1.27	5.1217	0.0018	5652 /	22
Al K	Normal	1.19- 1.83	1.9239	0.0005	3066 /	31
B K	Normal	0.00- 0.36	0.4361	0.0002	70 /	10

Chi\_square = 35.3338

Element	Mass%	Atomic%	ZAF	Z	A	F
O	59.189	61.3093	0.7111	0.9776	0.7274	0.9999
Na	19.917	14.3574	1.2809	1.0324	1.2409	0.9999
Al	8.376	5.1446	1.4341	1.0053	1.4265	1.0000
B	12.518	19.1887	9.4555	1.1351	8.3304	1.0000

Total 100.000 100.0000  
Normalization factor = 3.0360

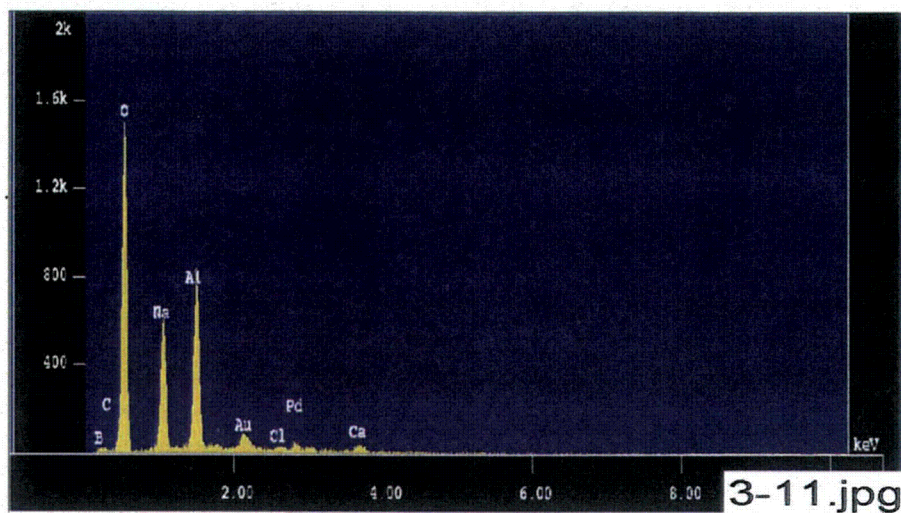


**Figure D-26.** End-test archive, post-T1 sample #3 SEM image (POST-T1015) magnified 40 times; overview of the soft tan particles with concoidal fracturing.



**Figure D-27.** End-test archive, post-T1 sample #3 SEM image (POST-T1016) magnified 2000 times on the surface of the concoidal fracture, as shown in Figure D-26.





**Figure D-28.** End-test archive, post-T1 sample #3 counting spectrum (EDS 3-11) on an area ( $10 \times 10 \mu\text{m}$ ) on the surface in SEM image POST-T1016, as shown in Figure D-27.

The results from the chemical composition analysis for EDS 3-11 are given in Table D-9.

**Table D-9. The Chemical Compositions for EDS 3-11**

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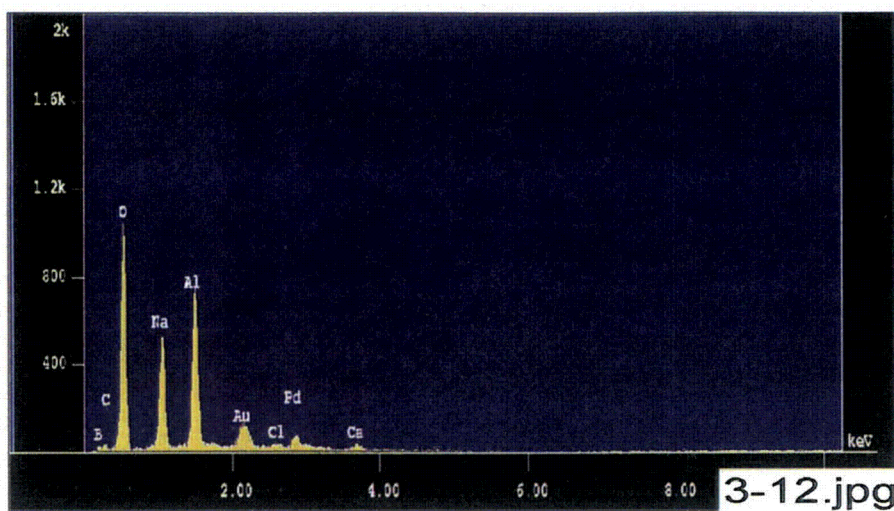
Group : NRC  
Sample : Post-T1 ID# : 11 SEM#3 (Day 30)  
Comment : concoidal surface area analysis  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 9.560E-10 A  
Stage Point : X=19.341 Y=67.891 Z=10.967  
Acq. Date : Tue Jan 18 12:36:40 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	33.3149	0.0045	12424 /	24
Na K	Normal	0.81- 1.27	5.0959	0.0018	5460 /	26
Al K	Normal	1.19- 1.83	4.9523	0.0007	7663 /	28
B K	Normal	0.00- 0.36	0.0000	0.0000	0 /	14
Ca K	Normal	3.39- 4.30	0.6178	0.0012	433 /	12
Cl K	Normal	2.34- 3.06	0.2676	0.0007	264 /	28

Chi\_square = 22.8528

Element	Mass%	Atomic%	ZAF	Z	A	F
O	62.147	72.2967	0.7289	0.9919	0.7349	0.9999
Na	17.338	14.0366	1.3295	1.0471	1.2705	0.9994
Al	18.165	12.5300	1.4333	1.0193	1.4062	1.0000
B	0.000	0.0000	12.1965	1.1519	10.5881	1.0000
Ca	1.604	0.7446	1.0142	1.0182	0.9960	1.0000
Cl	0.747	0.3921	1.0905	1.0507	1.0384	0.9995

Total 100.000 100.0000  
Normalization factor = 2.5592



**Figure D-29. End-test archive, post-T1 sample #3 counting spectrum (EDS 3-12) on another concoidal surface of a different particle in SEM image POST-T1016, as shown in Figure D-27.**

The results from the chemical composition analysis for EDS 3-12 are given in Table D-10.

**Table D-10. The Chemical Compositions for EDS 3-12**

Jan 18 12:43 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : Post-T1 ID# : 12 SEM#3 (Day 30)  
Comment : concoidal surface area analysis  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 9.432E-10 A  
Stage Point : X=20.778 Y=66.810 Z=10.967  
Acq. Date : Tue Jan 18 12:42:24 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	24.4363	0.0039	8991 /	30
Na K	Normal	0.81- 1.27	4.4039	0.0017	4655 /	30
Al K	Normal	1.19- 1.83	4.5798	0.0007	6992 /	30
B K	Normal	0.00- 0.36	0.3873	0.0002	59 /	14
Ca K	Normal	3.39- 4.30	0.4315	0.0011	299 /	15
Cl K	Normal	2.34- 3.06	0.2999	0.0008	292 /	32

Chi\_square = 15.3263

Element	Mass%	Atomic%	ZAF	Z	A	F
O	54.203	58.3833	0.8118	0.9762	0.8316	0.9999
Na	15.113	11.3286	1.2559	1.0308	1.2192	0.9994
Al	17.053	10.8912	1.3627	1.0036	1.3578	1.0000
B	11.587	18.4692	10.9486	1.1335	9.6590	1.0000
Ca	1.174	0.5046	0.9954	1.0035	0.9920	1.0000
Cl	0.870	0.4231	1.0623	1.0350	1.0268	0.9996

Total 100.000 100.0000  
Normalization factor = 2.7325



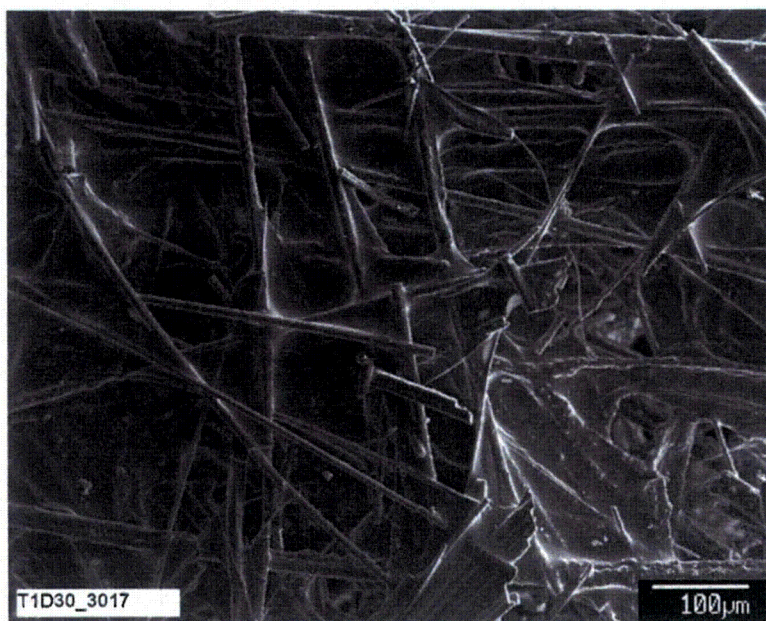


Figure D-30. Day-30, T1D30 sample #3 SEM image (T1D30-3017) magnified 150 times; overview of fiberglass from high-flow sacrificial sample.

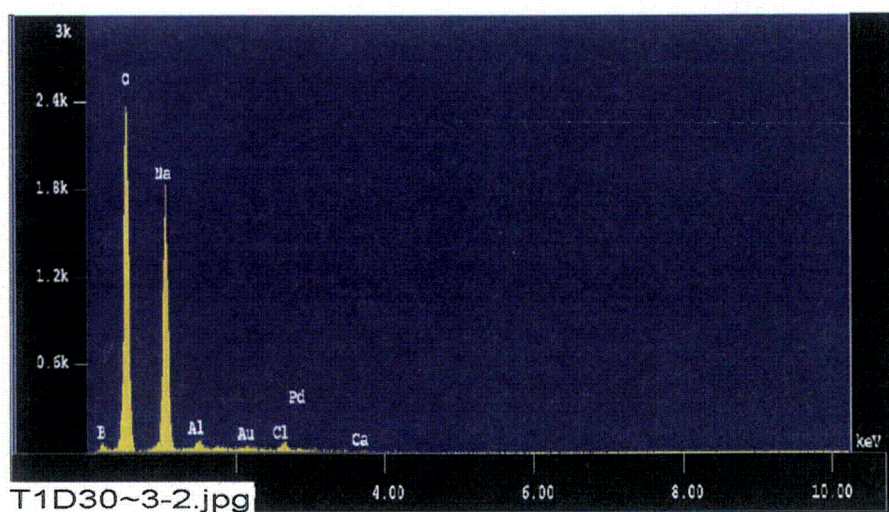


Figure D-31. Day-30, T1D30 sample #3 counting spectrum (EDS T1D30-3-2) of the web-like film between the fibers.



The results from the chemical composition analysis for EDS T1D30-3-2 are given in Table D-11.

**Table D-11. The Chemical Compositions for EDS T1D30-3-2**

Jan 18 15:18 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : T1D30 ID# : 2 From sample #3 (12/21/04)  
Comment : web-like film between fibers  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.010E-09 A  
Stage Point : X=21.255 Y=59.925 Z= 9.989  
Acq. Date : Tue Jan 18 15:15:57 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	50.7380	0.0058	19990 /	36
Na K	Normal	0.81- 1.27	13.1256	0.0028	14858 /	35
Al K	Normal	1.19- 1.83	0.2843	0.0003	465 /	33
B K	Normal	0.00- 0.36	1.3261	0.0003	217 /	20
Ca K	Normal	3.39- 4.30	0.1149	0.0009	85 /	19
Cl K	Normal	2.34- 3.06	0.6698	0.0009	699 /	38

Chi\_square = 33.8015

Element	Mass%	Atomic%	ZAF	Z	A	F
O	56.581	57.0707	0.7265	0.9724	0.7472	0.9999
Na	25.315	17.7694	1.2565	1.0270	1.2231	1.0003
Al	0.648	0.3878	1.4856	1.0001	1.4855	1.0000
B	16.227	24.2224	7.9723	1.1289	7.0619	1.0000
Ca	0.173	0.0697	0.9809	1.0008	0.9801	1.0000
Cl	1.055	0.4801	1.0259	1.0319	0.9943	0.9999

Total 100.000 100.0000  
Normalization factor = 1.5350

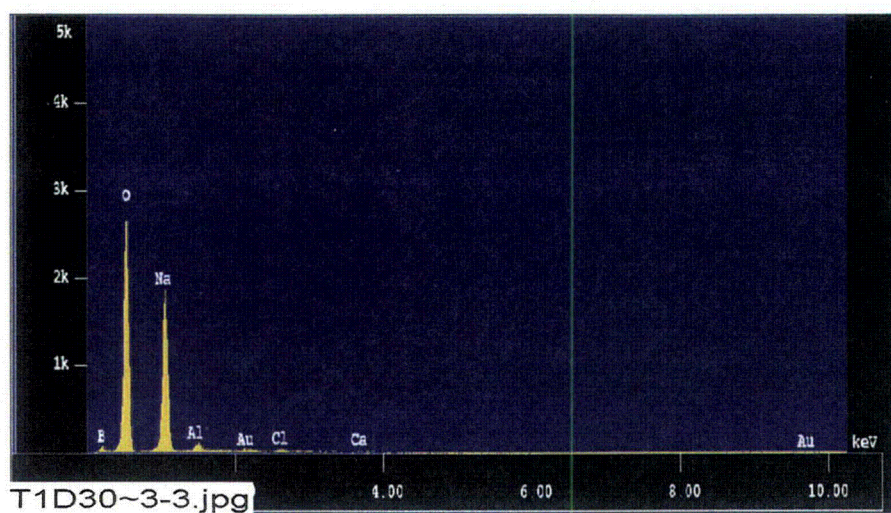


Figure D-32. Day-30, T1D30 sample #3 counting spectrum (EDS T1D30-3-3) of the web-like film between fibers in Figure D-30; replicate analysis at second location.

The results from the chemical composition analysis for EDS T1D30-3-3 are given in Table D-12.

**Table D-12. The Chemical Compositions for EDS T1D30-3-3**

Jan 18 15:24 2005 /tmp/eds\_pout.log Page 1

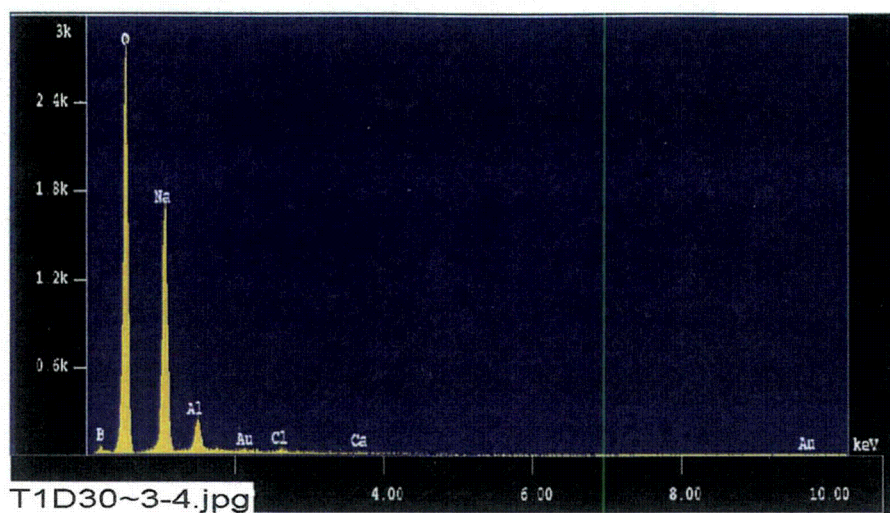
Group : NRC  
Sample : T1D30 ID# : 3 From sample #3 (12/21/04)  
Comment : web-like film between fibers  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.003E-09 A  
Stage Point : X=21.255 Y=59.925 Z= 9.989  
Acq. Date : Tue Jan 18 15:23:07 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	57.2962	0.0062	22418 / 34
Na K	Normal	0.81- 1.27	14.2524	0.0029	16022 / 28
Al K	Normal	1.19- 1.83	0.4161	0.0003	676 / 31
B K	Normal	0.00- 0.36	1.7870	0.0003	291 / 14
Ca K	Normal	3.39- 4.30	0.1173	0.0009	86 / 14
Cl K	Normal	2.34- 3.06	0.2448	0.0008	254 / 28

Chi\_square = 36.9226

Element	Mass%	Atomic%	ZAF	Z	A	F
O	56.205	55.6375	0.7308	0.9699	0.7536	0.9999
Na	23.929	16.4842	1.2508	1.0244	1.2207	1.0003
Al	0.818	0.4802	1.4645	0.9976	1.4680	1.0000
B	18.559	27.1876	7.7372	1.1259	6.8718	1.0000
Ca	0.154	0.0607	0.9760	0.9986	0.9773	1.0000
Cl	0.335	0.1499	1.0209	1.0295	0.9917	0.9999

Total 100.000 100.0000  
Normalization factor = 1.3423



**Figure D-33. Day-30, T1D30 sample #3 counting spectrum (EDS T1D30-3-4) of the web-like film between fibers in Figure D-30; replicate analysis at a third location.**

The results from the chemical composition analysis for EDS T1D30-3-4 are given in Table D-13.

**Table D-13. The Chemical Compositions for EDS T1D30-3-4**

Jan 18 15:31 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : T1D30 ID# : 4 From sample #3 (12/21/04)  
Comment : web-like film between fibers  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 9.984E-10 A  
Stage Point : X=21.255 Y=59.925 Z= 9.989  
Acq. Date : Tue Jan 18 15:29:46 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	58.2719	0.0062	22695 /	27
Na K	Normal	0.81- 1.27	13.4543	0.0029	15055 /	44
Al K	Normal	1.19- 1.83	1.3081	0.0004	2114 /	40
B K	Normal	0.00- 0.36	1.7140	0.0003	278 /	14
Ca K	Normal	3.39- 4.30	0.2180	0.0010	160 /	16
Cl K	Normal	2.34- 3.06	0.2771	0.0008	286 /	27

Chi\_square = 37.2253

Element	Mass%	Atomic%	ZAF	Z	A	F
O	56.633	56.3842	0.7380	0.9705	0.7605	0.9999
Na	22.285	15.4402	1.2578	1.0250	1.2269	1.0002
Al	2.494	1.4723	1.4479	0.9983	1.4504	1.0000
B	17.934	26.4238	7.9459	1.1267	7.0522	1.0000
Ca	0.281	0.1115	0.9776	0.9992	0.9784	1.0000
Cl	0.374	0.1679	1.0242	1.0301	0.9944	0.9999

Total 100.000 100.0000  
Normalization factor = 1.3168



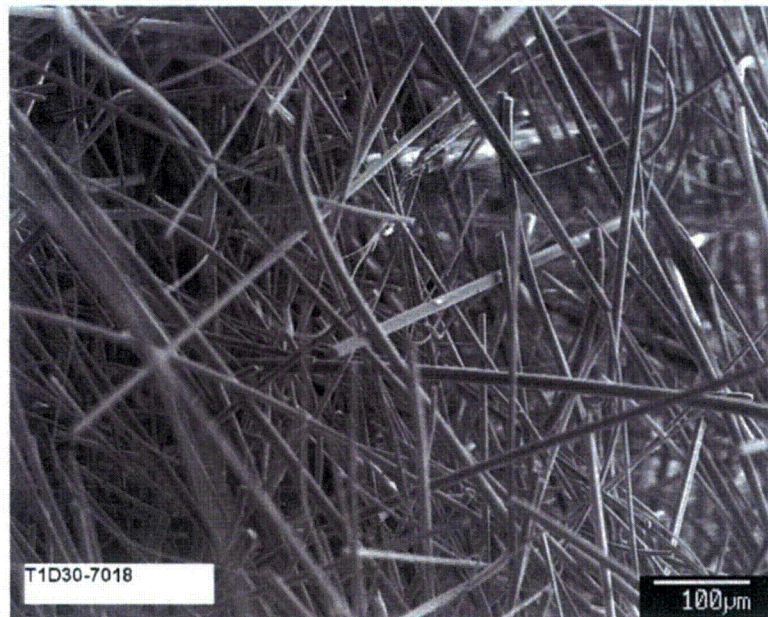


Figure D-34. T1D30 sample #7 SEM image (T1D30-7018) magnified 150 times; overview of clean fiberglass.

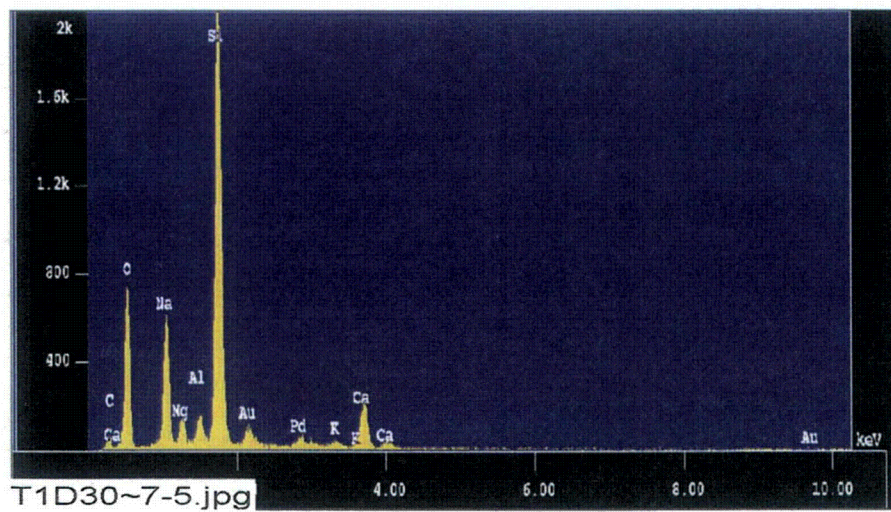


Figure D-35. T1D30 sample #7 counting spectrum (EDS T1D30-7-5) on an individual thick fiber.

The results from the chemical composition analysis for EDS T1D30-7-5 are given in Table D-14.

**Table D-14. The Chemical Compositions for EDS T1D30-7-5**

Jan 18 15:48 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : T1D30 ID# : 5  
Comment : clean glass filbers From sample #7 (12/21/04)  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.003E-09 A  
Stage Point : X=15.076 Y=66.231 Z=11.620  
Acq. Date : Tue Jan 18 15:44:58 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	17.6048	0.0036	6888 / 36
Na K	Normal	0.81- 1.27	4.7404	0.0018	5329 / 83
Mg K	Normal	0.97- 1.57	0.5839	0.0004	954 / 80
Al K	Normal	1.19- 1.83	0.6942	0.0004	1127 / 144
Si K	Normal	1.50- 2.05	14.3850	0.0013	21778 / 94
Ca K	Normal	3.39- 4.30	3.8044	0.0021	2799 / 24
C K	Normal	0.09- 0.46	0.0969	0.0004	56 / 76

-----  
Chi\_square = 9.1028

Element	Mass%	Atomic%	ZAF	Z	A	F
O	41.639	54.6247	1.2000	0.9920	1.2097	1.0000
Na	11.653	10.6381	1.2471	1.0468	1.1926	0.9990
Mg	1.750	1.5106	1.5203	0.9854	1.5481	0.9966
Al	1.834	1.4264	1.3402	1.0187	1.3280	0.9907
Si	34.048	25.4442	1.2009	0.9959	1.2060	0.9998
Ca	7.768	4.0679	1.0359	1.0160	1.0197	1.0000
C	1.309	2.2881	6.8540	1.0403	6.5890	1.0000

-----  
Total 100.000 100.0000  
Normalization factor = 1.9710

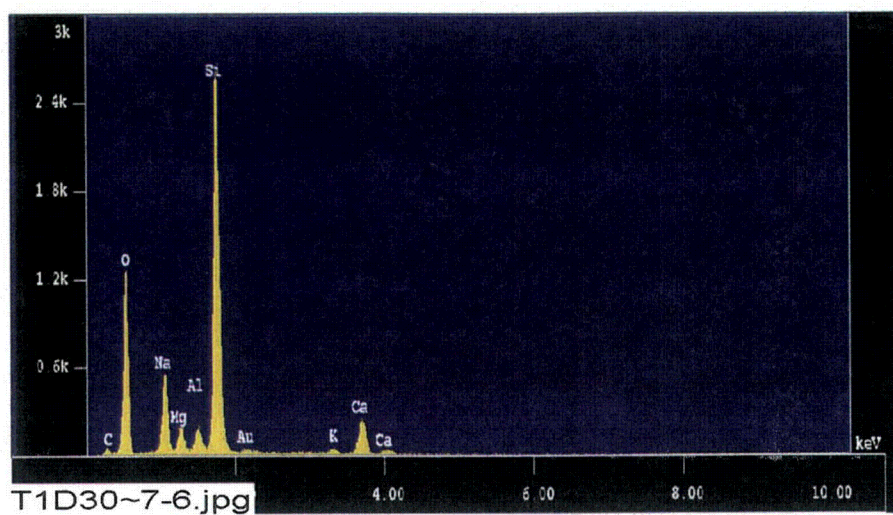


Figure D-36. T1D30 sample #7 counting spectrum (EDS T1D30-7-6) on an individual clump fiber.



The results from the chemical composition analysis for EDS T1D30-7-6 are given in Table D-15.

**Table D-15. The Chemical Compositions for EDS T1D30-7-6**

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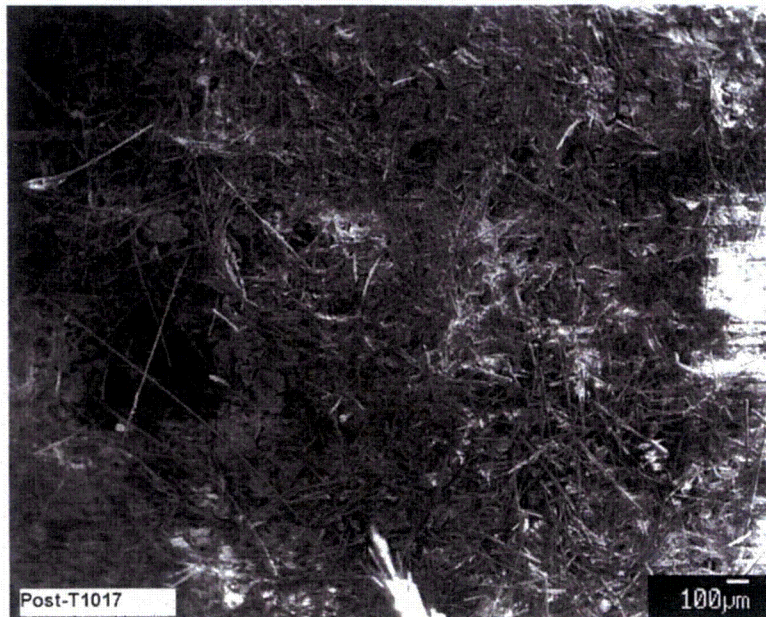
Group : NRC  
Sample : T1D30 ID# : 6  
Comment : clean glass filbers  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 9.958E-10 A  
Stage Point : X=14.777 Y=66.987 Z=11.620  
Acq. Date : Tue Jan 18 15:54:13 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	27.3788	0.0043	10635 / 48
Na K	Normal	0.81- 1.27	4.3174	0.0018	4819 / 114
Mg K	Normal	0.97- 1.57	0.8765	0.0004	1421 / 82
Al K	Normal	1.19- 1.83	0.8334	0.0004	1343 / 164
Si K	Normal	1.50- 2.05	17.8096	0.0014	26769 / 112
Ca K	Normal	3.39- 4.30	4.4556	0.0022	3255 / 23
K K	Normal	3.01- 3.86	0.6160	0.0018	376 / 24
C K	Normal	0.09- 0.46	0.0000	0.0000	0 / 135

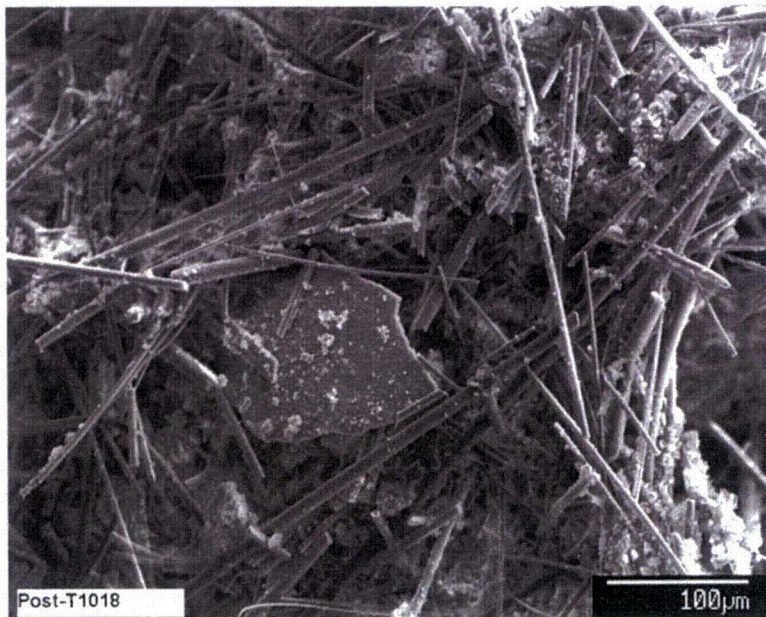
Chi\_square = 17.7249

Element	Mass%	Atomic%	ZAF	Z	A	F
O	47.563	61.4845	1.1461	0.9931	1.1541	1.0000
Na	8.481	7.6293	1.2960	1.0480	1.2378	0.9990
Mg	1.992	1.6948	1.4995	0.9866	1.5250	0.9967
Al	1.682	1.2893	1.3316	1.0199	1.3175	0.9910
Si	32.230	23.7332	1.1939	0.9971	1.1977	0.9998
Ca	7.004	3.6143	1.0372	1.0173	1.0195	1.0000
K	1.048	0.5546	1.1230	1.2432	0.9109	0.9917
C	0.000	0.0000	6.4648	1.0414	6.2081	1.0000

Total 100.000 100.0000  
Normalization factor = 1.5157



**Figure D-37.** Day-30, post-T1 sample P1 SEM image (Post-T1017) magnified 35 times; overview of the fibers and the other debris.



**Figure D-38.** Day-30, post-T1 sample P1 SEM-SE image (Post-T1018) magnified 220 times on large particles at left corner of image T1017, as shown in Figure D-37.



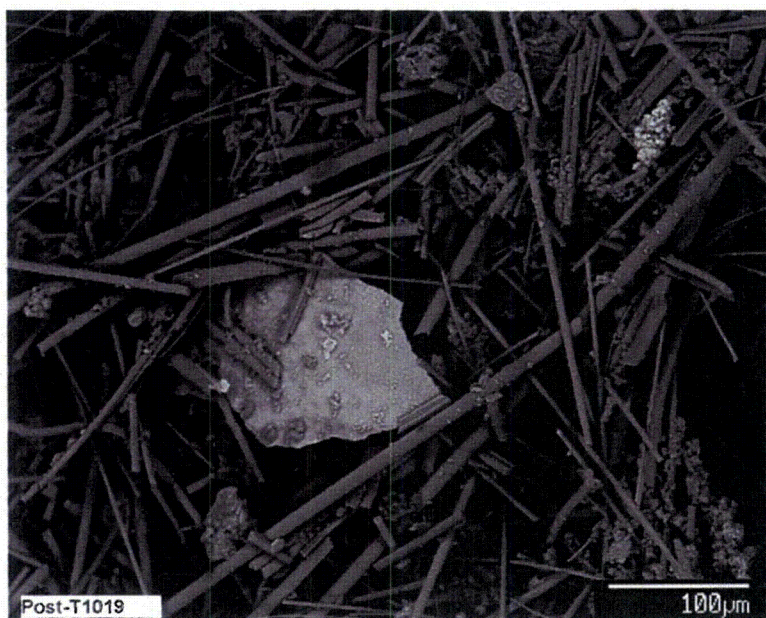


Figure D-39. Day-30, post-T1 sample P1 SEM-BSE image (Post-T1019) magnified 220 times on the same field as image T1018, as shown Figure D-38.

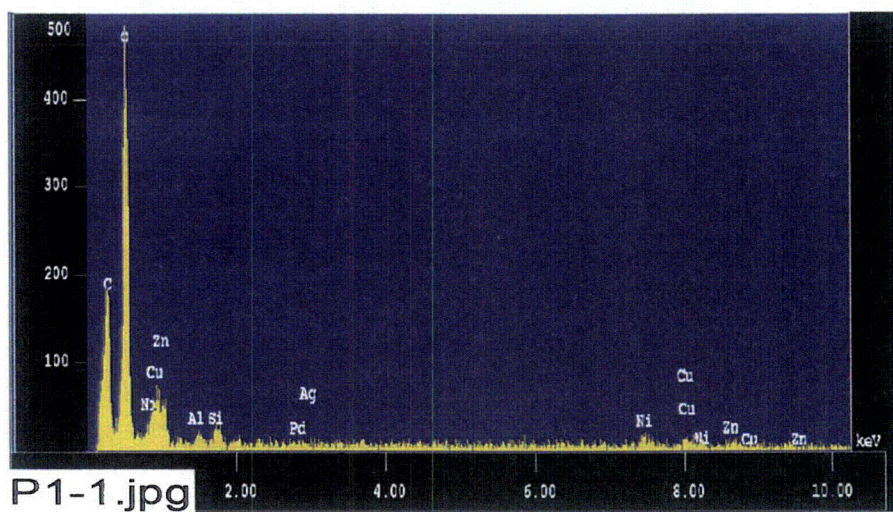


Figure D-40. Day-30, post-T1 sample P1 counting spectrum (EDS P1-1) on the large flake in image T1018, as shown in Figure D-38.

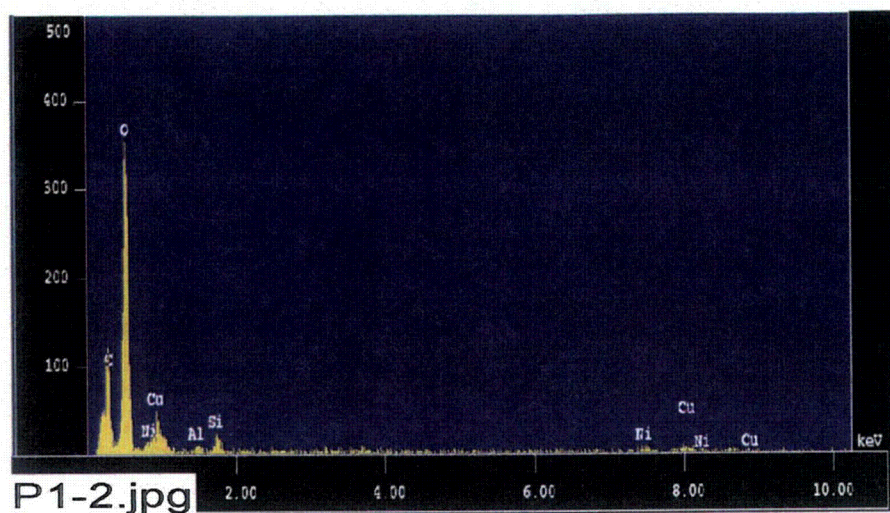


Figure D-41. Day-30, post-T1 sample P1 counting spectrum (EDS P1-2) on the small cluster to lower left of large flake shown in image T1018, as shown in Figure D-38.

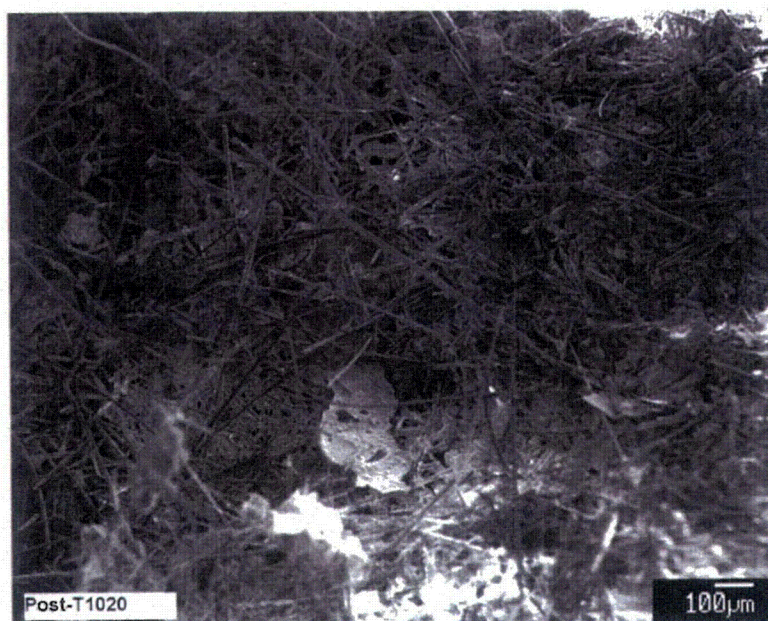
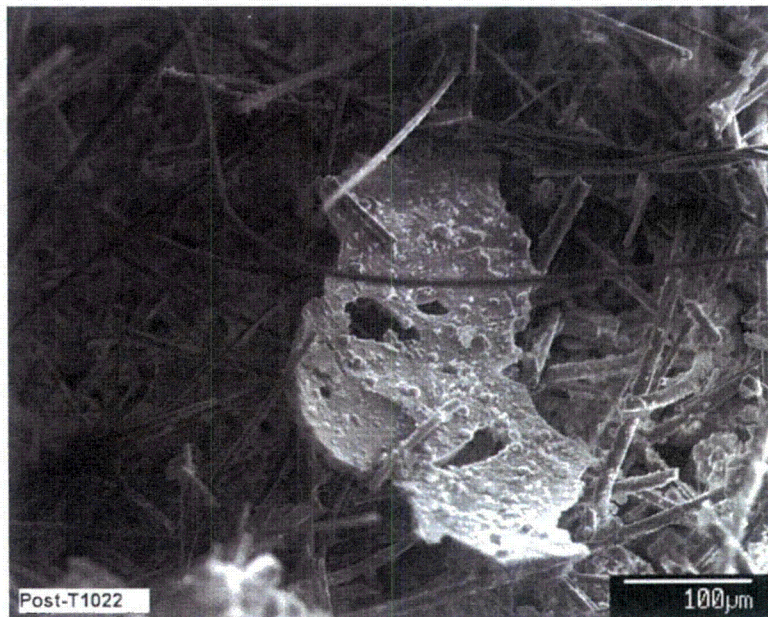


Figure D-42. Day-30, post-T1 sample P1 SEM-SE image (post-T1020) magnified 60 times on a different area of sample P1.





**Figure D-43.** Day-30, post-T1 sample P1 SEM-BSE image (Post-T1021) magnified 60 times on the same field as image T1020, as shown in Figure D-42.



**Figure D-44.** Day-30, post-T1 sample P1 SEM-SE image (Post-T1022) magnified 200 times on the flake, as shown in Figure D-43.

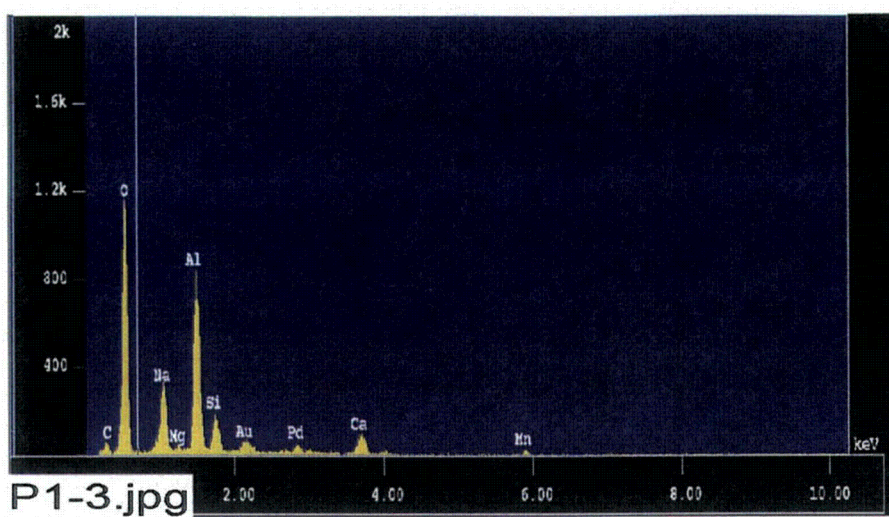


Figure D-45. Day-30, post-T1 sample P1 counting spectrum (EDS P1-3) on the particles in foreground below the flake shown in image T1021.



The results from the chemical composition analysis for EDS P1-3 are given in Table D-16.

**Table D-16. The Chemical Compositions for EDS P1-3**

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Group : NRC  
Sample : Post-T1\_1-28-05 ID# : 3  
Comment : P1 particles  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 6.753E-10 A  
Stage Point : X=81.768 Y=61.832 Z=10.582  
Acq. Date : Fri Jan 28 10:03:44 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	39.9049	0.0044	10512 / 39
Na K	Normal	0.83- 1.28	2.7379	0.0085	2268 / 30
Mg K	Normal	1.03- 1.52	0.0604	0.0010	63 / 448
Al K	Normal	1.26- 1.78	5.7166	0.0015	7138 / 79
Si K	Normal	1.50- 2.07	1.1338	0.0010	1415 / 376
Ca K	Normal	3.40- 4.30	1.7209	0.0063	1136 / 14
Mn K	Normal	5.53- 6.82	1.1673	0.0008	282 / 7
C K	Normal	0.09- 0.46	0.0000	0.0000	0 / 112

Chi\_square = 8.7099

Element	Mass%	Atomic%	ZAF	Z	A	F
O	67.623	78.8082	0.7645	0.9886	0.7733	1.0000
Na	7.221	5.8567	1.1899	0.9931	1.1973	1.0007
Mg	0.157	0.1201	1.1709	0.9957	1.1772	0.9989
Al	14.925	10.3139	1.1779	1.0013	1.1772	0.9993
Si	3.112	2.0657	1.2380	0.9891	1.2518	0.9999
Ca	3.755	1.7467	0.9843	1.0029	0.9824	0.9990
Mn	3.208	1.0887	1.2397	1.2426	0.9977	1.0000
C	0.000	0.0000	3.9691	1.0365	3.8297	0.9999

Total 100.000 100.0000  
Normalization factor = 2.2166

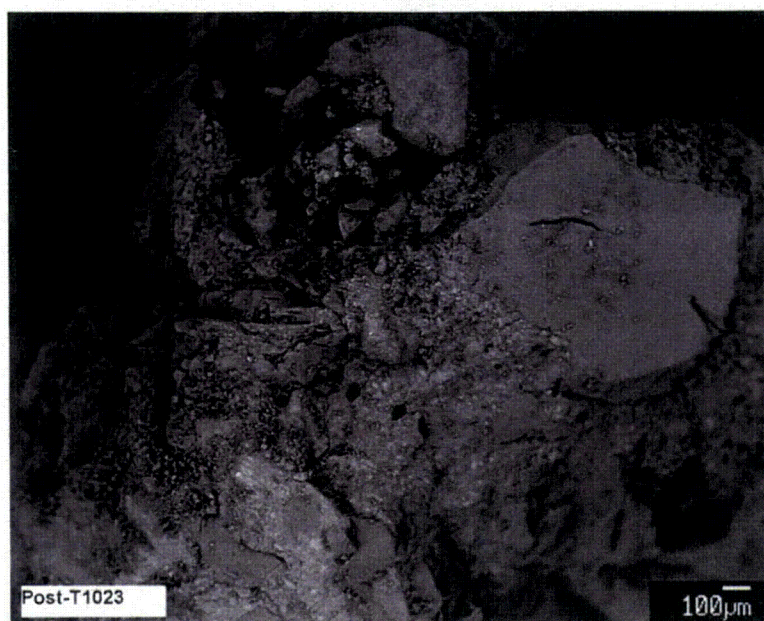


Figure D-46. Day-30, post-T1-sample-Conc SEM-BSE image (Post-T1023) magnified 43 times; overview of portion of concrete fragment.

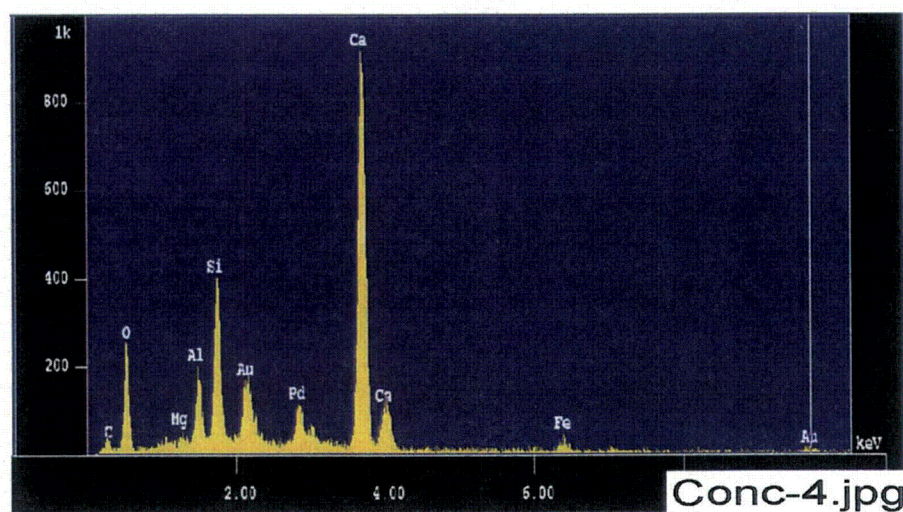


Figure D-47. Day-30, post-T1-sample-Conc counting spectrum (EDS Conc-4) on an average area ( $20 \times 20 \mu\text{m}$ ) of the concrete matrix magnified 5500 times.

The results from the chemical composition analysis for EDS Conc-4 are given in Table D-17.

**Table D-17. The Chemical Compositions for EDS Conc-4**

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Group : NRC  
Sample : PostTl\_1-28-05 ID# : 4  
Comment : Concrete  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.038E-09 A  
Stage Point : X=69.901 Y=61.652 Z=10.565  
Acq. Date : Fri Jan 28 10:30:24 2005

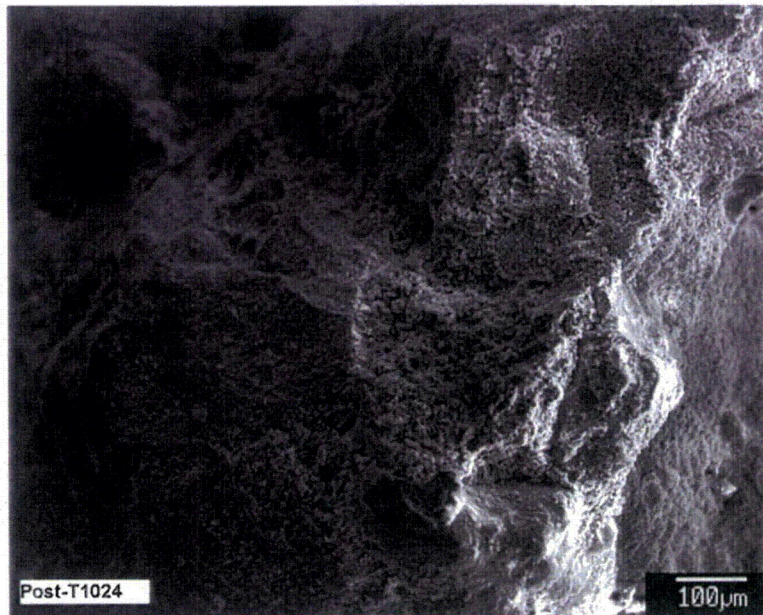
Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	5.6143	0.0021	2273 / 30
Mg K	Normal	1.03- 1.52	0.1044	0.0010	168 / 98
Al K	Normal	1.26- 1.78	0.7042	0.0008	1352 / 133
Si K	Normal	1.50- 2.07	1.8080	0.0014	3468 / 130
Ca K	Normal	3.40- 4.30	11.5423	0.0159	11712 / 18
Fe K	Normal	6.04- 7.40	0.8690	0.0473	284 / 16

Chi\_square = 2.4699

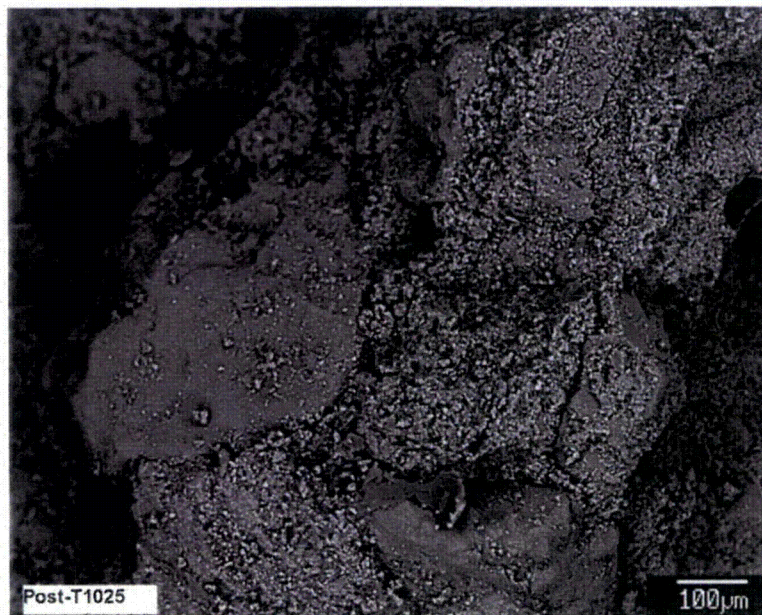
Element	Mass%	Atomic%	ZAF	Z	A	F
O	43.793	64.5383	2.0502	0.9681	2.1178	1.0000
Mg	0.453	0.4392	1.1408	0.9741	1.1708	1.0002
Al	3.090	2.7000	1.1532	0.9792	1.1804	0.9977
Si	7.508	6.3025	1.0914	0.9670	1.1299	0.9989
Ca	41.877	24.6354	0.9536	0.9778	0.9756	0.9996
Fe	3.279	1.3846	0.9919	0.9699	1.0219	1.0008

Total 100.000 100.0000  
Normalization factor = 3.8047





**Figure D-48.** Day-30, post-T1-sample-Conc SEM-SE image (Post-T1024) magnified 110 times on another area of the sample from the concrete fragment.



**Figure D-49.** Day-30, post-T1-sample-Conc SEM-BSE image (Post-T1025) magnified 110 times on the same field as in image Post-T1024 (see Figure D-48).

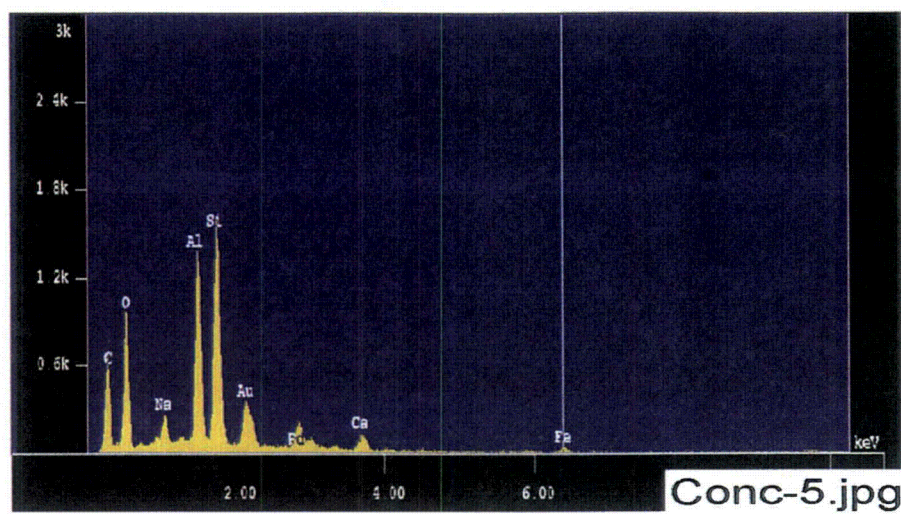


Figure D-50. Day-30, post-T1-sample-Conc counting spectrum (EDS Conc-5) on the aggregate particle in lower portion of image Post-T1025, as shown in Figure D-49.



The results from the chemical composition analysis for EDS Conc-5 are given in Table D-18.

**Table D-18. The Chemical Compositions for EDS Conc-5**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 5  
Comment : Concrete aggregate  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.085E-09 A  
Stage Point : X=71.968 Y=63.927 Z=10.565  
Acq. Date : Fri Jan 28 10:43:57 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
C K	Normal	0.09- 0.46	6.4490	0.0009	4049 / 87
O K	Normal	0.25- 0.77	20.8346	0.0042	8818 / 310
Na K	Normal	0.83- 1.28	1.0347	0.0086	1377 / 96
Al K	Normal	1.26- 1.78	5.6526	0.0020	11340 / 525
Si K	Normal	1.50- 2.07	6.8576	0.0027	13750 / 686
Ca K	Normal	3.40- 4.30	1.2480	0.0076	1324 / 35
Fe K	Normal	6.04- 7.40	0.9509	0.0533	324 / 10

Chi\_square = 17.2326

Element	Mass%	Atomic%	ZAF	Z	A	F
C	33.796	44.7339	3.6197	1.0266	3.5261	1.0000
O	42.274	42.0080	1.4015	0.9794	1.4310	1.0000
Na	1.561	1.0798	1.0424	0.9843	1.0583	1.0007
Al	8.522	5.0215	1.0414	0.9928	1.0523	0.9968
Si	10.725	6.0712	1.0803	0.9810	1.1013	0.9999
Ca	1.758	0.6972	0.9727	0.9964	0.9765	0.9997
Fe	1.365	0.3885	0.9912	0.9949	0.9955	1.0008

Total 100.000 100.0000  
Normalization factor = 1.4478

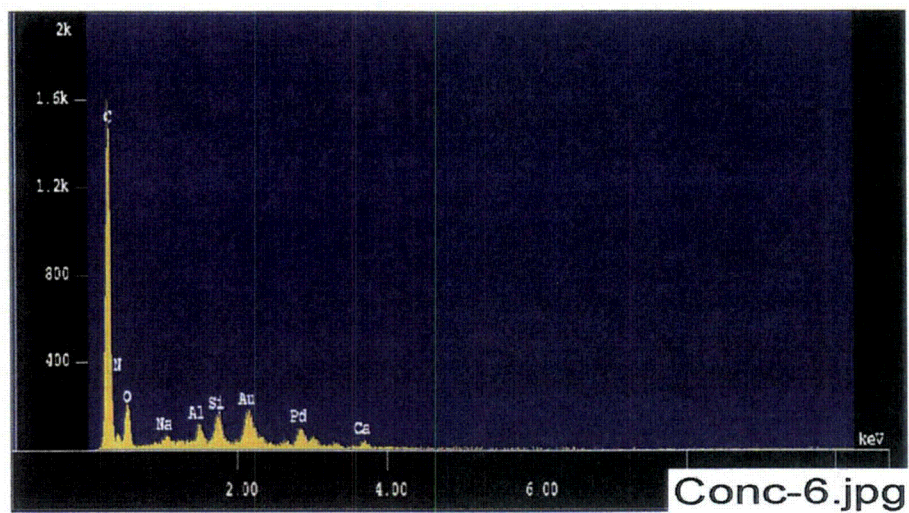


Figure D-51. Day-30, post-T1-sample-Conc counting spectrum (EDS Conc-6) on the surface granules on or in the concrete, as shown in image T1025.

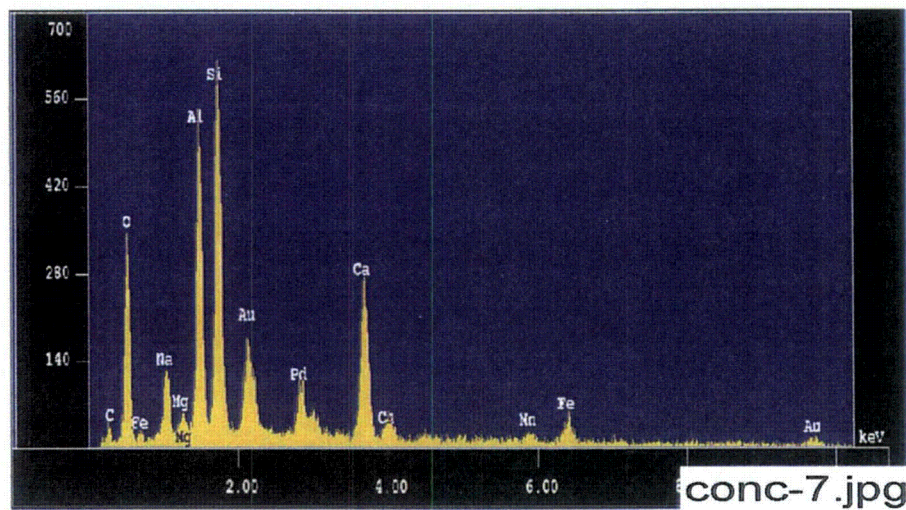


Figure D-52. Day-30, post-T1-sample-Conc counting spectrum (EDS Conc-7) on the concrete matrix behind surface granules, shown in image T1025.

The results from the chemical composition analysis for EDS Conc-7 are given in Table D-19.

**Table D-19. The Chemical Compositions for EDS Conc-7**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 7  
Comment : Concrete matrix  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.104E-09 A  
Stage Point : X=71.902 Y=63.995 Z=10.565  
Acq. Date : Fri Jan 28 10:51:55 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
C K	Normal	0.09- 0.46	0.0000	0.0000	0 /	22
O K	Normal	0.25- 0.77	7.5549	0.0026	3254 /	22
Na K	Normal	0.83- 1.28	0.6424	0.0057	870 /	32
Al K	Normal	1.26- 1.78	2.1633	0.0012	4416 /	220
Si K	Normal	1.50- 2.07	2.6236	0.0017	5353 /	282
Ca K	Normal	3.40- 4.30	2.9940	0.0094	3231 /	26
Fe K	Normal	6.04- 7.40	1.2796	0.0545	444 /	10
Mg K	Normal	1.03- 1.52	0.1059	0.0010	181 /	221
Mn K	Normal	5.53- 6.82	0.6354	0.0009	251 /	14

Chi\_square = 2.2310

Element	Mass%	Atomic%	ZAF	Z	A	F
C	0.000	0.0000	4.9670	1.0196	4.8717	0.9999
O	44.480	61.9981	1.2202	0.9723	1.2551	0.9999
Na	3.815	3.7002	1.2307	0.9761	1.2601	1.0006
Al	12.105	10.0042	1.1597	0.9837	1.1830	0.9966
Si	15.039	11.9407	1.1880	0.9715	1.2233	0.9997
Ca	14.137	7.8657	0.9786	0.9830	0.9973	0.9983
Fe	6.077	2.4265	0.9843	0.9761	1.0076	1.0008
Mg	0.586	0.5374	1.1465	0.9785	1.1735	0.9985
Mn	3.762	1.5272	1.2272	1.2146	1.0104	1.0000

Total 100.000 100.0000  
Normalization factor = 4.8249





Figure D-53. Day-30, post-T1-sample-CD1 SEM-SE image (Post-T1026) magnified 40 times; overview of the dust particles mounted on carbon tape.

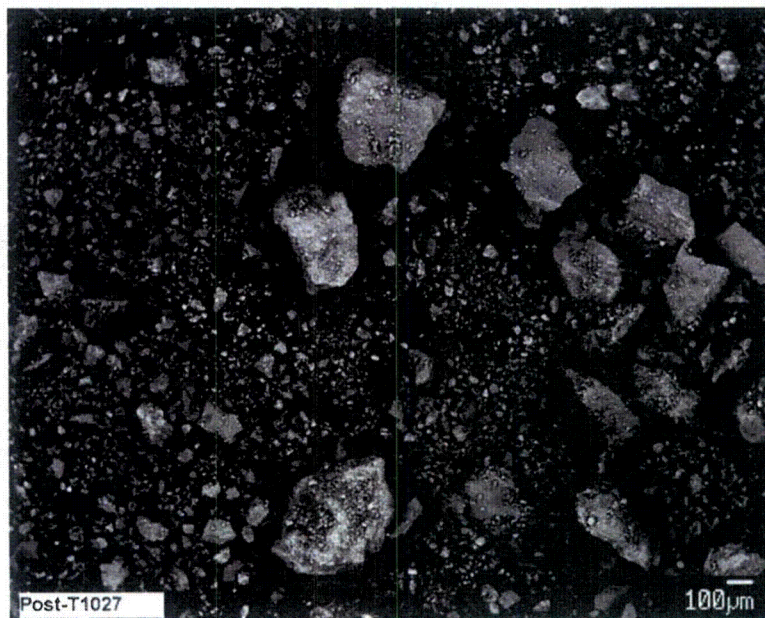


Figure D-54. Day-30, post-T1-sample-CD1 SEM-BSE image (Post-T1027) magnified 40 times on the same field as in image Post-T1026 (see Figure D-53).

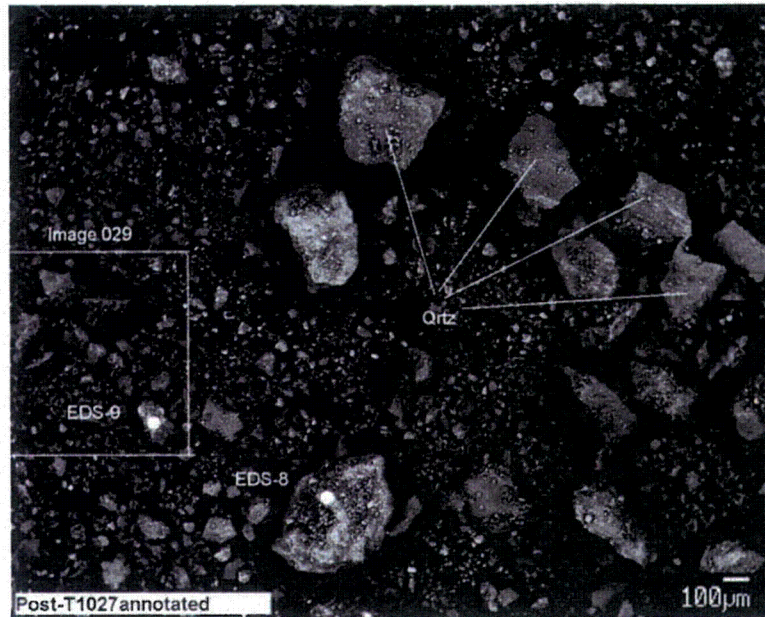


Figure D-55. Day-30, post-T1-sample-CD1 SEM-SE image (Post-T1027 annotated) magnified 40 times, annotating the EDS locations.

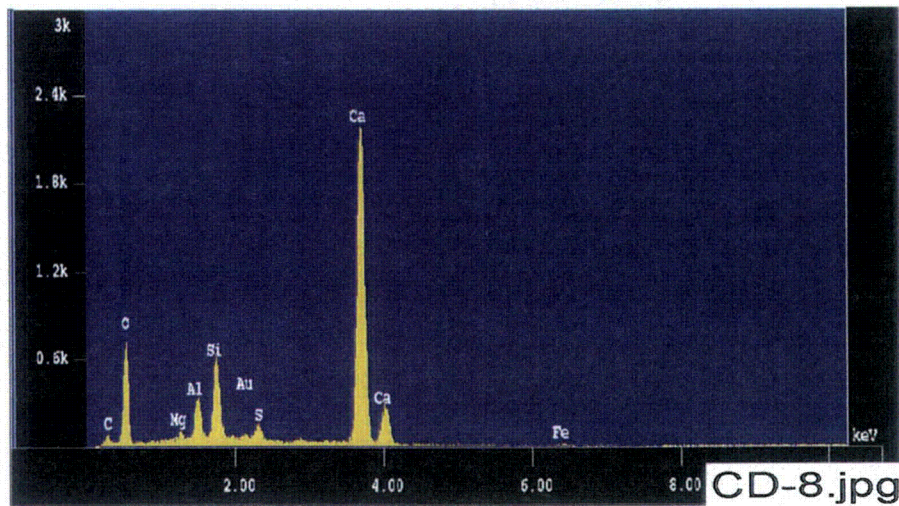


Figure D-56. Day-30, post-T1-sample-CD1 counting spectrum (EDS CD-8) on particle in the lower center of image Post-T1027 (see Figure D-55).



The results from the chemical composition analysis for EDS CD-8 are given in Table D-20.

**Table D-20. The Chemical Compositions for EDS CD-8**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 8  
Comment : Concrete dust particle  
Condition : Full Scale : 20KeV(10ev/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.146E-09 A  
Stage Point : X=43.880 Y=75.323 Z=10.565  
Acq. Date : Fri Jan 28 11:15:28 2005

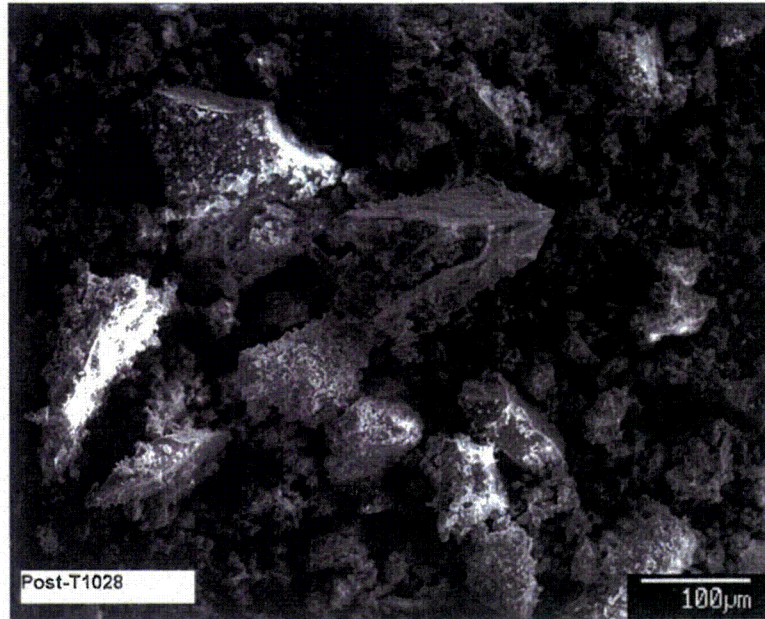
Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	15.2816	0.0036	6832 / 50
Mg K	Normal	1.03- 1.52	0.2151	0.0014	382 / 148
Al K	Normal	1.26- 1.78	1.1786	0.0011	2497 / 259
Si K	Normal	1.50- 2.07	2.4899	0.0018	5273 / 210
S K	Normal	2.04- 2.71	0.9062	0.0014	1099 / 42
Ca K	Normal	3.40- 4.30	26.1728	0.0242	29320 / 33
Fe K	Normal	6.04- 7.40	0.2300	0.0445	83 / 12

Chi\_square = 5.1089

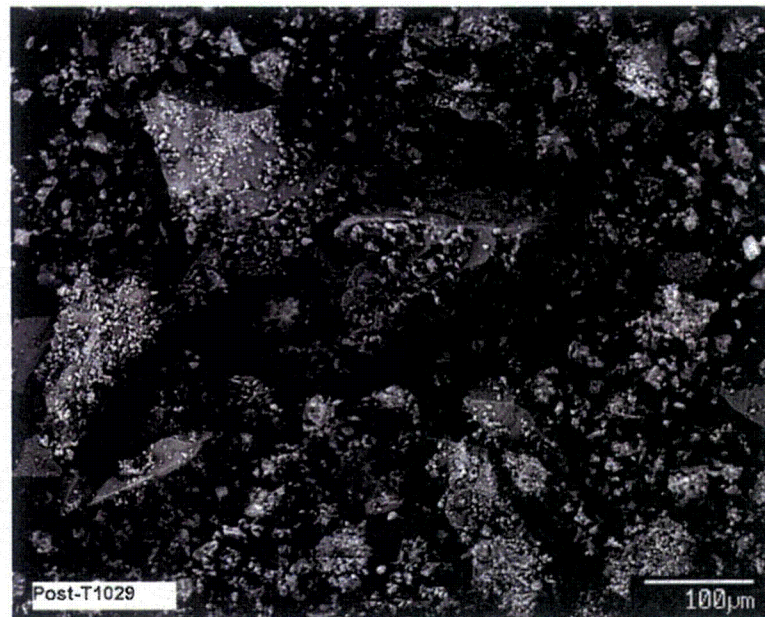
Element	Mass%	Atomic%	ZAF	Z	A	F
O	50.188	70.2325	2.0081	0.9733	2.0631	1.0000
Mg	0.399	0.3673	1.1339	0.9796	1.1568	1.0006
Al	2.215	1.8380	1.1492	0.9848	1.1689	0.9983
Si	4.403	3.5098	1.0812	0.9726	1.1133	0.9986
S	1.477	1.0310	0.9963	1.1195	0.8961	0.9932
Ca	40.943	22.8710	0.9565	0.9840	0.9720	1.0000
Fe	0.375	0.1505	0.9980	0.9769	1.0208	1.0008

Total 100.000 100.0000

Normalization factor = 1.6355



**Figure D-57.** Day-30, post-T1-sample-CD1 SEM-SE image (Post-T1028) magnified 170 times on the smaller particles at different area in the overview image, as shown in Figure D-55.



**Figure D-58.** Day-30, post-T1-sample-CD1 SEM-BSE image (Post-T1029) magnified 170 times on the same field as in image Post-T1028 (see Figure D-57).

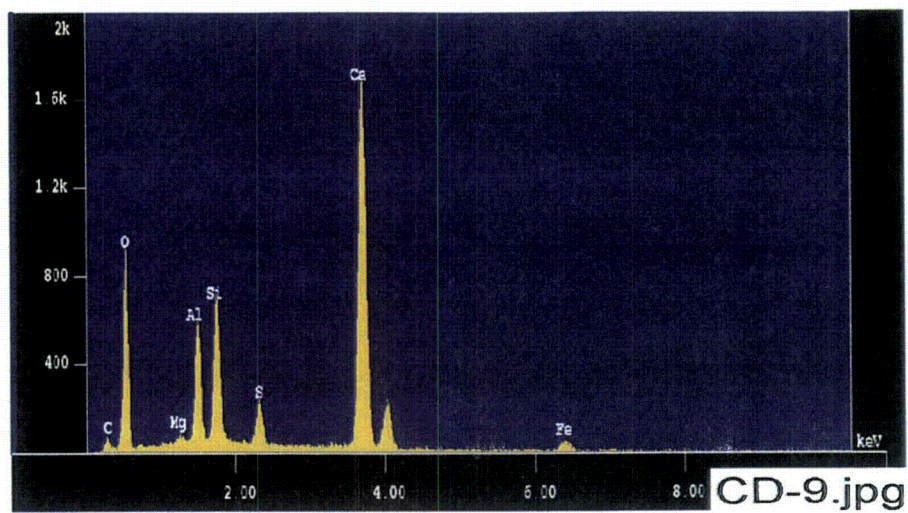


Figure D-59. Day-30, post-T1-sample-CD1 counting spectrum (EDS CD-9) on particle in the lower right of image Post-T1029 (see Figure D-58).

The results from the chemical composition analysis for EDS CD-9 are given in Table D-21.

**Table D-21. The Chemical Compositions for EDS CD-9**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 9  
Comment : Concrete dust particle  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.156E-09 A  
Stage Point : X=45.016 Y=75.364 Z=10.565  
Acq. Date : Fri Jan 28 11:27:56 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	17.5957	0.0038	7935 / 44
Mg K	Normal	1.03- 1.52	0.1183	0.0014	212 / 252
Al K	Normal	1.26- 1.78	2.2695	0.0014	4851 / 268
Si K	Normal	1.50- 2.07	2.8894	0.0019	6173 / 292
S K	Normal	2.04- 2.71	1.9982	0.0015	2444 / 44
Ca K	Normal	3.40- 4.30	19.4335	0.0215	21960 / 32
Fe K	Normal	6.04- 7.40	1.5351	0.0612	558 / 11

Chi\_square = 5.5950

Element	Mass%	Atomic%	ZAF	Z	A	F
O	51.920	71.1181	1.7330	0.9747	1.7780	1.0000
Mg	0.228	0.2056	1.1328	0.9810	1.1546	1.0001
Al	4.431	3.5988	1.1467	0.9862	1.1649	0.9981
Si	5.421	4.2296	1.1018	0.9740	1.1329	0.9985
S	3.450	2.3580	1.0140	1.1213	0.9087	0.9952
Ca	31.948	17.4687	0.9655	0.9857	0.9798	0.9997
Fe	2.602	1.0212	0.9957	0.9790	1.0163	1.0008

Total 100.000 100.0000  
Normalization factor = 1.7027



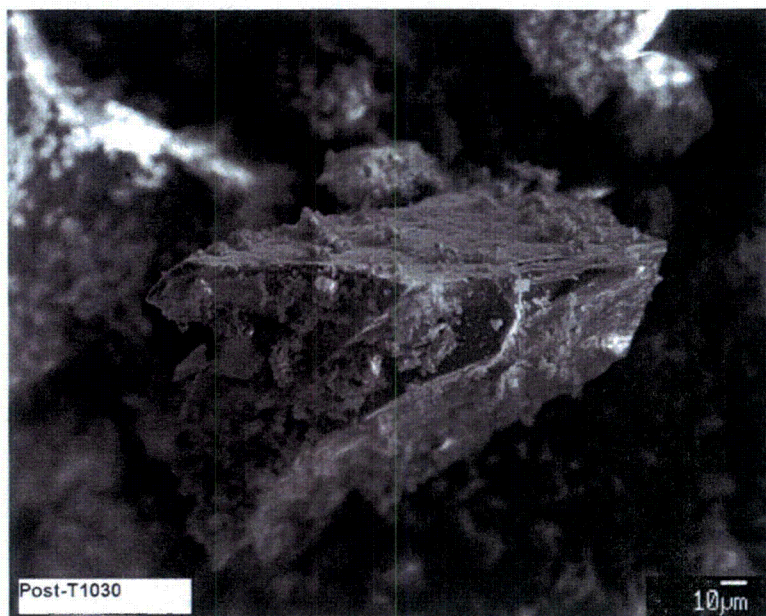


Figure D-60. Day-30, post-T1-sample-CD1 SEM-SE image (Post-T1030) magnified 400 times on the particle in the center of image Post-T1029 (see Figure D-58).

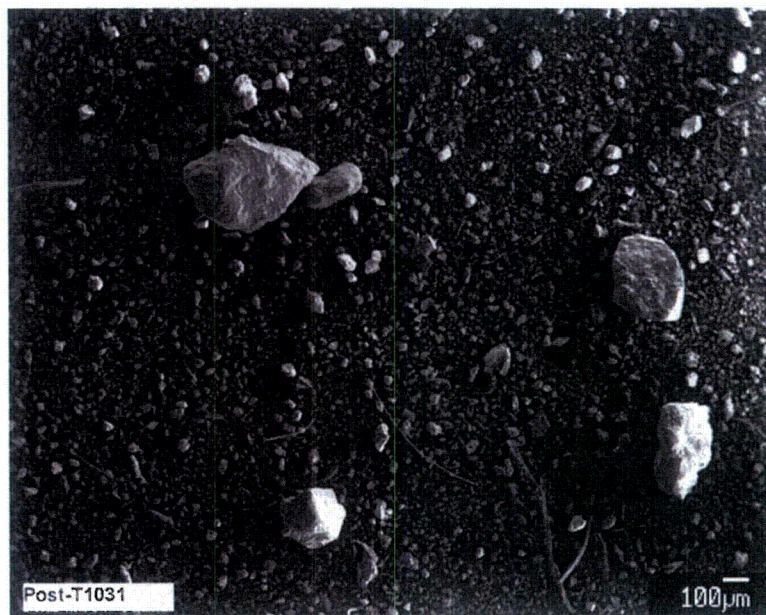


Figure D-61. Day-30, post-T1-sample-LD1 SEM-SE image (Post-T1031) magnified 40 times; overview of the dust sample mounted on carbon tape.

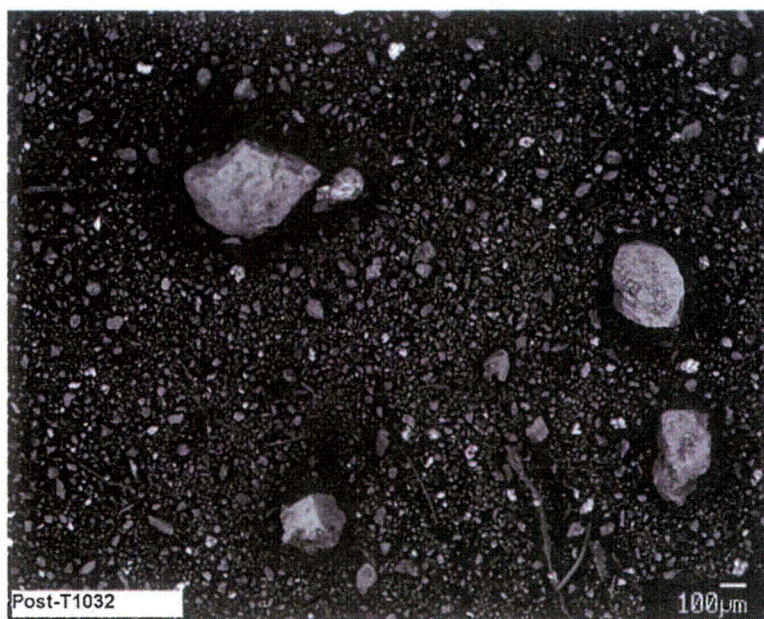


Figure D-62. Day-30, post-T1-sample-LD1 SEM-BSE image (Post-T1032) magnified 40 times on the same field as in image Post-T1031 (see Figure D-61); large particles are quartz as in K-feldspar.

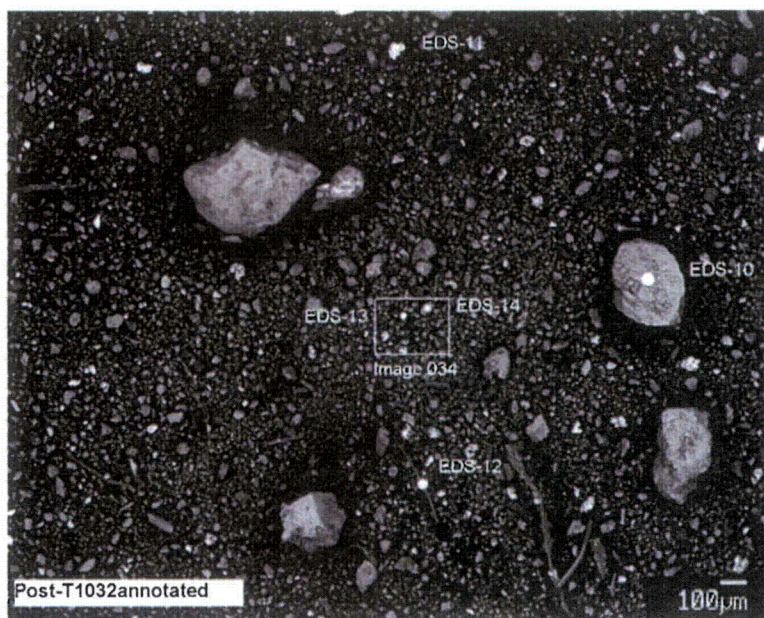


Figure D-63. Day-30, post-T1-sample-LD1 SEM-BSE image (Post-T1032 annotated) annotating the EDS locations.



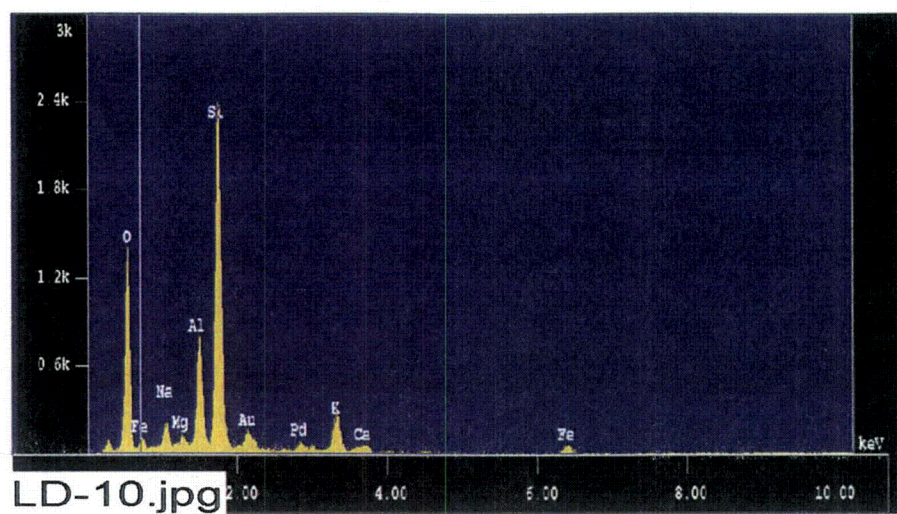


Figure D-64. Day-30, post-T1-sample-CD1 counting spectrum (EDS LD-10) on large particle at right of k-feldspar (see Figure D-63).

The results from the chemical composition analysis for EDS LD-10 are given in Table D-22.

**Table D-22. The Chemical Compositions for EDS LD-10**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 10  
Comment : K-feldspar in latent dust sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.165E-09 A  
Stage Point : X=46.733 Y=67.407 Z=10.565  
Acq. Date : Fri Jan 28 11:45:29 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	27.0588	0.0047	12297 / 68
Na K	Normal	0.83- 1.28	0.8837	0.0077	1263 / 82
Mg K	Normal	1.03- 1.52	0.2752	0.0016	497 / 346
Al K	Normal	1.26- 1.78	3.0567	0.0016	6585 / 720
Si K	Normal	1.50- 2.07	10.0455	0.0032	21627 / 420
K K	Normal	3.01- 3.86	4.5094	0.0034	3221 / 41
Fe K	Normal	6.04- 7.40	1.9483	0.0596	714 / 13
Ca K	Normal	3.40- 4.30	0.5385	0.0061	613 / 46

Chi\_square = 8.3513

Element	Mass%	Atomic%	ZAF	Z	A	F
O	55.460	70.6207	1.0754	0.9850	1.0918	1.0000
Na	1.971	1.7468	1.1705	0.9892	1.1826	1.0006
Mg	0.569	0.4770	1.0852	0.9917	1.0960	0.9984
Al	6.501	4.9088	1.1159	0.9971	1.1256	0.9943
Si	21.253	15.4161	1.1101	0.9849	1.1275	0.9996
K	9.494	4.9464	1.1047	1.2332	0.8971	0.9985
Fe	3.702	1.3506	0.9971	0.9923	1.0040	1.0008
Ca	1.050	0.5335	1.0226	0.9975	1.0256	0.9996

Total 100.000 100.0000  
Normalization factor = 1.9059



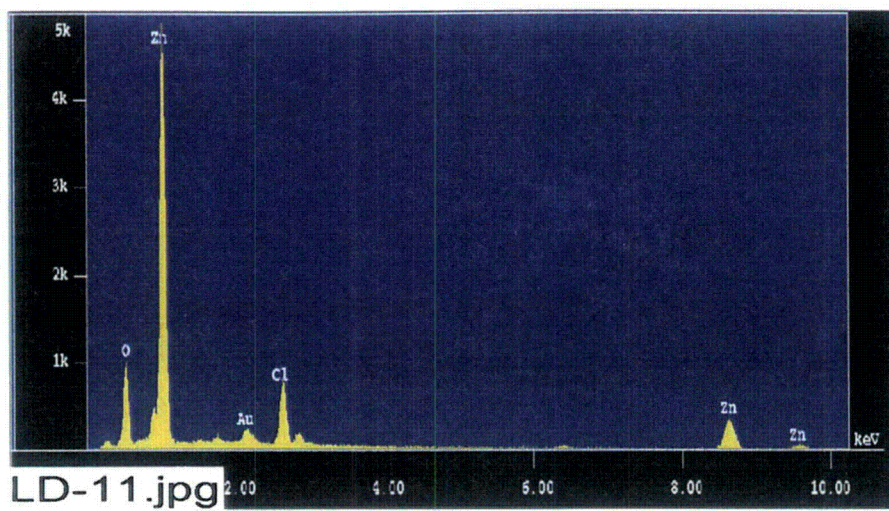


Figure D-65. Day-30, post-T1-sample-LD1 counting spectrum (EDS LD-11) on the small bright particle in the upper center of image Post-T1032, as shown in Figure D-63.

The results from the chemical composition analysis for EDS LD-11 are given in Table D-23.

**Table D-23. The Chemical Compositions for EDS LD-11**

Jan 28 11:51 2005 /tmp/eds\_pout.log Page 1

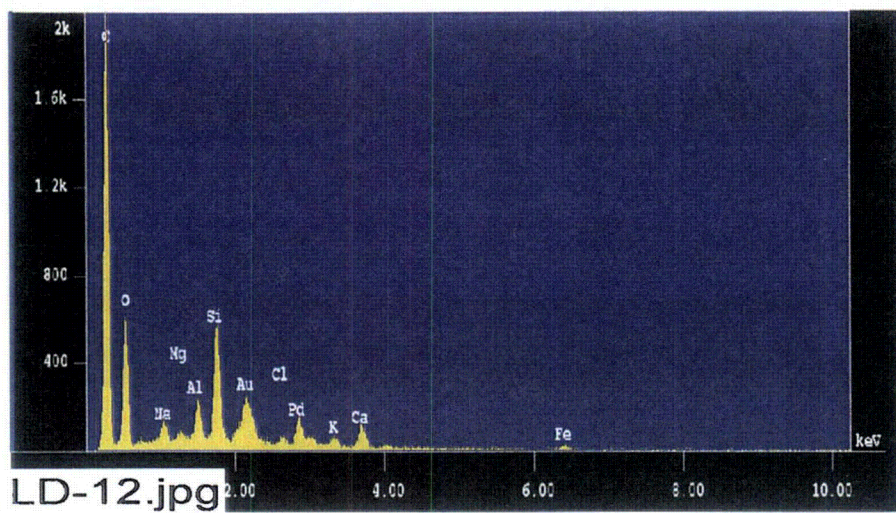
Group : NRC  
Sample : PostT1 1-28-05 ID# : 11  
Comment : ZnCl latent dust sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.167E-09 A  
Stage Point : X=46.743 Y=66.378 Z=10.565  
Acq. Date : Fri Jan 28 11:50:31 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	19.9450	0.0045	9080 / 114
Cl K	Normal	2.34- 3.06	7.9463	0.0025	9584 / 78
Zn K	Normal	8.22-10.03	45.6297	0.0180	5999 / 13

Chi\_square = 6.8473

Element	Mass%	Atomic%	ZAF	Z	A	F
O	24.790	54.6092	0.9731	0.8709	1.1175	0.9999
Cl	10.643	10.5798	1.0486	0.9156	1.1455	0.9999
Zn	64.567	34.8110	1.1079	1.1086	0.9993	1.0000

Total 100.000 100.0000  
Normalization factor = 1.2772



**Figure D-66.** Day-30, post-T1-sample-LD1 counting spectrum (EDS LD-12) on the thin fiber in the lower center of image Post-T1032, as shown in Figure D-63.

The results from the chemical composition analysis for EDS LD-12 are given in Table D-24.

**Table D-24. The Chemical Compositions for EDS LD-12**

Jan 28 16:30 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : PostT1\_1-28-05 ID# : 12  
Comment : Fiber in latent dust sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.169E-09 A  
Stage Point : X=46.614 Y=68.050 Z=10.565  
Acq. Date : Fri Jan 28 11:56:29 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
C K	Normal	0.09- 0.46	22.4454	0.0014	15184 / 57
O K	Normal	0.25- 0.77	13.1602	0.0034	6001 / 839
Na K	Normal	0.83- 1.28	0.4650	0.0066	667 / 65
Mg K	Normal	1.03- 1.52	0.1354	0.0014	245 / 158
Al K	Normal	1.26- 1.78	0.7357	0.0010	1590 / 237
Si K	Normal	1.50- 2.07	2.3036	0.0017	4976 / 188
Cl K	Normal	2.34- 3.06	0.5360	0.0009	648 / 62
K K	Normal	3.01- 3.86	0.8042	0.0021	576 / 39
Ca K	Normal	3.40- 4.30	1.1517	0.0068	1316 / 26

Chi\_square = 64.9276

Element	Mass%	Atomic%	ZAF	Z	A	F
C	57.981	66.9895	1.8889	1.0178	1.8559	1.0000
O	33.753	29.2766	1.8754	0.9713	1.9309	1.0000
Na	0.635	0.3834	0.9988	0.9766	1.0213	1.0014
Mg	0.176	0.1003	0.9496	0.9797	0.9685	1.0008
Al	1.016	0.5225	1.0098	0.9855	1.0259	0.9987
Si	3.083	1.5232	0.9786	0.9740	1.0050	0.9997
Cl	0.721	0.2824	0.9842	1.0327	0.9550	0.9979
K	1.138	0.4037	1.0344	1.2240	0.8488	0.9956
Ca	1.497	0.5183	0.9505	0.9910	0.9591	1.0001

Total 100.000 100.0000  
Normalization factor = 1.3676



Results from an alternative chemical composition analysis for EDS LD-12 using a different set of elements from those selected in the previous table are given in Table D-25. The high mass fraction of carbon is from the tape used for mounting the latent dust.

**Table D-25. The Chemical Compositions for Alternative Analysis of EDS LD-12**

Jan 28 16:30 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : PostT1\_1-28-05 ID# : 12  
Comment : Fiber in latent dust sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.169E-09 A  
Stage Point : X=46.614 Y=68.050 Z=10.565  
Acq. Date : Fri Jan 28 11:56:29 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
C K	Normal	0.09- 0.46	22.4454	0.0014	15184 / 57
O K	Normal	0.25- 0.77	13.1602	0.0034	6001 / 839
Na K	Normal	0.83- 1.28	0.4650	0.0066	667 / 65
Mg K	Normal	1.03- 1.52	0.1354	0.0014	245 / 158
Al K	Normal	1.26- 1.78	0.7357	0.0010	1590 / 237
Si K	Normal	1.50- 2.07	2.3036	0.0017	4976 / 188
Cl K	Normal	2.34- 3.06	0.5360	0.0009	648 / 62
K K	Normal	3.01- 3.86	0.8042	0.0021	576 / 39
Ca K	Normal	3.40- 4.30	1.1517	0.0068	1316 / 26

Chi\_square = 64.9276

Element	Mass%	Atomic%	ZAF	Z	A	F
C	57.981	66.9895	1.8889	1.0178	1.8559	1.0000
O	33.753	29.2766	1.8754	0.9713	1.9309	1.0000
Na	0.635	0.3834	0.9988	0.9766	1.0213	1.0014
Mg	0.176	0.1003	0.9496	0.9797	0.9685	1.0008
Al	1.016	0.5225	1.0098	0.9855	1.0259	0.9987
Si	3.083	1.5232	0.9786	0.9740	1.0050	0.9997
Cl	0.721	0.2824	0.9842	1.0327	0.9550	0.9979
K	1.138	0.4037	1.0344	1.2240	0.8488	0.9956
Ca	1.497	0.5183	0.9505	0.9910	0.9591	1.0001

Total 100.000 100.0000

Normalization factor = 1.3676

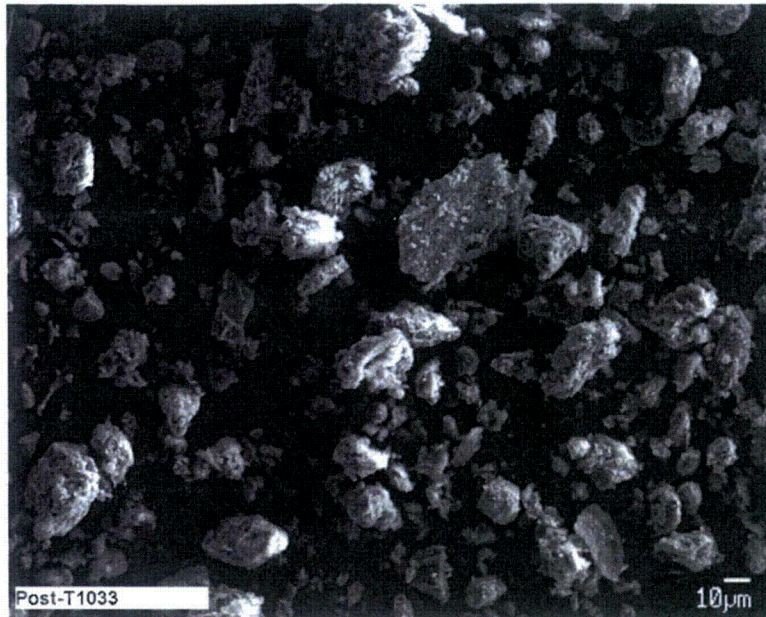


Figure D-67. Day-30, post-T1-sample-LD1 SEM-SE image (Post-T1033) magnified 400 times on the central portion of image Post-T1031, as shown in Figure D-61.

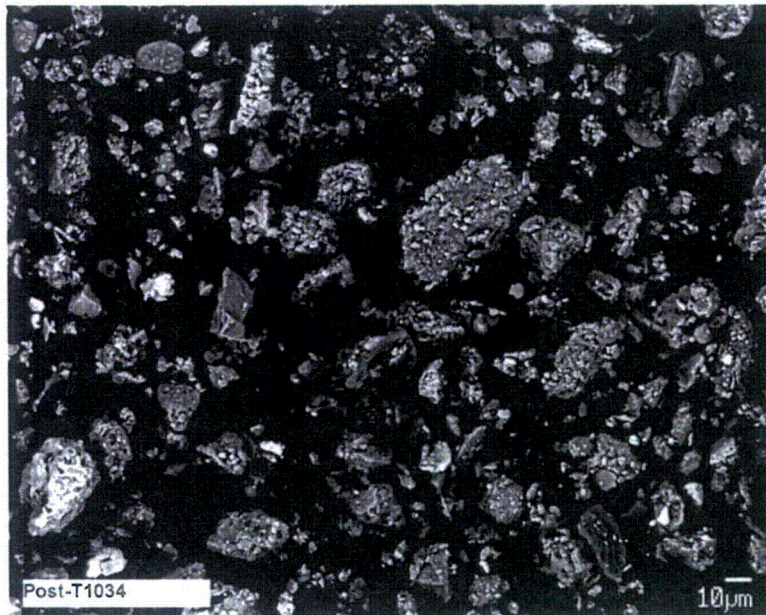


Figure D-68. Day-30, post-T1-sample-LD1 SEM-BSE image (Post-T1034) magnified 400 times on the same field as in image Post-T1033 (see Figure D-67).

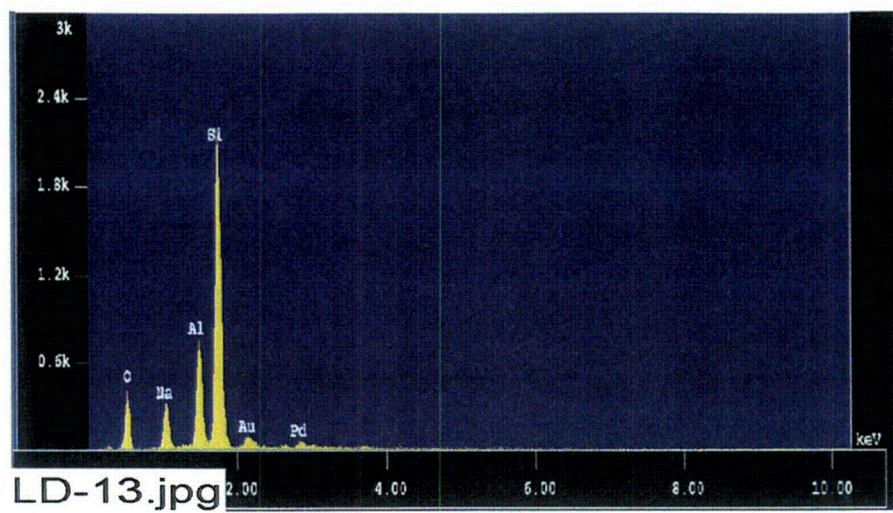


Figure D-69. Day-30, post-T1-sample-LD1 counting spectrum (EDS LD-13) on the flake at the left center of Na-feldspar in image Post-T1034 (see Figure D-68).



The results from the chemical composition analysis for EDS LD-13 are given in Table D-26.

**Table D-26. The Chemical Compositions for EDS LD-13**

Jan 28 12:08 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : PostT1\_1-28-05 ID# : 13  
Comment : Na-feldspar in latent dust sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.169E-09 A  
Stage Point : X=46.619 Y=67.410 Z=10.565  
Acq. Date : Fri Jan 28 12:07:32 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	7.8674	0.0026	3588 / 18
Na K	Normal	0.83- 1.28	1.7705	0.0081	2539 / 24
Al K	Normal	1.26- 1.78	2.9692	0.0015	6418 / 686
Si K	Normal	1.50- 2.07	9.1928	0.0030	19859 / 367
Ca K	Normal	3.40- 4.30	0.1851	0.0046	212 / 16

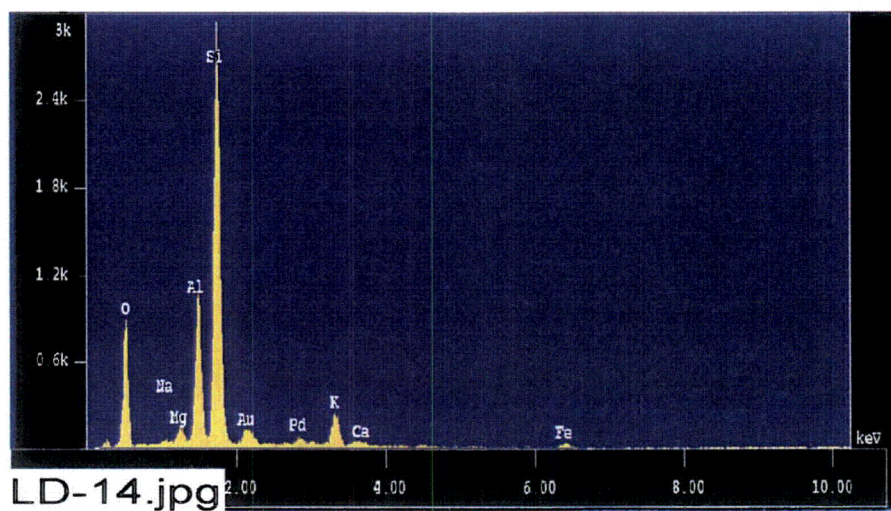
Chi\_square = 5.7053

Element	Mass%	Atomic%	ZAF	Z	A	F
O	36.363	49.3783	1.1117	0.9948	1.1176	1.0000
Na	6.851	6.4742	0.9308	0.9988	0.9324	0.9994
Al	12.829	10.3298	1.0393	1.0067	1.0446	0.9883
Si	43.160	33.3861	1.1293	0.9943	1.1359	1.0000
Ca	0.796	0.4317	1.0347	1.0065	1.0279	1.0001

Total 100.000 100.0000

Normalization factor = 4.1574





**Figure D-70.** Day-30, post-T1-sample-LD1 counting spectrum (EDS LD-14) on the large particle at the upper center of image Post-T1034 (see Figure D-68).

The results from the chemical composition analysis for EDS LD-14 are given in Table D-27.

**Table D-27. The Chemical Compositions for EDS LD-14**

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Group : NRC  
 Sample : PostT1\_1-28-05 ID# : 14  
 Comment : Particle in latent dust sample  
 Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
 Live Time : 100.000 sec Aperture # : 1  
 Acc. Volt : 15.0 KV Probe Current : 1.170E-09 A  
 Stage Point : X=46.619 Y=67.410 Z=10.565  
 Acq. Date : Fri Jan 28 12:10:44 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	16.6818	0.0037	7614 / 37
Mg K	Normal	1.03- 1.52	0.4320	0.0016	783 / 377
Al K	Normal	1.26- 1.78	4.1712	0.0018	9024 / 864
Si K	Normal	1.50- 2.07	11.7041	0.0035	25306 / 544
K K	Normal	3.01- 3.86	4.1207	0.0033	2956 / 37
Ca K	Normal	3.40- 4.30	0.2675	0.0057	306 / 42
Fe K	Normal	6.04- 7.40	1.0424	0.0520	383 / 16

Chi\_square = 6.5270

Element	Mass%	Atomic%	ZAF	Z	A	F
O	45.973	61.6192	1.2142	0.9856	1.2319	1.0000
Mg	0.985	0.8687	1.0044	0.9922	1.0156	0.9968
Al	10.049	7.9867	1.0615	0.9975	1.0729	0.9919
Si	29.495	22.5196	1.1103	0.9852	1.1274	0.9996
K	10.506	5.7615	1.1233	1.2330	0.9117	0.9992
Ca	0.630	0.3372	1.0377	0.9973	1.0407	0.9998
Fe	2.363	0.9072	0.9986	0.9914	1.0065	1.0008

Total 100.000 100.0000  
 Normalization factor = 2.2697

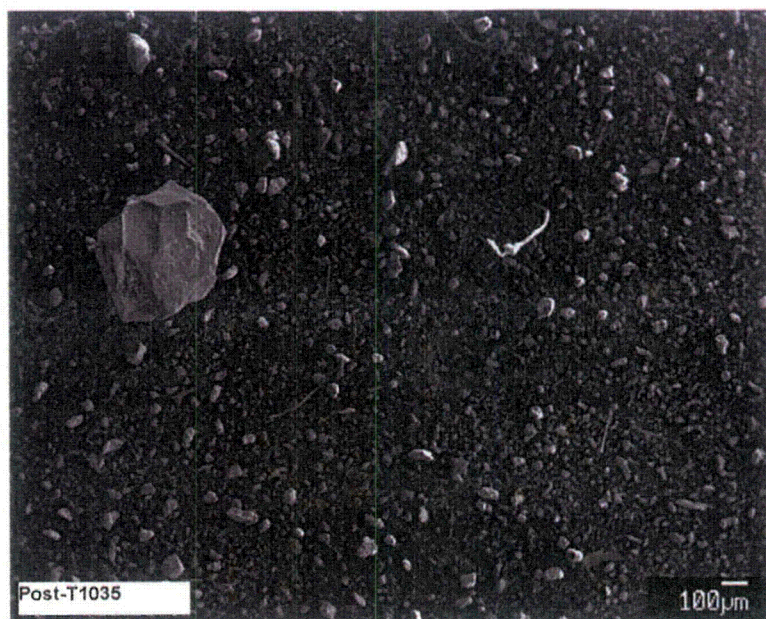


Figure D-71. Day-30, post-T1-sample-LD1 SEM-SE image (Post-T1035) magnified 40 times; overview of another area of the dust sample mounted on carbon tape.

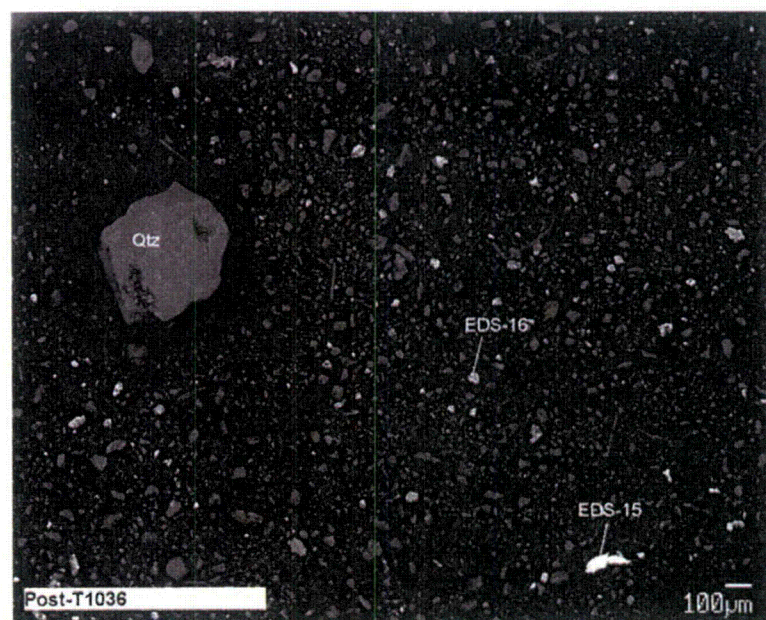


Figure D-72. Day-30, post-T1-sample-LD1 SEM-BSE image (Post-T1036) magnified 40 times on the same field as in image Post-T1035 (see Figure D-71).



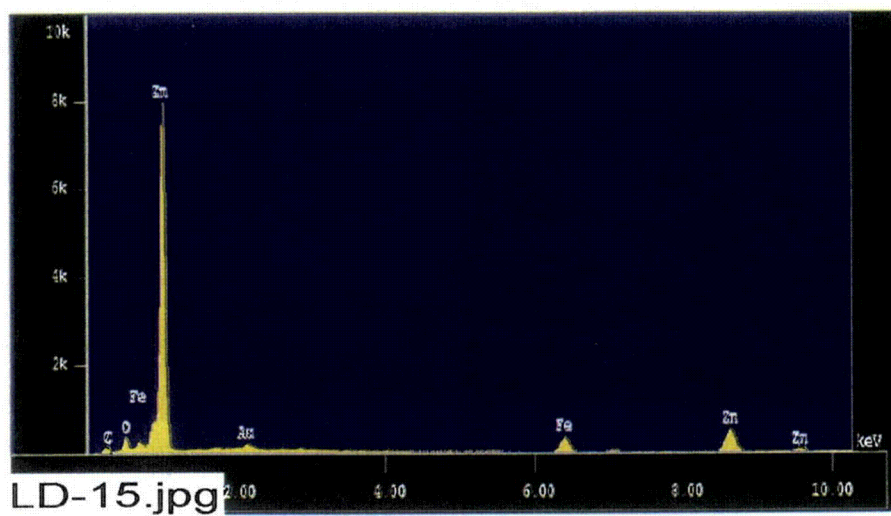


Figure D-73. Day-30, post-T1-sample-LD1 counting spectrum (EDS LD-15) on the bright particle in the lower right of image Post-T1036 (see Figure D-72).



The results from the chemical composition analysis for EDS LD-15 are given in Table D-28.

**Table D-28. The Chemical Compositions for EDS LD-15**

Jan 28 12:28 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : PostT1\_1-28-05 ID# : 15  
Comment : Brite particle in latent dust sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.169E-09 A  
Stage Point : X=50.691 Y=62.647 Z=10.565  
Acq. Date : Fri Jan 28 12:26:15 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	7.5209	0.0034	3430 / 186
Si K	Normal	1.50- 2.07	0.1738	0.0012	375 / 160
Cl K	Normal	2.34- 3.06	0.4364	0.0014	527 / 119
Fe K	Normal	6.04- 7.40	10.6827	0.1340	3926 / 34
Zn K	Normal	8.22-10.03	70.4669	0.0221	9280 / 26

-----  
Chi\_square = 5.9022

Element	Mass%	Atomic%	ZAF	Z	A	F
O	7.386	24.1083	0.8675	0.8226	1.0547	0.9998
Si	0.293	0.5444	1.4880	0.8183	1.8185	1.0000
Cl	0.513	0.7559	1.0388	0.8625	1.2045	0.9998
Fe	9.186	8.5894	0.7596	0.8043	1.0084	0.9365
Zn	82.622	66.0020	1.0357	1.0327	1.0029	1.0000

-----  
Total 100.000 100.0000  
Normalization factor = 1.1321

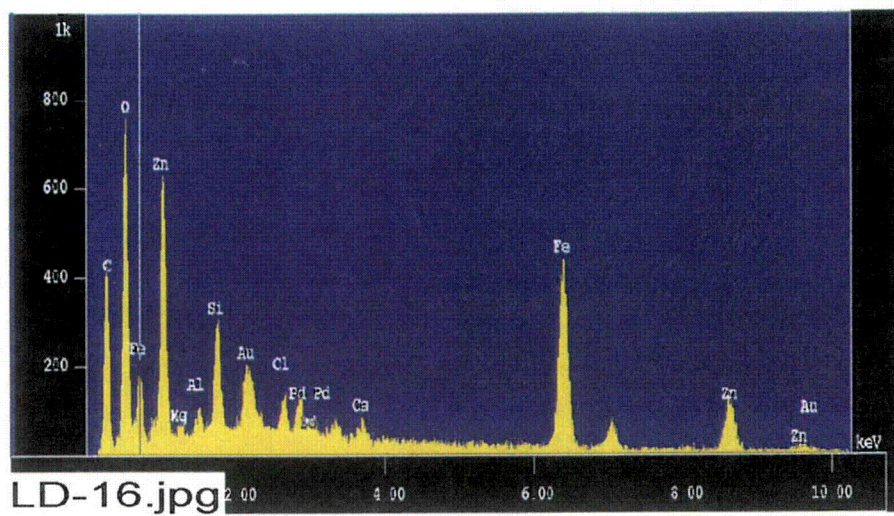


Figure D-74. Day-30, post-T1-sample-LD1 counting spectrum (EDS LD-16) on the round particle at slightly right of the center of image Post-T1036 (see Figure D-72).

The results from the chemical composition analysis for EDS LD-16 are given in Table D-29.

**Table D-29. The Chemical Compositions for EDS LD-16**

Jan 28 12:33 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
Sample : PostT1\_1-28-05 ID# : 16  
Comment : Brite particle in latent dust sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.168E-09 A  
Stage Point : X=50.484 Y=62.853 Z=10.565  
Acq. Date : Fri Jan 28 12:31:06 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	17.1582	0.0039	7818 / 231
Mg K	Normal	1.03- 1.52	0.1158	0.0012	210 / 354
Al K	Normal	1.26- 1.78	0.2078	0.0007	449 / 142
Si K	Normal	1.50- 2.07	1.0789	0.0014	2329 / 111
Cl K	Normal	2.34- 3.06	1.0453	0.0013	1262 / 72
Ca K	Normal	3.40- 4.30	0.4189	0.0066	478 / 40
Fe K	Normal	6.04- 7.40	12.0769	0.1311	4434 / 17
Zn K	Normal	8.22-10.03	16.3616	0.0116	2153 / 10

Chi\_square = 8.8330

Element	Mass%	Atomic%	ZAF	Z	A	F
O	30.426	60.3020	0.8300	0.8879	0.9350	0.9998
Mg	0.466	0.6074	1.8827	0.8923	2.1073	1.0013
Al	0.734	0.8626	1.6531	0.8966	1.8445	0.9995
Si	3.145	3.5505	1.3645	0.8851	1.5419	0.9998
Cl	2.349	2.1005	1.0516	0.9344	1.1261	0.9995
Ca	0.815	0.6445	0.9103	0.8918	1.0245	0.9964
Fe	22.085	12.5395	0.8560	0.8786	1.0040	0.9704
Zn	39.980	19.3929	1.1438	1.1362	1.0066	1.0000

Total 100.000 100.0000  
Normalization factor = 2.1364

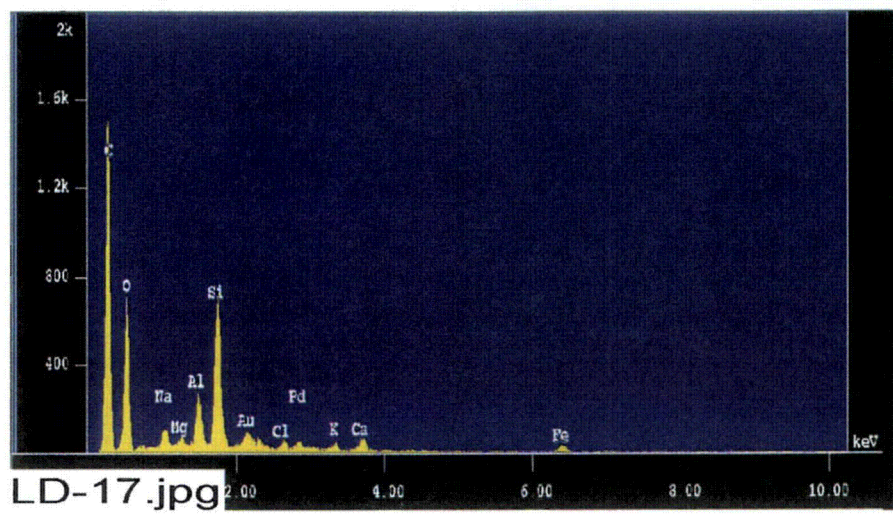


Figure D-75. Day-30, Post-T1-sample-LD1 counting spectrum (EDS LD-17) over an area of  $425 \times 425 \mu\text{m}$ , magnified 250 times. (C and Cl peaks are from the mounting tape).



The results from the chemical composition analysis from EDS LD-17 are given in Table D-30.

**Table D-30. The Chemical Compositions for EDS LD-17**

Jan 28 12:38 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
 Sample : PostT1\_1-28-05 ID# : 17  
 Comment : Area of latent dust sample  
 Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
             Live Time : 100.000 sec Aperture # : 1  
             Acc. Volt : 15.0 KV Probe Current : 1.168E-09 A  
             Stage Point : X=50.719 Y=62.405 Z=10.565  
             Acq. Date : Fri Jan 28 12:37:20 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	14.6419	0.0034	6671 / 648
Mg K	Normal	1.03- 1.52	0.1506	0.0012	273 / 146
Al K	Normal	1.26- 1.78	0.9264	0.0010	2001 / 241
Si K	Normal	1.50- 2.07	2.9558	0.0018	6380 / 135
Ca K	Normal	3.40- 4.30	0.6744	0.0056	770 / 21
Fe K	Normal	6.04- 7.40	1.0013	0.0459	368 / 4
K K	Normal	3.01- 3.86	0.6405	0.0017	459 / 23

Chi\_square = 42.6433

Element	Mass%	Atomic%	ZAF	Z	A	F
O	65.858	79.3709	0.9080	0.9874	0.9196	1.0000
Mg	0.831	0.6587	1.1135	0.9944	1.1208	0.9991
Al	5.237	3.7421	1.1410	0.9998	1.1462	0.9956
Si	16.317	11.2023	1.1144	0.9876	1.1286	0.9998
Ca	3.338	1.6060	0.9992	1.0009	0.9991	0.9992
Fe	4.950	1.7090	0.9979	0.9965	1.0007	1.0008
K	3.470	1.7110	1.0936	1.2372	0.8885	0.9949

Total 100.000 100.0000  
 Normalization factor = 4.9538



Figure D-76. Day-30, post-T1-sample-Sed1 SEM-SE image (Post-T1037) magnified 40 times; overview of particles.

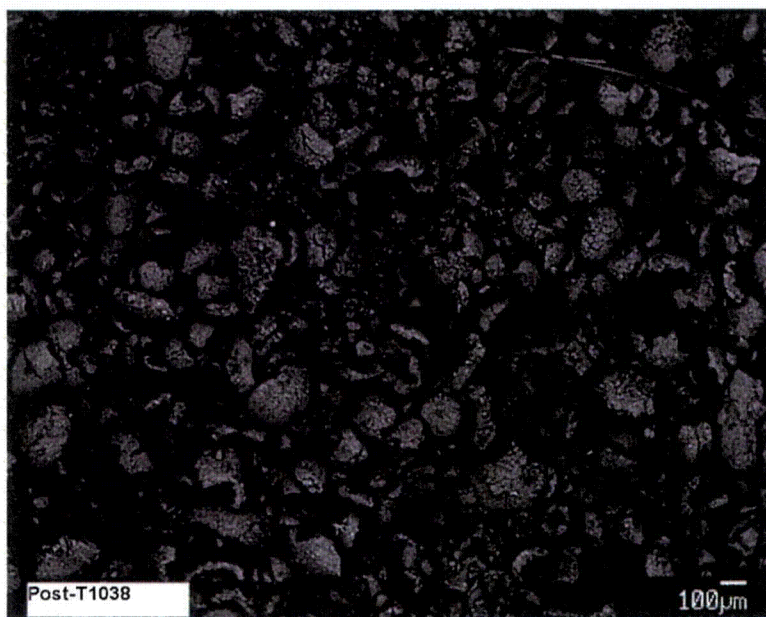


Figure D-77. Day-30, post-T1-sample-Sed1 SEM-BSE image (Post-T1038) magnified 40 times on the same particles, as shown in Figure D-76.

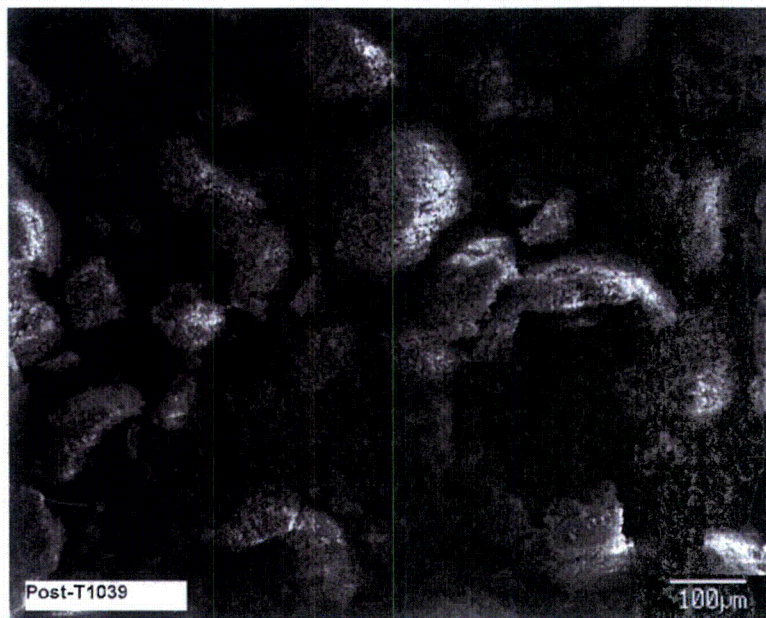


Figure D-78. Day-30, post-T1-sample-Sed1 SEM-SE image (Post-T1039) magnified 120 times; close-up of particles.

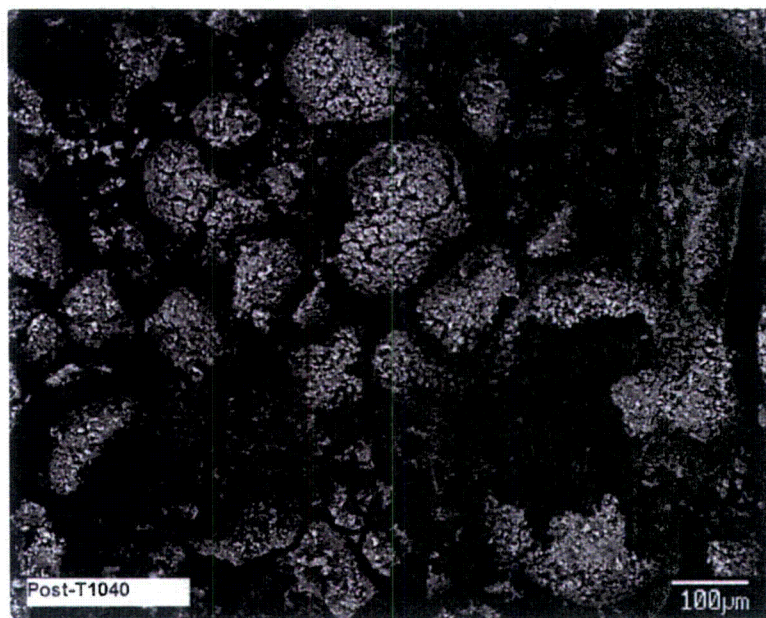


Figure D-79. Day-30, Post-T1-sample-Sed1 SEM-BSE image (Post-T1040) on the same field, as shown in Figure D-78.



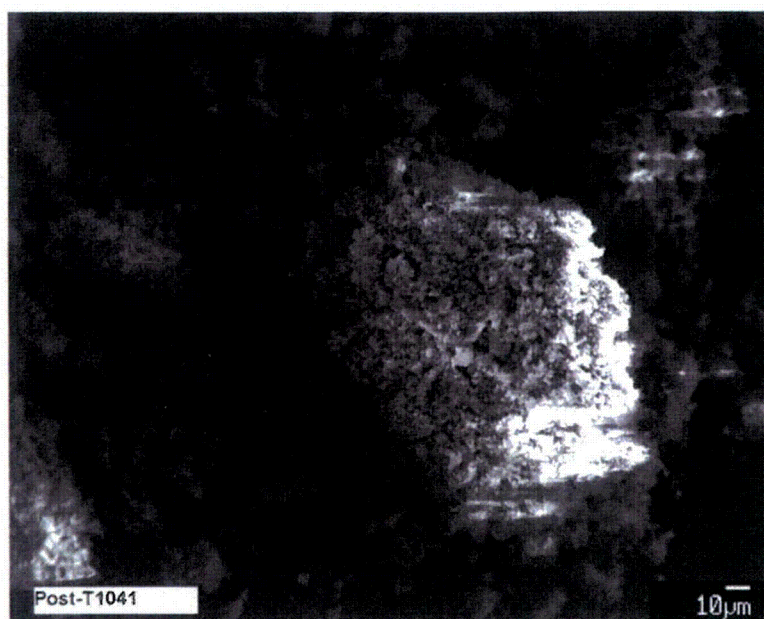


Figure D-80. Day-30, post-T1-sample-Sed1 SEM-SE image (Post-T1041) magnified 370 times on a single particle in image Post-T1-1040, as shown in Figure D-79.

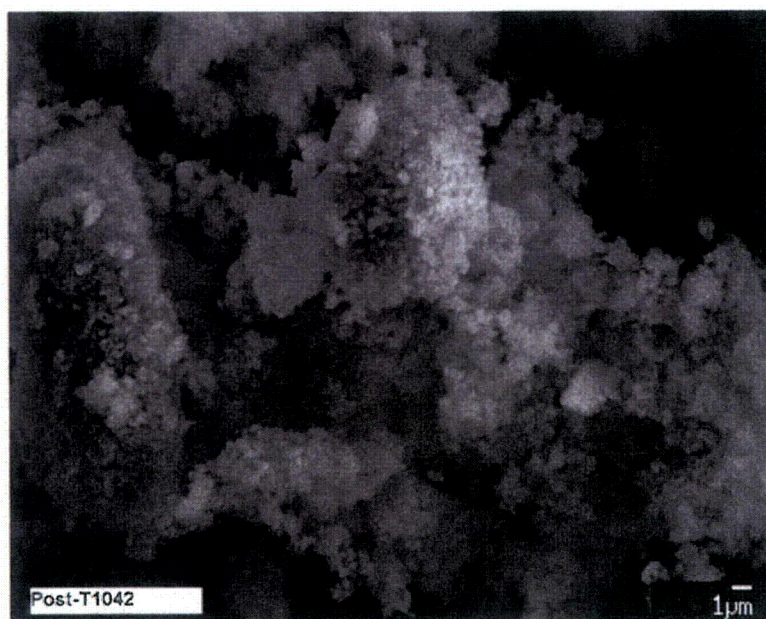
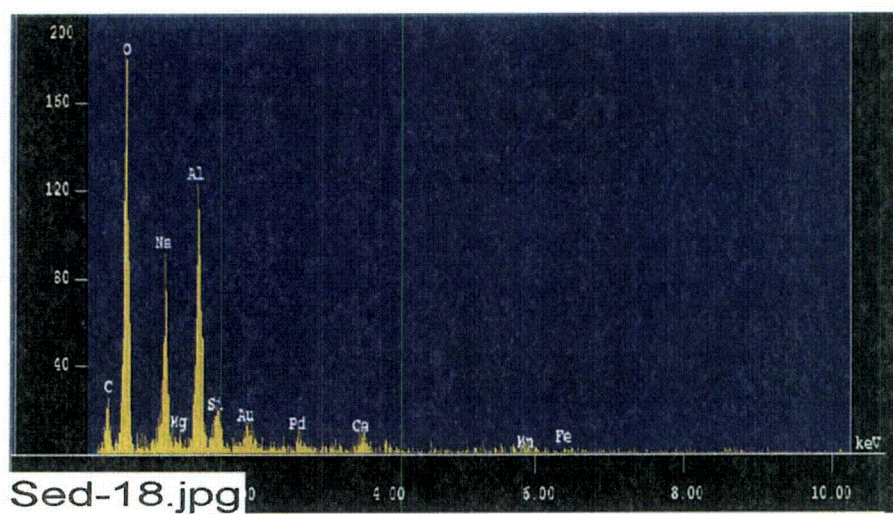


Figure D-81. Day-30, post-T1-sample-Sed1 SEM-SE image (Post-T1042) magnified 3000 times on the small particles in image Post-T1040, as shown in Figure D-79.





**Figure D-82.** Day-30, post-T1-sample-Sed1 counting spectrum (EDS SED-18) over the particles in an area ( $18 \times 18 \mu\text{m}$ ) in image Post-T1042 (see Figure D-81), magnified 6000 times.

The results from the chemical composition analysis for EDS SED-18 are given in Table D-31.

**Table D-31. The Chemical Compositions for EDS SED-18**

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Group : NRC  
Sample : PostTl\_1-28-05 ID# : 18  
Comment : Pipe sediment sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 2.991E-10 A  
Stage Point : X=37.268 Y=67.741 Z=10.565  
Acq. Date : Fri Jan 28 13:51:02 2005

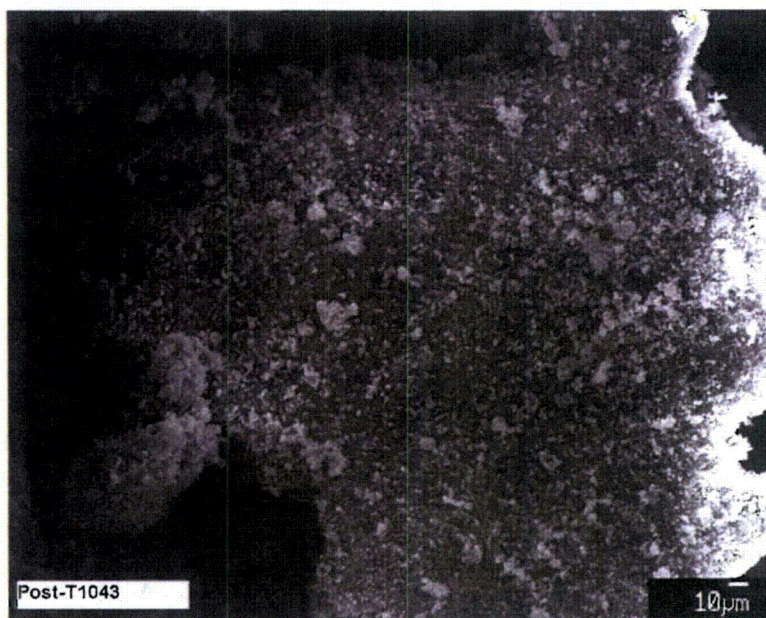
Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
C K	Normal	0.09- 0.46	0.0000	0.0000	0 / 20
O K	Normal	0.25- 0.77	14.2631	0.0018	1664 / 16
Na K	Normal	0.83- 1.28	1.5969	0.0039	586 / 2
Al K	Normal	1.26- 1.78	1.6726	0.0005	925 / 10
Si K	Normal	1.50- 2.07	0.2688	0.0004	149 / 52
Ca K	Normal	3.40- 4.30	0.3276	0.0021	96 / 3
Mn K	Normal	5.53- 6.82	0.3310	0.0003	35 / 0
Fe K	Normal	6.04- 7.40	0.0159	0.0120	1 / 1

Chi\_square = 1.8808

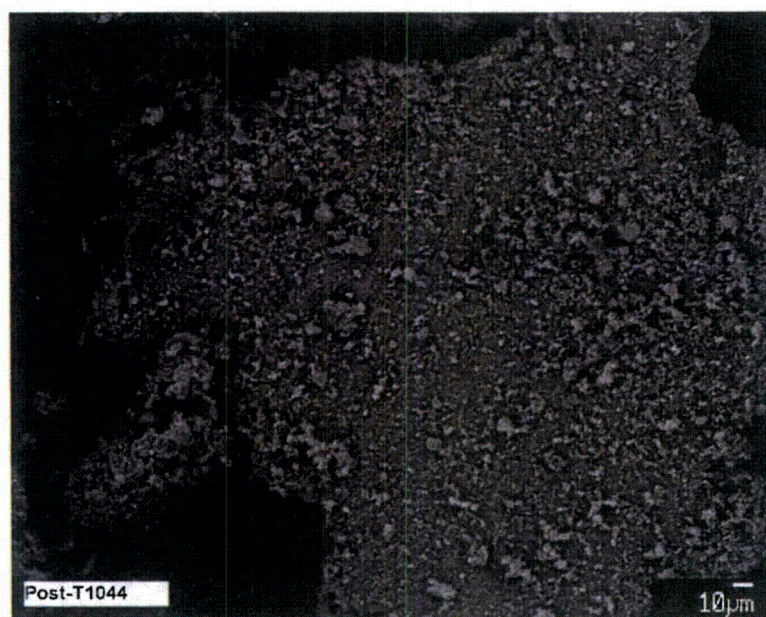
Element	Mass%	Atomic%	ZAF	Z	A	F
C	0.000	0.0000	3.9321	1.0376	3.7901	0.9999
O	67.010	77.4509	0.7082	0.9896	0.7157	0.9999
Na	12.316	9.9063	1.1626	0.9942	1.1684	1.0008
Al	13.480	9.2382	1.2149	1.0024	1.2126	0.9995
Si	2.226	1.4655	1.2481	0.9902	1.2604	0.9999
Ca	2.141	0.9880	0.9852	1.0042	0.9820	0.9991
Mn	2.722	0.9162	1.2395	1.2444	0.9961	1.0000
Fe	0.106	0.0349	0.9982	1.0007	0.9967	1.0008

Total 100.000 100.0000

Normalization factor = 6.6339

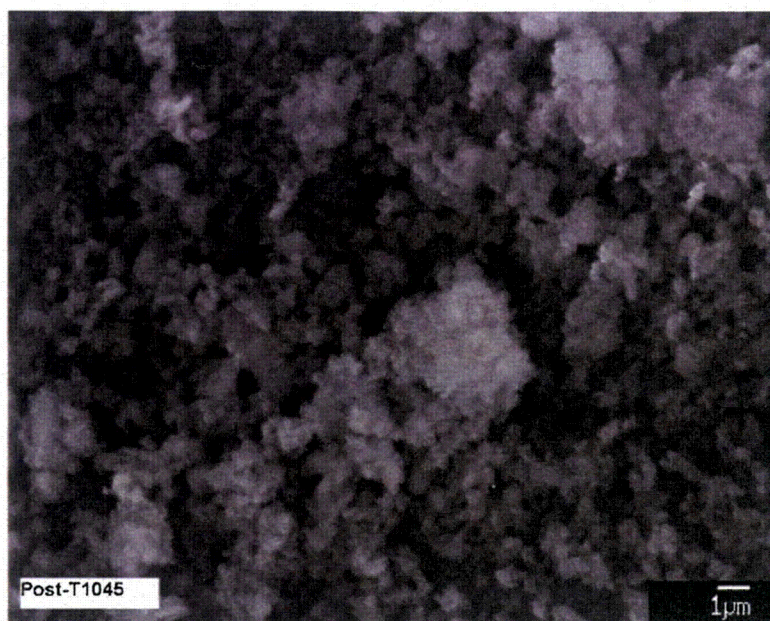


**Figure D-83.** Day-30, post-T1-sample-Sed1 SEM-SE image (Post-T1043) magnified 300 times on another particle in image Post-T1040, as shown in Figure D-79.

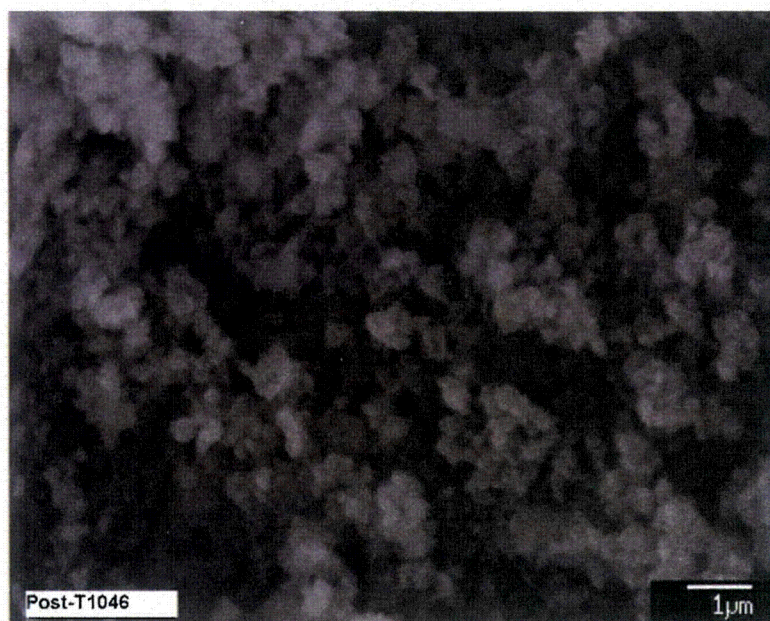


**Figure D-84.** Day-30, post-T1-sample-Sed1 SEM-BSE image (Post-T1044) magnified 300 times on the same particle in image Post-T1043, as shown in Figure D-83.



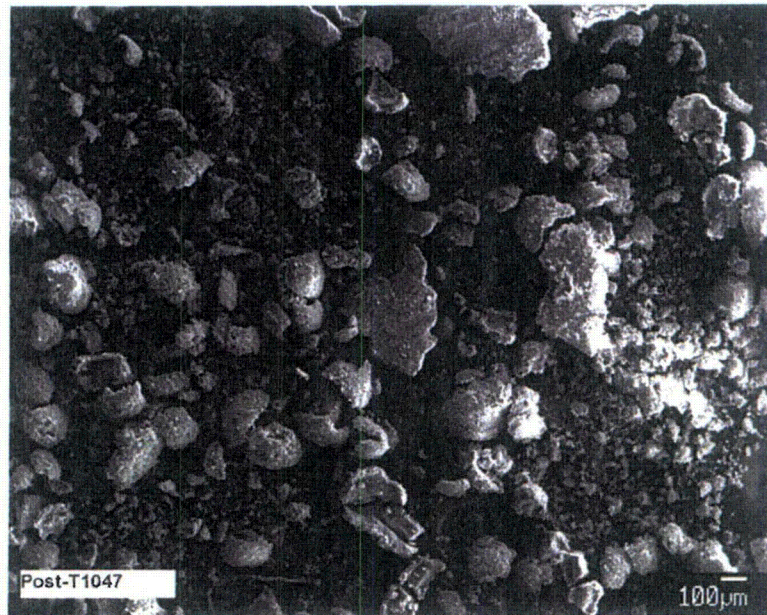


**Figure D-85.** Day-30, post-T1-sample-Sed1 SEM-SE image (Post-T1045) magnified 5000 times on the center particle in image Post-T1043, as shown in Figure D-83.

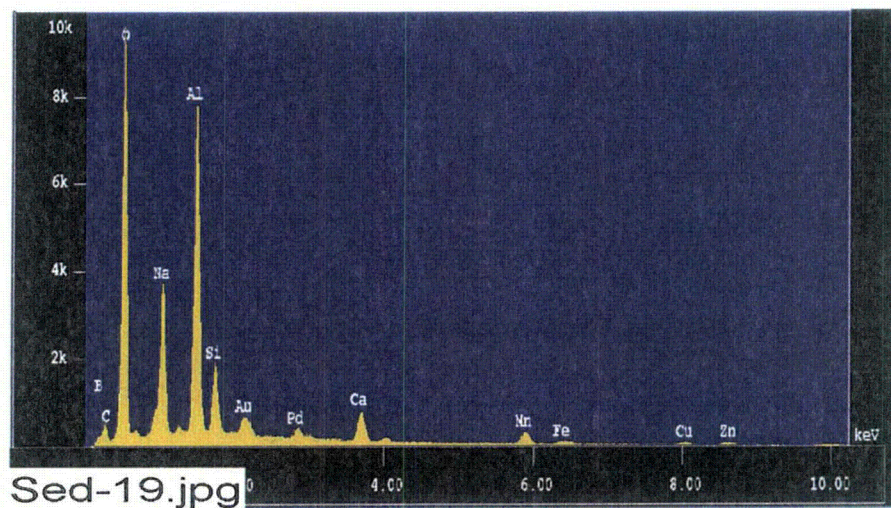


**Figure D-86.** Day-30, post-T1-sample-Sed1 SEM-SE image (Post-T1046) magnified 10,000 times on the same particle in image Post-T1043, as shown in Figure D-83.





**Figure D-87.** Day-30, post-T1-sample-Sed1 SEM-SE image (Post-T1047) magnified 40 times; overview of the particles in images Post-T1043, -T1044, -T1045, and -T1046, as shown in Figure D-83 to Figure D-86.



**Figure D-88.** Day-30, post-T1-sample-Sed1 counting spectrum (EDS SED-19) for the same field as in image Post-T1046 (see Figure D-86), magnified 10,000 times.

The results from the chemical composition analysis for EDS SED-19 are given in Table D-32.

**Table D-32. The Chemical Compositions for EDS SED-19**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 19  
Comment : Pipe sediment sample  
Condition : Full Scale : 20KeV(10eV/cn,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 5.884E-09 A  
Stage Point : X=36.914 Y=68.416 Z=10.565  
Acq. Date : Fri Jan 28 14:08:16 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	40.2864	0.0134	92468 / 381
Na K	Normal	0.83- 1.28	3.1848	0.0412	22988 / 376
Mg K	Normal	1.03- 1.52	0.1428	0.0033	1302 / 4531
Al K	Normal	1.26- 1.78	6.1469	0.0046	66877 / 856
Si K	Normal	1.50- 2.07	1.3594	0.0034	14782 / 3944
Ca K	Normal	3.40- 4.30	1.5660	0.0181	9007 / 154
Mn K	Normal	5.53- 6.82	2.2207	0.0029	4681 / 76
Fe K	Normal	6.04- 7.40	0.3664	0.1051	678 / 58
Cu K	Normal	7.63- 9.27	1.2864	0.0090	1124 / 46
Zn K	Normal	8.22-10.03	1.5860	0.0125	1051 / 31

Chi\_square = 31.9346

Element	Mass%	Atomic%	ZAF	Z	A	F
O	58.714	74.0315	0.7799	0.9730	0.8016	0.9999
Na	7.760	6.8088	1.3038	0.9771	1.3332	1.0008
Mg	0.346	0.2873	1.2969	0.9796	1.3248	0.9993
Al	14.542	10.8723	1.2659	0.9849	1.2861	0.9994
Si	3.264	2.3446	1.2849	0.9729	1.3209	0.9999
Ca	2.853	1.4357	0.9747	0.9853	0.9910	0.9982
Mn	5.018	1.8425	1.2091	1.2190	0.9990	0.9929
Fe	0.662	0.2392	0.9674	0.9799	0.9989	0.9883
Cu	3.053	0.9691	1.2698	1.2712	0.9989	1.0000
Zn	3.788	1.1689	1.2781	1.2801	0.9984	1.0000

Total 100.000 100.0000  
Normalization factor = 1.8688



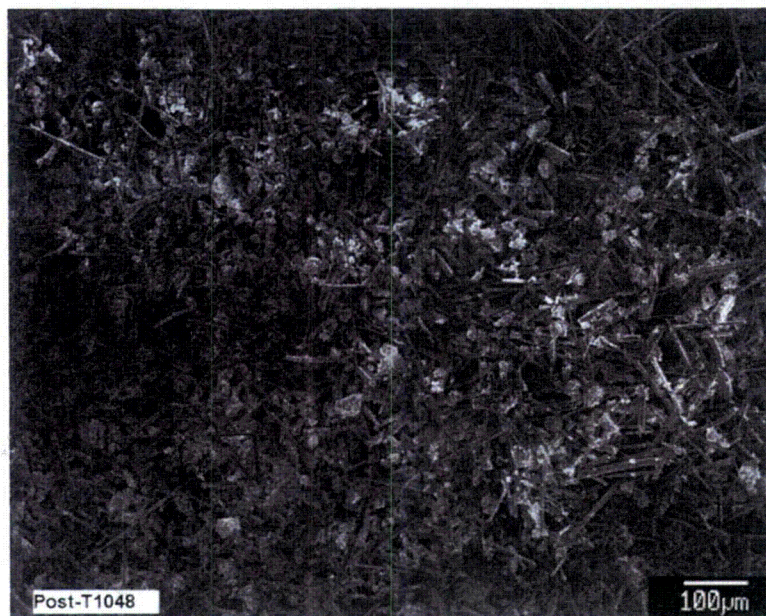


Figure D-89. Day-30, post-T1-sample-Sed2A SEM-SE image (Post-T1048) magnified 100 times; overview of tank-sediment sample Sed2A.

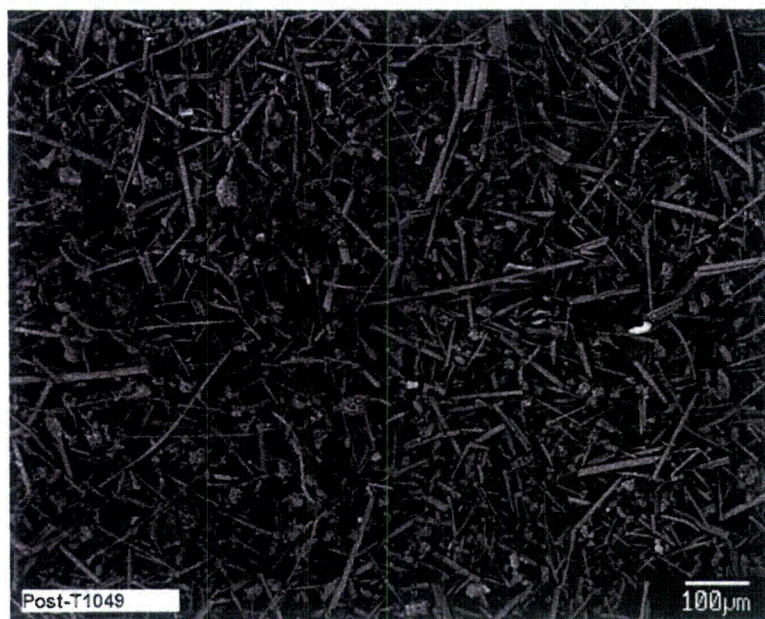
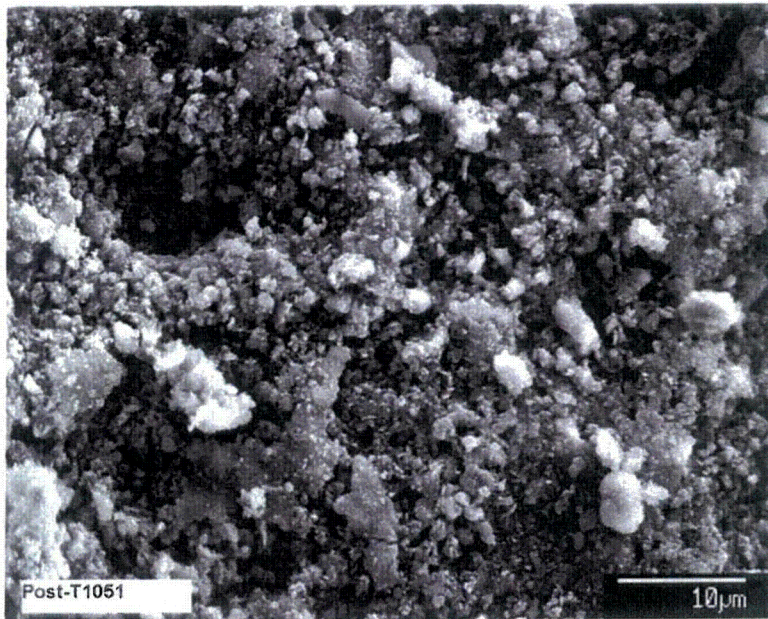


Figure D-90. Day-30, post-T1-sample-Sed2A SEM-BSE image (Post-T1049) on the same field as image Post-T1048, as shown in Figure D-89.

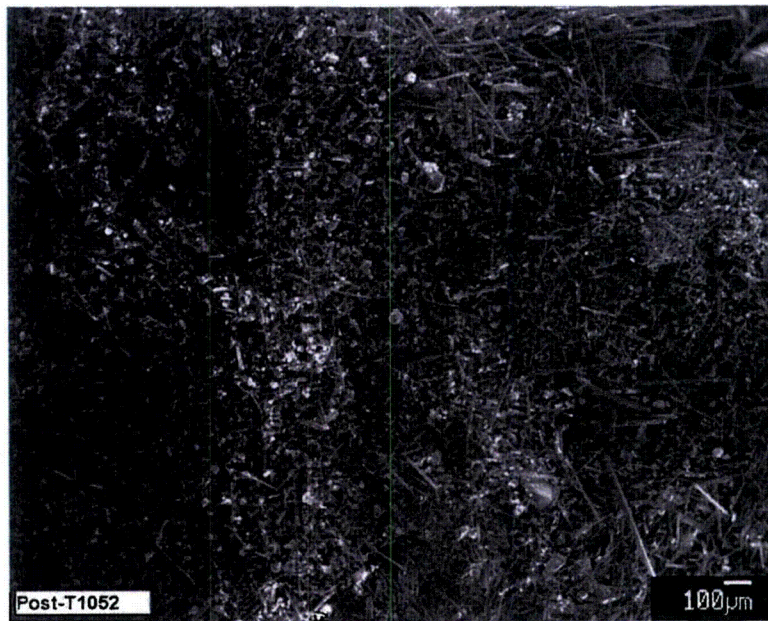


**Figure D-91.** Day-30, post-T1-sample-Sed2A SEM-SE image (Post-T1050) higher magnification of a representative large particle in image Post-T1049, as shown in Figure D-90.

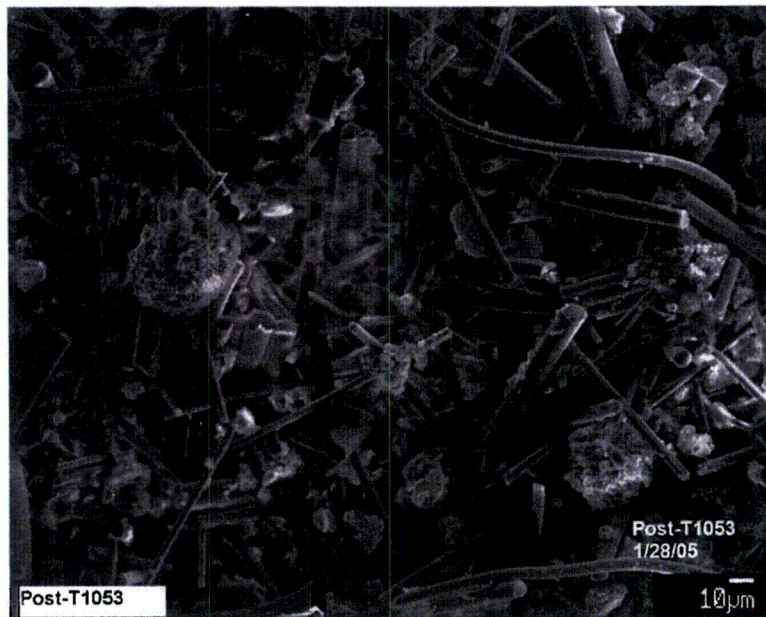


**Figure D-92.** Day-30, post-T1-sample-Sed2A SEM-SE image (Post-T1051) magnified 550 times on the same particle as in image Post-T1050 (see Figure D-91).





**Figure D-93.** Day-30, post-T1-sample-Sed2A SEM-SE image (Post-T1052) magnified 43 times; overview of tank-sediment sample Sed2A.



**Figure D-94.** Day-30, post-T1-sample-Sed2A SEM-SE image (Post-T1053) magnified 370 times on two large particles in image Post-T1052 (see Figure D-93).

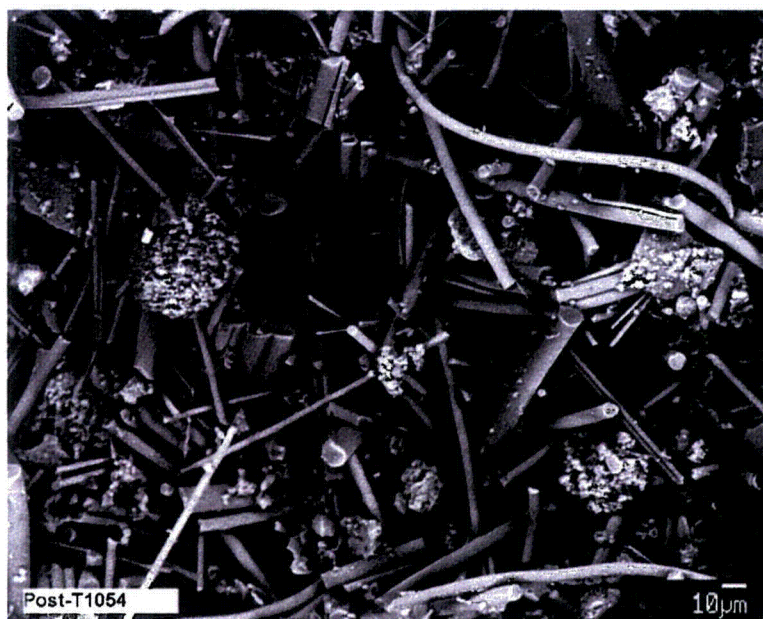


Figure D-95. Day-30, post-T1-sample-Sed2A SEM-BSE image (Post-T1054) magnified 370 times on the same two particles as in image Post-T1053 (see Figure D-94).

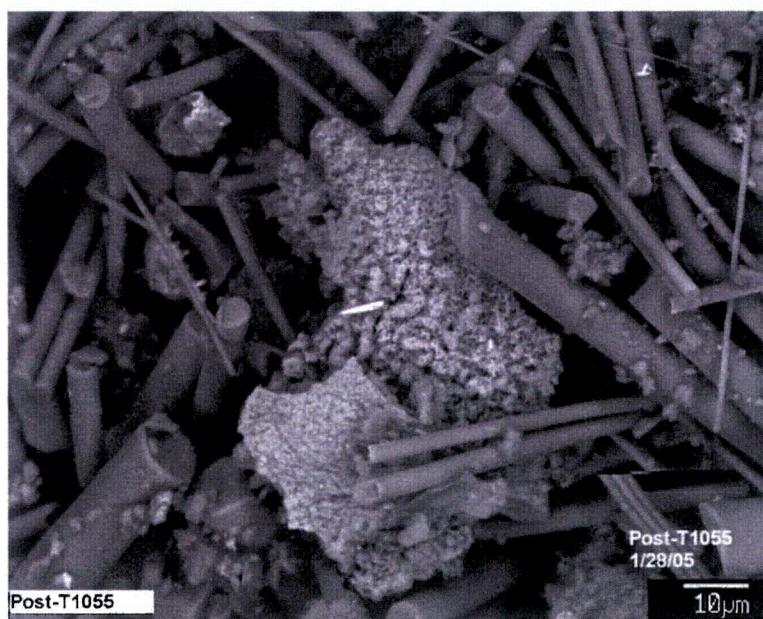


Figure D-96. Day-30, post-T1-sample-Sed2A SEM-SE image (Post-T1055) magnified 1000 times on fuzzy particle in image Post-T1054 (see Figure D-95).



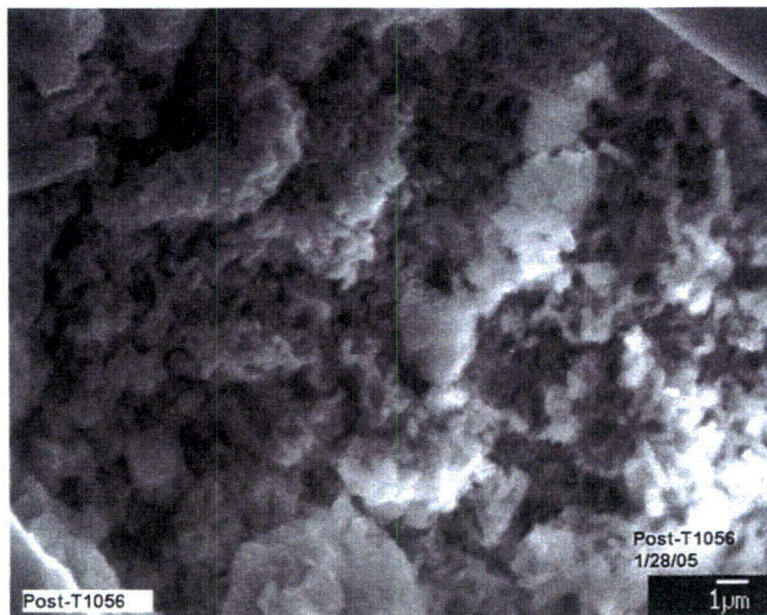


Figure D-97. Day-30, post-T1-sample-Sed2A SEM-SE image (Post-T1056) magnified 5000 times on the same particle as in image Post-T1055 (see Figure D-96).

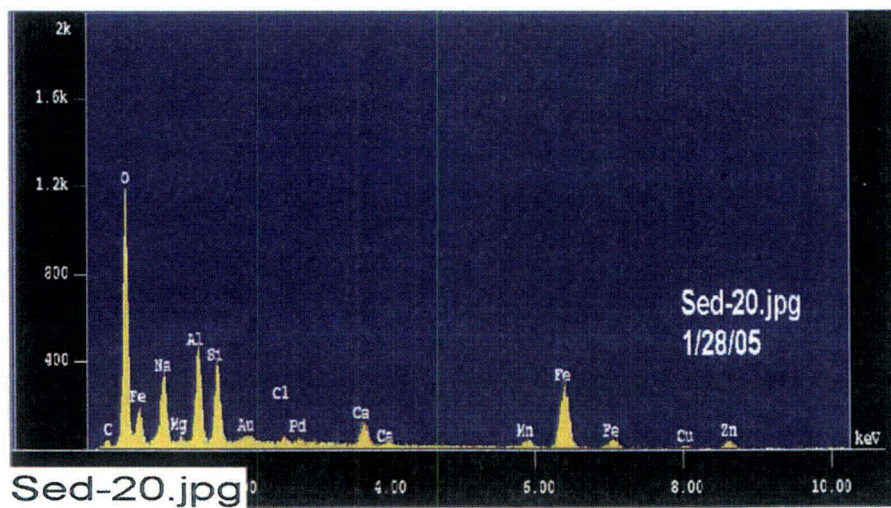


Figure D-98. Day-30, post-T1-sample-Sed2A counting spectrum (EDS SED-20) on the fuzzy particle, as shown in Figure D-97.

The results from the chemical composition analysis for EDS SED-20 are given in Table D-33.

**Table D-33. The Chemical Compositions for EDS SED-20**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 20  
Comment : Tank sediment sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 1.049E-09 A  
Stage Point : X=22.235 Y=61.110 Z=12.288  
Acq. Date : Fri Jan 28 15:12:25 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	27.8526	0.0049	11397 /	54
Na K	Normal	0.83- 1.28	0.4496	0.0129	579 /	38
Mg K	Normal	1.03- 1.52	0.1386	0.0011	225 /	354
Al K	Normal	1.26- 1.78	2.0430	0.0012	3963 /	142
Si K	Normal	1.50- 2.07	1.7540	0.0014	3400 /	276
Cl K	Normal	2.34- 3.06	0.4256	0.0009	461 /	30
Ca K	Normal	3.40- 4.30	1.2765	0.0072	1309 /	20
Fe K	Normal	6.04- 7.40	9.3292	0.1066	3077 /	14
Zn K	Normal	8.22-10.03	5.3859	0.0070	637 /	4
Mn K	Normal	5.53- 6.82	1.2839	0.0012	482 /	13
Cu K	Normal	7.63- 9.27	1.2101	0.0038	189 /	7

Chi\_square = 4.8801

Element	Mass%	Atomic%	ZAF	Z	A	F
O	46.310	70.7546	0.8015	0.9337	0.8586	0.9999
Na	1.569	1.6684	1.6827	0.9371	1.7934	1.0013
Mg	0.443	0.4449	1.5394	0.9392	1.6380	1.0006
Al	6.045	5.4760	1.4264	0.9441	1.5121	0.9992
Si	4.679	4.0727	1.2861	0.9322	1.3799	0.9999
Cl	0.939	0.6471	1.0632	0.9853	1.0802	0.9989
Ca	2.492	1.5198	0.9412	0.9418	1.0035	0.9959
Fe	17.787	7.7854	0.9191	0.9325	1.0011	0.9846
Zn	13.617	5.0918	1.2188	1.2124	1.0053	1.0000
Mn	3.069	1.3655	1.1523	1.1611	1.0018	0.9906
Cu	3.051	1.1737	1.2154	1.2056	1.0081	1.0000

Total 100.000 100.0000

Normalization factor = 2.0743



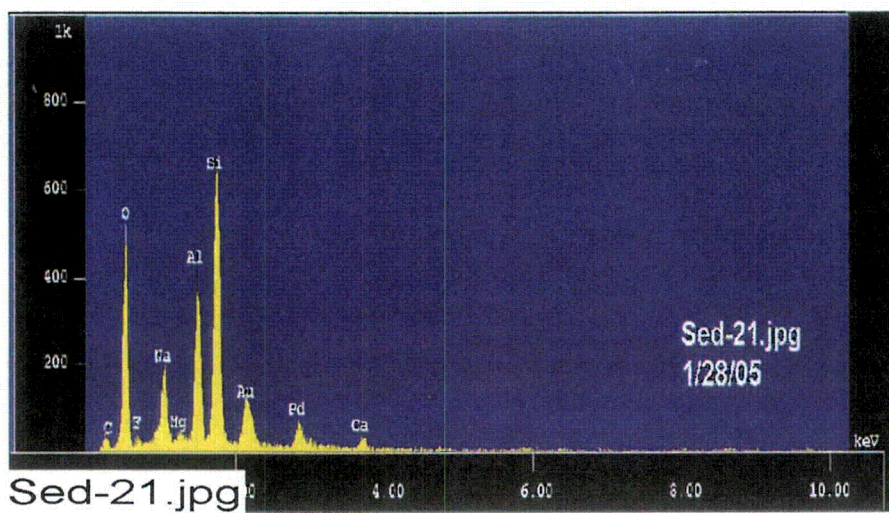


Figure D-99. Day-30, post-T1-sample-Sed2A counting spectrum (EDS SED-21) on another particle of tank-sediment sample Sed2A.

The results from the chemical composition analysis for EDS SED-21 are given in Table D-34.

**Table D-34. The Chemical Compositions for EDS SED-21**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 21  
Comment : Tank sediment sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 4.347E-10 A  
Stage Point : X=21.632 Y=61.902 Z=12.288  
Acq. Date : Fri Jan 28 15:17:22 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	26.3138	0.0029	4462 / 40
Na K	Normal	0.83- 1.28	2.3020	0.0068	1228 / 32
Al K	Normal	1.26- 1.78	4.1307	0.0011	3320 / 234
Si K	Normal	1.50- 2.07	7.5148	0.0017	6037 / 198
Ca K	Normal	3.40- 4.30	0.7705	0.0040	327 / 10
F K	Normal	0.46- 0.87	2.8319	0.0019	274 / 60

Chi\_square = 5.2691

Element	Mass%	Atomic%	ZAF	Z	A	F
O	47.350	57.4238	0.8368	0.9899	0.8455	0.9997
Na	5.724	4.8309	1.1563	0.9943	1.1623	1.0005
Al	10.135	7.2883	1.1410	1.0024	1.1435	0.9954
Si	18.840	13.0151	1.1658	0.9902	1.1774	1.0000
Ca	1.659	0.8029	1.0010	1.0037	0.9972	1.0001
F	16.292	16.6389	2.6752	1.0987	2.4353	0.9998

Total 100.000 100.0000  
Normalization factor = 2.1505

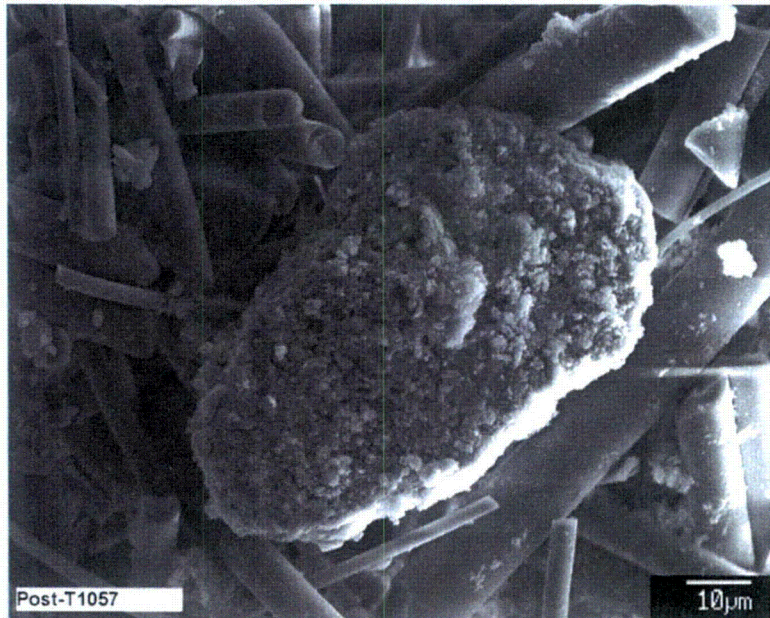


Figure D-100. Day-30, post-T1-sample-Sed2A SEM-SE image (Post-T1057) magnified 1000 times on the particle analyzed in the counting spectrum (EDS SED-21), as shown in Figure D-99.

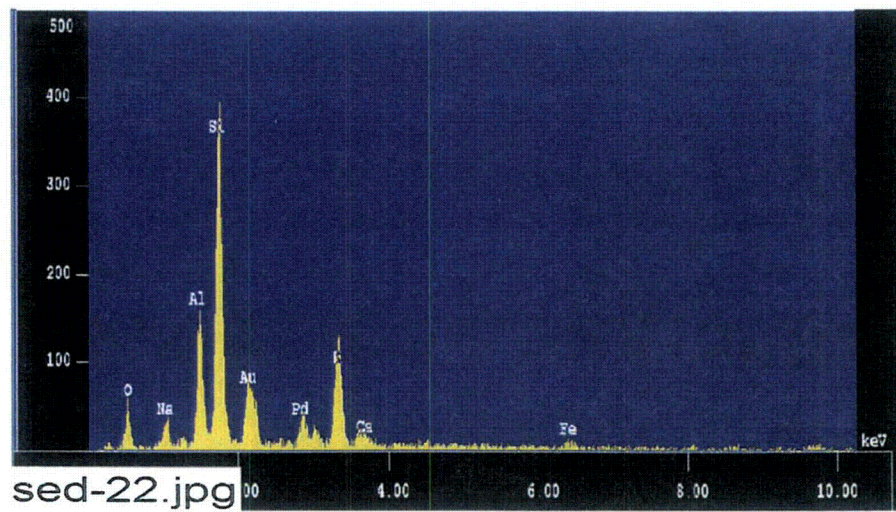


Figure D-101. Day-30, post-T1-sample-Sed2A counting spectrum (EDS SED-22) on a large round particle of K-feldspar, probably from the concrete sample.



The results from the chemical composition analysis for EDS SED-22 are given in Table D-35.

**Table D-35. The Chemical Compositions for EDS SED-22**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 22  
Comment : Tank sediment sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 4.322E-10 A  
Stage Point : X=21.652 Y=61.673 Z=12.288  
Acq. Date : Fri Jan 28 15:23:18 2005

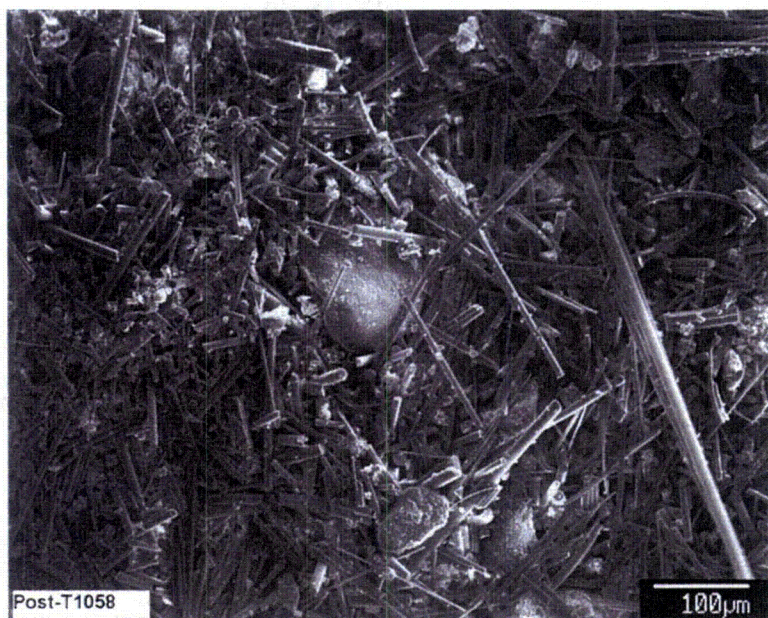
Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	2.6175	0.0010	441 /	7
Na K	Normal	0.83- 1.28	0.3307	0.0029	175 /	8
Al K	Normal	1.26- 1.78	1.5862	0.0007	1268 /	129
Si K	Normal	1.50- 2.07	4.1906	0.0013	3347 /	93
Ca K	Normal	3.40- 4.30	0.2405	0.0034	102 /	23
K K	Normal	3.01- 3.86	5.7503	0.0022	1524 /	17
Fe K	Normal	6.04- 7.40	0.6338	0.0299	86 /	6

Chi\_square = 1.1162

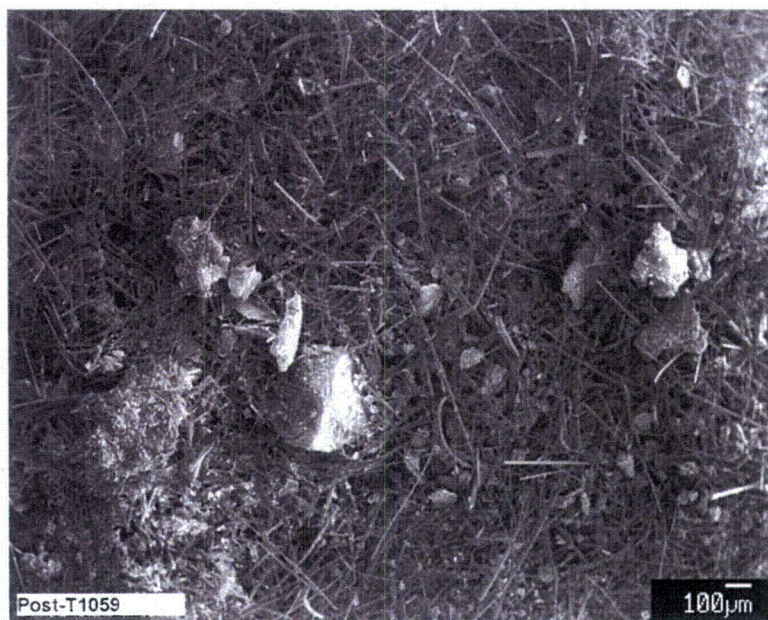
Element	Mass%	Atomic%	ZAF	Z	A	F
O	26.266	42.2610	1.8669	0.9646	1.9353	1.0000
Na	1.927	2.1575	1.0839	0.9681	1.1192	1.0003
Al	9.032	8.6170	1.0593	0.9753	1.0936	0.9932
Si	24.485	22.4414	1.0870	0.9631	1.1300	0.9988
Ca	1.391	0.8934	1.0759	0.9732	1.1057	0.9998
K	33.547	22.0848	1.0854	1.2037	0.9028	0.9987
Fe	3.351	1.5448	0.9837	0.9647	1.0189	1.0008

Total 100.000 100.0000  
Normalization factor = 5.3752





**Figure D-102.** Day-30, post-T1-sample-Sed2A SEM-SE image (Post-T1058) of the high-Z particles analyzed in EDS counting spectra EDS-21 and -22, as shown in Figure D-99 and Figure D-101.



**Figure D-103.** Day-30, post-T1-sample-Sed2B SEM-SE image (Post-T1059) magnified 40 times; overview of large particles in tank-sediment sample Sed2B.





Figure D-104. Day-30, post-T1-sample-Sed2B SEM-BSE image (Post-T1060) magnified 40 times on the same particles shown above.



Figure D-105. Day-30, post-T1-sample-Sed2B SEM-BSE image (Post-T1060annotated) magnified 40 times on the same particles as in image Post-T1060 (see Figure D-104).

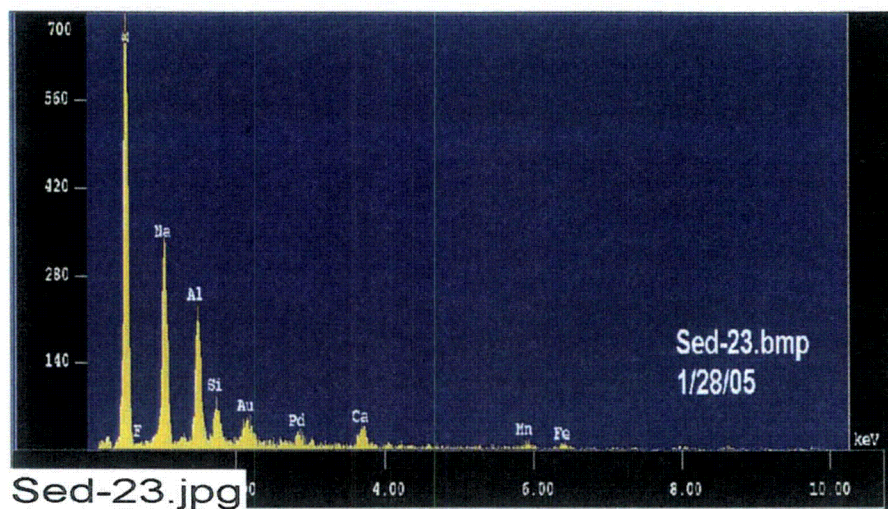


Figure D-106. Day-30, post-T1-sample-Sed2B counting spectrum (EDS SED-23) on the plate, as shown in Figure D-105. This sample shows O>Na>Al, which is similar to the filtrate composition from January 18, 2005.

The results from the chemical composition analysis for EDS SED-23 are given in Table D-36.

**Table D-36. The Chemical Compositions for EDS SED-23**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 23  
Comment : Tank sediment sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 4.184E-10 A  
Stage Point : X= 8.337 Y=63.713 Z=12.288  
Acq. Date : Fri Jan 28 15:41:44 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	41.2748	0.0035	6737 /	16
Na K	Normal	0.83- 1.28	5.3562	0.0081	2749 /	16
Al K	Normal	1.26- 1.78	2.5107	0.0008	1942 /	34
Si K	Normal	1.50- 2.07	0.6362	0.0007	492 /	115
Ca K	Normal	3.40- 4.30	0.9001	0.0041	368 /	7
Mn K	Normal	5.53- 6.82	0.7900	0.0006	118 /	2
Fe K	Normal	6.04- 7.40	0.8879	0.0277	117 /	4

Chi\_square = 6.1401

Element	Mass%	Atomic%	ZAF	Z	A	F
O	67.967	78.3590	0.6757	0.9879	0.6840	0.9999
Na	15.696	12.5931	1.2024	0.9924	1.2102	1.0012
Al	7.758	5.3038	1.2680	1.0006	1.2677	0.9996
Si	1.894	1.2441	1.2218	0.9885	1.2360	0.9999
Ca	2.149	0.9891	0.9798	1.0024	0.9788	0.9987
Mn	2.380	0.7992	1.2364	1.2421	0.9954	1.0000
Fe	2.155	0.7117	0.9958	0.9989	0.9961	1.0008

Total 100.000 100.0000

Normalization factor = 2.4371



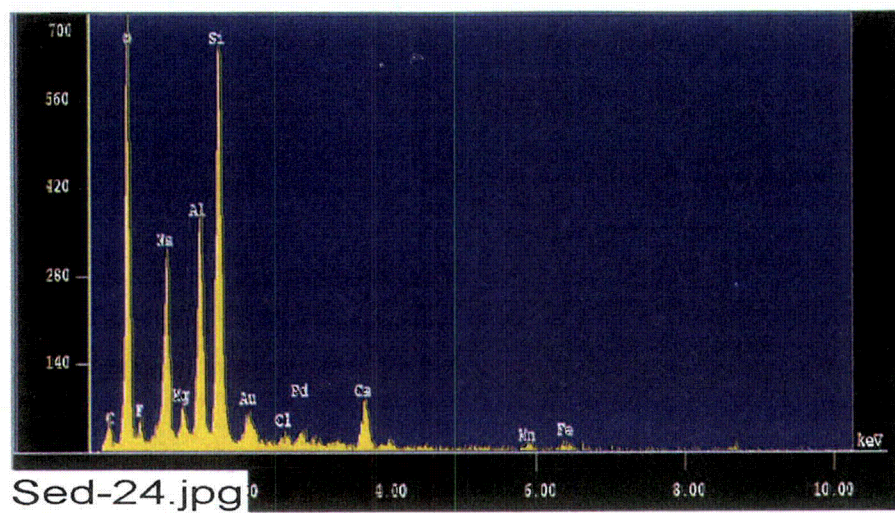


Figure D-107. Day-30, post-T1-sample-Sed2B counting spectrum (EDS SED-24) for the particles on the plate in image Post-T1060 (see Figure D-105).

The results from the chemical composition analysis for EDS SED-24 are given in Table D-37.

**Table D-37. The Chemical Compositions for EDS SED-24**

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Group : NRC  
Sample : PostTl\_1-28-05 ID# : 24  
Comment : Tank sediment sample  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 4.195E-10 A  
Stage Point : X= 8.337 Y=63.713 Z=12.288  
Acq. Date : Fri Jan 28 15:46:01 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
C K	Normal	0.09- 0.46	0.0000	0.0000	0 / 58
O K	Normal	0.25- 0.77	39.6299	0.0037	6485 / 38
F K	Normal	0.46- 0.87	2.0252	0.0029	189 / 72
Na K	Normal	0.83- 1.28	4.3170	0.0083	2222 / 39
Mg K	Normal	1.03- 1.52	0.6122	0.0011	398 / 292
Al K	Normal	1.26- 1.78	4.0630	0.0011	3152 / 226
Si K	Normal	1.50- 2.07	7.5171	0.0017	5827 / 185
Ca K	Normal	3.40- 4.30	2.4193	0.0055	992 / 14
Mn K	Normal	5.53- 6.82	1.1727	0.0007	176 / 6
Fe K	Normal	6.04- 7.40	0.7872	0.0314	104 / 4

Chi\_square = 4.2987

Element	Mass%	Atomic%	ZAF	Z	A	F
C	0.000	0.0000	4.7675	1.0337	4.6124	0.9999
O	52.424	64.0771	0.8428	0.9859	0.8551	0.9998
F	9.581	9.8616	3.0142	1.0942	2.7551	0.9998
Na	8.097	6.8877	1.1951	0.9902	1.2060	1.0007
Mg	1.139	0.9165	1.1859	0.9928	1.1954	0.9992
Al	7.634	5.5326	1.1971	0.9983	1.2031	0.9968
Si	13.858	9.6491	1.1746	0.9861	1.1913	0.9999
Ca	3.759	1.8341	0.9900	0.9993	0.9915	0.9992
Mn	2.277	0.8106	1.2373	1.2374	0.9999	1.0000
Fe	1.230	0.4306	0.9953	0.9950	0.9996	1.0008

Total 100.000 100.0000  
Normalization factor = 1.5695



Figure D-108. Day-30, post-T1-sample-Sed2B SEM-SE image (Post-T1061) magnified 160 times on the particles and fibers at left side of image Post-T1059 (see Figure D-103).

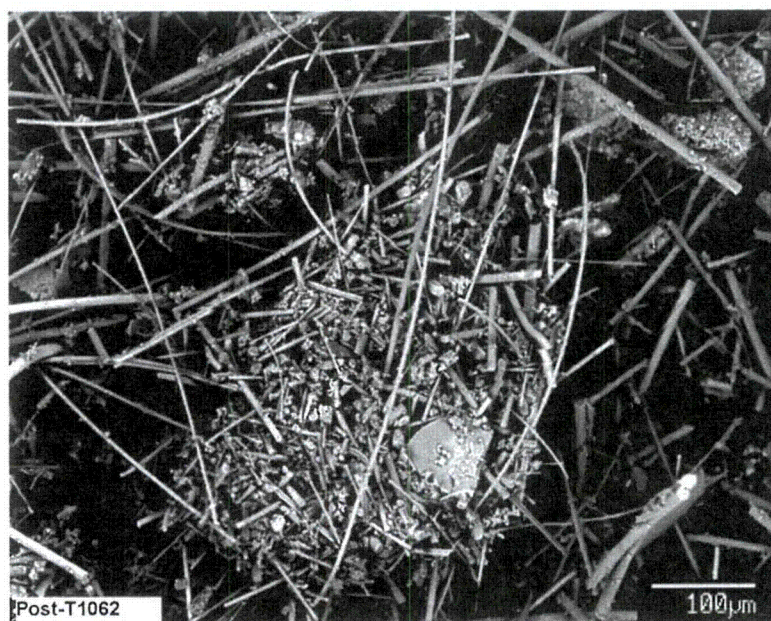


Figure D-109. Day-30, post-T1-sample-Sed2B SEM-BSE image (Post-T1062) magnified 160 times on the same field as in image Post-T1061 (see Figure D-108).



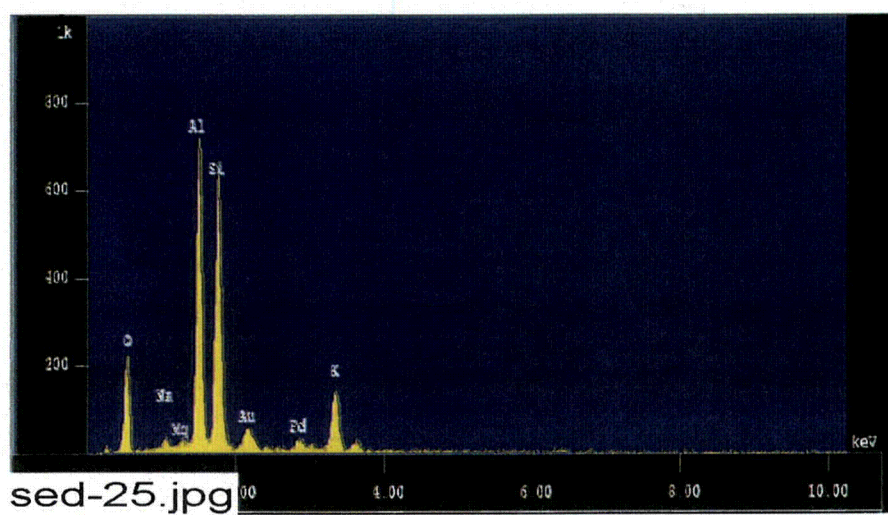


Figure D-110. Day-30, post-T1-sample-Sed2B counting spectrum (EDS SED-25) on the particle in agglomerate image Post-T1062 (see Figure D-109).

The results from the chemical composition analysis for EDS SED-25 are given in Table D-38.

**Table D-38. The Chemical Compositions for EDS SED-25**

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Group : NRC  
 Sample : PostT1\_1-28-05 ID# : 25  
 Comment : Tank sediment sample  
 Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
           Live Time : 100.000 sec Aperture # : 1  
           Acc. Volt : 15.0 KV Probe Current : 4.259E-10 A  
           Stage Point : X= 9.289 Y=64.031 Z=12.288  
           Acq. Date : Fri Jan 28 15:57:48 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	12.2389	0.0019	2033 / 14
Al K	Normal	1.26- 1.78	7.7756	0.0014	6123 / 206
Si K	Normal	1.50- 2.07	7.3272	0.0017	5767 / 346
K K	Normal	3.01- 3.86	7.2242	0.0024	1886 / 15
Na K	Normal	0.83- 1.28	0.3054	0.0033	160 / 25
Mg K	Normal	1.03- 1.52	0.1299	0.0008	86 / 228

-----  
 Chi\_square = 3.9525

Element	Mass%	Atomic%	ZAF	Z	A	F
O	40.610	56.4293	1.4063	0.9807	1.4340	1.0000
Al	19.030	15.6793	1.0373	0.9923	1.0508	0.9948
Si	20.371	16.1251	1.1784	0.9800	1.2031	0.9994
K	18.942	10.7696	1.1113	1.2263	0.9062	1.0000
Na	0.747	0.7224	1.0369	0.9846	1.0534	0.9998
Mg	0.300	0.2743	0.9792	0.9871	0.9962	0.9959

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 Total 100.000 100.0000  
 Normalization factor = 2.3594

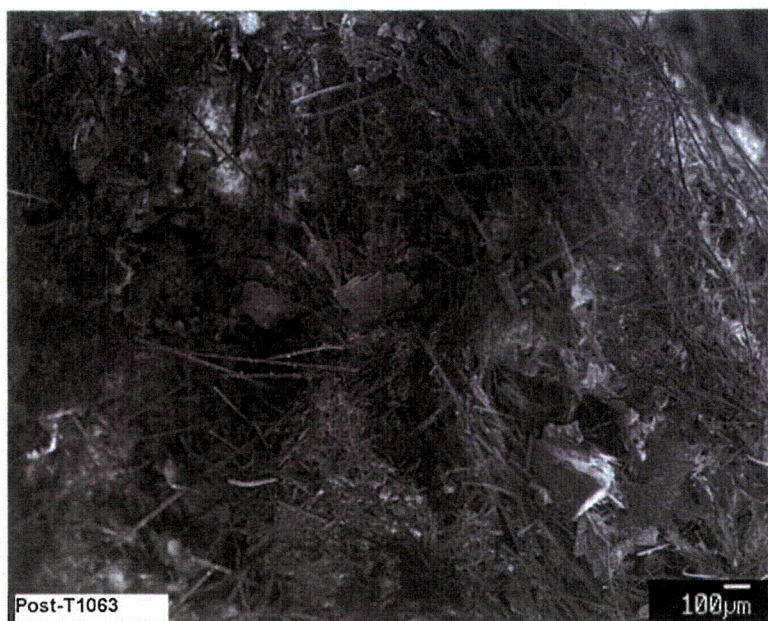


Figure D-111. Day-30, post-T1-sample-P1 SEM-SE image (Post-T1063) magnified 40 times; overview of the large particles present in the pump-suction-debris sample.



Figure D-112. Day-30, post-T1-sample-P1 SEM-BSE image (Post-T1064) magnified 40 times on the same large particles as in image Post-T1063 (see Figure D-111).





Figure D-113. Day-30, post-T1-sample-P1 SEM-SE image (Post-T1064 annotated) annotating the EDS locations.

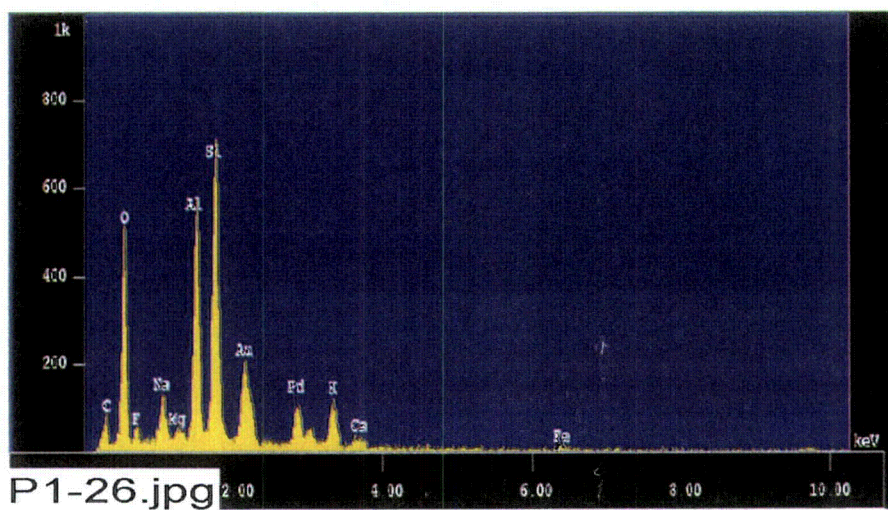


Figure D-114. Day-30, post-T1-sample-P1 counting spectrum (EDS P1-26) on the triangular large particle in image Post-T1064 (see Figure D-113).

The results from the chemical composition analysis for EDS P1-26 are given in Table D-39.

**Table D-39. The Chemical Compositions for EDS P1-26**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 26  
Comment : Pump Suction Debris  
Condition : Full Scale : 20keV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 4.196E-10 A  
Stage Point : X=70.335 Y=64.112 Z=12.288  
Acq. Date : Fri Jan 28 16:14:09 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
C K	Normal	0.09- 0.46	1.4540	0.0003	353 / 59
O K	Normal	0.25- 0.77	28.7309	0.0030	4703 / 46
F K	Normal	0.46- 0.87	5.1768	0.0022	484 / 72
Na K	Normal	0.83- 1.28	1.5083	0.0060	776 / 42
Al K	Normal	1.26- 1.78	5.9468	0.0013	4614 / 226
Si K	Normal	1.50- 2.07	7.8631	0.0018	6097 / 299
K K	Normal	3.01- 3.86	5.2345	0.0023	1347 / 32
Fe K	Normal	6.04- 7.40	0.8985	0.0331	119 / 6

Chi\_square = 4.0233

Element	Mass%	Atomic%	ZAF	Z	A	F
C	8.303	13.0283	4.2517	1.0269	4.1405	1.0000
O	40.921	48.2017	1.0604	0.9794	1.0829	0.9997
F	18.488	18.3398	2.6588	1.0871	2.4460	0.9999
Na	2.433	1.9946	1.2011	0.9839	1.2198	1.0008
Al	8.989	6.2784	1.1254	0.9920	1.1380	0.9969
Si	12.026	8.0693	1.1386	0.9799	1.1623	0.9997
K	7.644	3.6842	1.0872	1.2279	0.8855	0.9999
Fe	1.196	0.4036	0.9910	0.9898	1.0005	1.0008

Total 100.000 100.0000  
Normalization factor = 1.3432

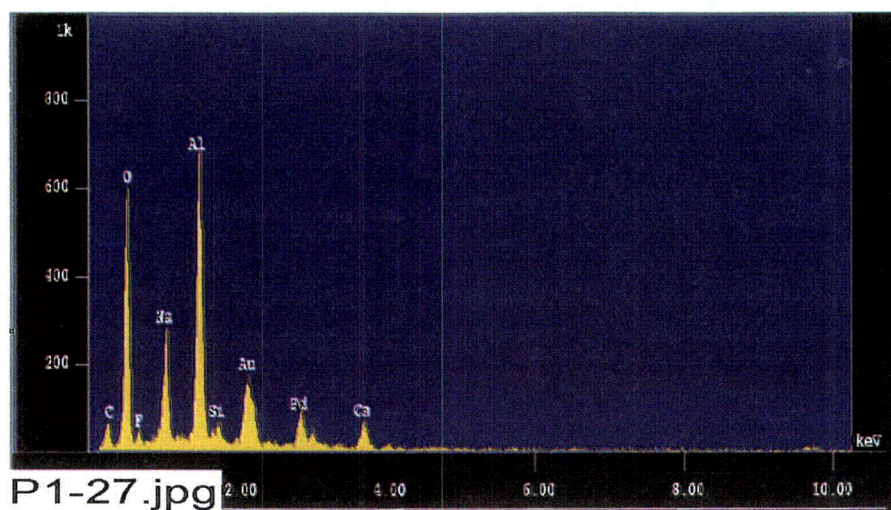


Figure D-115. Day-30, post-T1-sample-P1 counting spectrum (EDS P1-27) on the flat particle at lower right corner of image Post-T1064 (see Figure D-113).



The results from the chemical composition analysis for EDS P1-27 are given in Table D-40.

**Table D-40. The Chemical Compositions for EDS P1-27**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 27  
Comment : pump suction screen debris  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 4.189E-10 A  
Stage Point : X=70.335 Y=64.112 Z=12.288  
Acq. Date : Fri Jan 28 16:20:03 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
C K	Normal	0.09- 0.46	0.2744	0.0004	67 / 46
O K	Normal	0.25- 0.77	32.5575	0.0032	5320 / 48
F K	Normal	0.46- 0.87	3.9728	0.0020	371 / 58
Na K	Normal	0.83- 1.28	3.8472	0.0077	1977 / 28
Al K	Normal	1.26- 1.78	7.4580	0.0014	5777 / 38
Si K	Normal	1.50- 2.07	0.2973	0.0007	230 / 367
Ca K	Normal	3.40- 4.30	1.8105	0.0052	741 / 12

Chi\_square = 6.2495

Element	Mass%	Atomic%	ZAF	Z	A	F
C	2.094	3.2545	4.0445	1.0324	3.9179	1.0000
O	48.264	56.3066	0.7857	0.9847	0.7982	0.9997
F	20.048	19.6968	2.6747	1.0930	2.4476	0.9998
Na	8.725	7.0835	1.2020	0.9892	1.2143	1.0007
Al	16.804	11.6242	1.1942	0.9974	1.1975	0.9998
Si	0.711	0.4725	1.2673	0.9853	1.2863	0.9999
Ca	3.354	1.5620	0.9819	0.9992	0.9826	1.0001

Total 100.000 100.0000  
Normalization factor = 1.8867

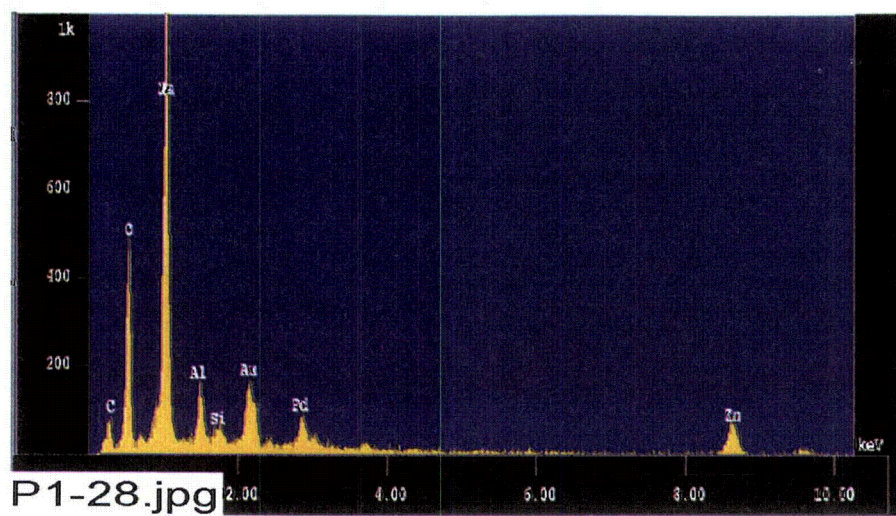


Figure D-116. Day-30, post-T1-sample-P1 counting spectrum (EDS P1-28) on bright particle in the center of image Post-T1064 (see Figure D-113).

The results from the chemical composition analysis for EDS P1-28 are given in Table D-41.

**Table D-41. The Chemical Compositions for EDS P1-28**

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Group : NRC  
Sample : PostT1\_1-28-05 ID# : 28  
Comment : pump suction screen debris  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 100.000 sec Aperture # : 1  
Acc. Volt : 15.0 KV Probe Current : 4.194E-10 A  
Stage Point : X=70.335 Y=64.112 Z=12.288  
Acq. Date : Fri Jan 28 16:24:11 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	27.2716	0.0030	4462 /	58
Na K	Normal	0.83- 1.28	0.0000	0.0000	0 /	43
Al K	Normal	1.26- 1.78	1.4018	0.0008	1087 /	45
Zn K	Normal	8.22-10.03	26.4466	0.0088	1250 /	6
Si K	Normal	1.50- 2.07	0.2317	0.0007	180 /	96
C K	Normal	0.09- 0.46	1.2827	0.0003	311 /	52

Chi\_square = 4.4939

Element	Mass%	Atomic%	ZAF	Z	A	F
O	38.917	59.7633	0.9217	0.9084	1.0148	0.9999
Na	0.000	0.0000	1.7609	0.9116	1.9289	1.0015
Al	3.598	3.2767	1.6582	0.9183	1.8058	0.9999
Zn	47.937	18.0168	1.1708	1.1742	0.9971	1.0000
Si	0.502	0.4394	1.4004	0.9067	1.5446	1.0000
C	9.046	18.5038	4.5552	0.9529	4.7807	1.0000

Total 100.000 100.0000  
Normalization factor = 1.5482



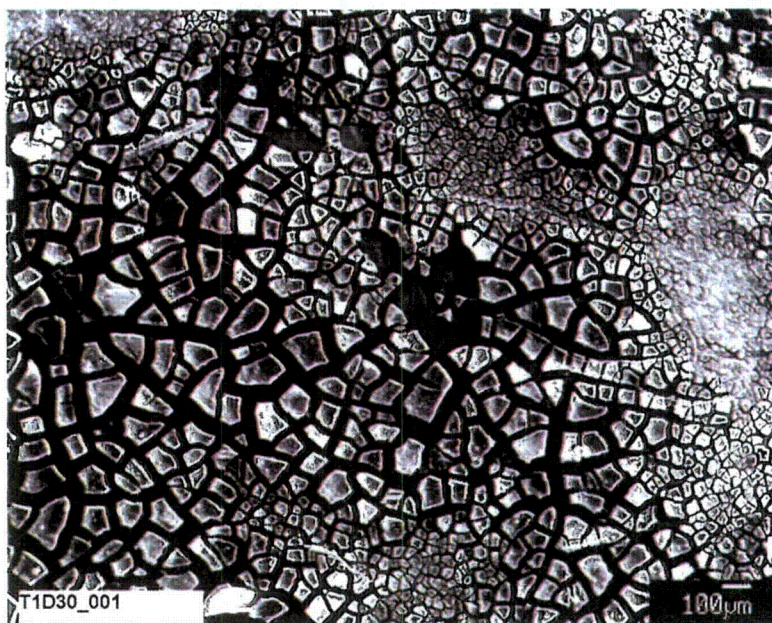


Figure D-117. Day-30, high-volume sample Microprobe image (T1D30\_001) magnified 40 times; overview of the filtrate.

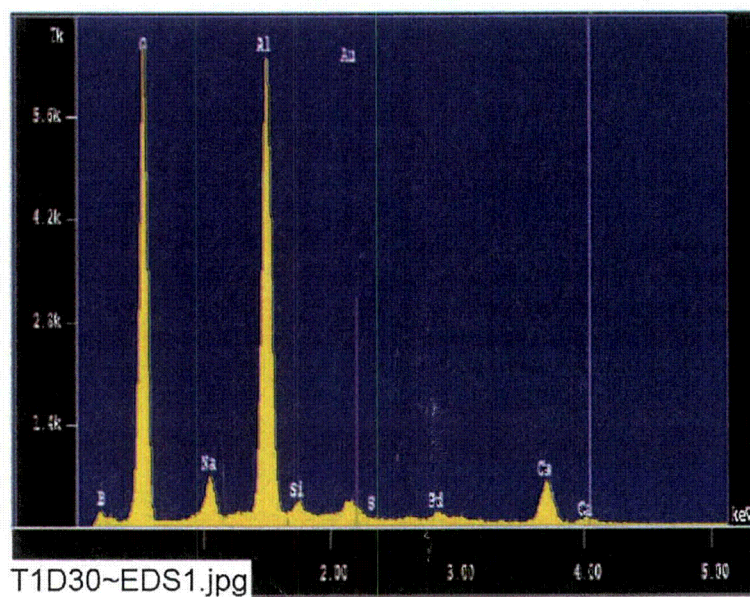


Figure D-118. Day-30, high-volume sample counting spectrum (T1D30~EDS1) for the filtrate.

The results from the chemical composition analysis for EDS (T1D30~EDS1) are given in Table D-42.

**Table D-42. The Chemical Compositions for EDS (T1D30-EDS1)**

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Group : NRC  
Sample : T1D30\_EDS1 ID# : 1  
Comment : filtrate  
Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
Live Time : 60.000 sec Aperture # : 2  
Acc. Volt : 15.0 KV Probe Current : 2.869E-08 A  
Stage Point : X=51.618 Y=62.980 Z=10.097  
Acq. Date : Fri Feb 25 10:17:16 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	59.9054	0.0095	53380 / 140
Al K	Normal	1.26- 1.78	13.0861	0.0041	55272 / 259
Si K	Normal	1.50- 2.07	0.3594	0.0017	1517 / 3145
Ca K	Normal	3.40- 4.30	3.3380	0.0154	7454 / 63
Na K	Normal	0.83- 1.28	1.5755	0.0137	4415 / 156
B K	Normal	0.00- 0.36	2.8524	0.0005	1058 / 52

-----  
Chi\_square = 105.5553

Element	Mass%	Atomic%	ZAF	Z	A	F
O	57.362	55.9594	0.9173	0.9628	0.9527	1.0000
Al	14.240	8.2372	1.0424	0.9762	1.0680	0.9998
Si	0.425	0.2363	1.1334	0.9646	1.1751	0.9999
Ca	3.311	1.2893	0.9501	0.9801	0.9693	1.0001
Na	1.736	1.1785	1.0555	0.9678	1.0900	1.0006
B	22.927	33.0993	7.6998	1.1177	6.8889	1.0000

-----  
Total 100.000 100.0000  
Normalization factor = 1.0439

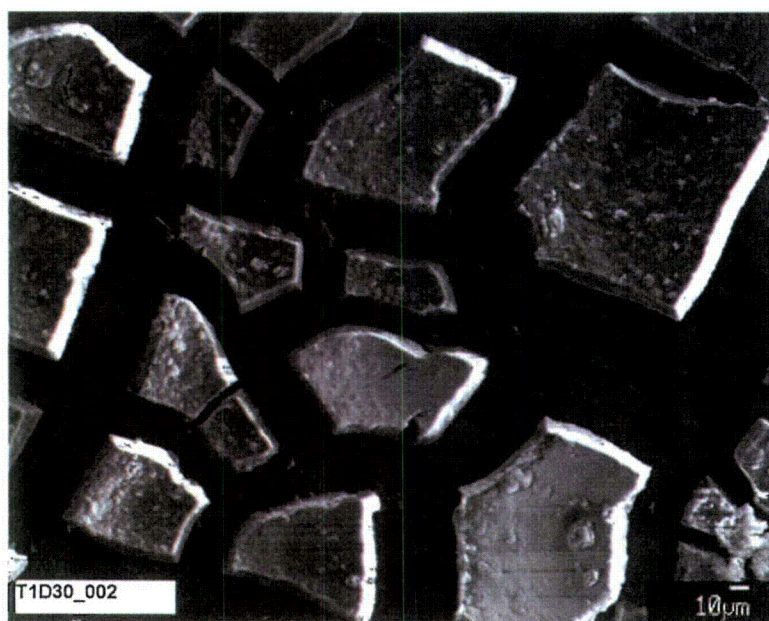


Figure D-119. Day-30, high-volume sample microprobe image (T1D30\_002) magnified 300 times, close-up of the filter.

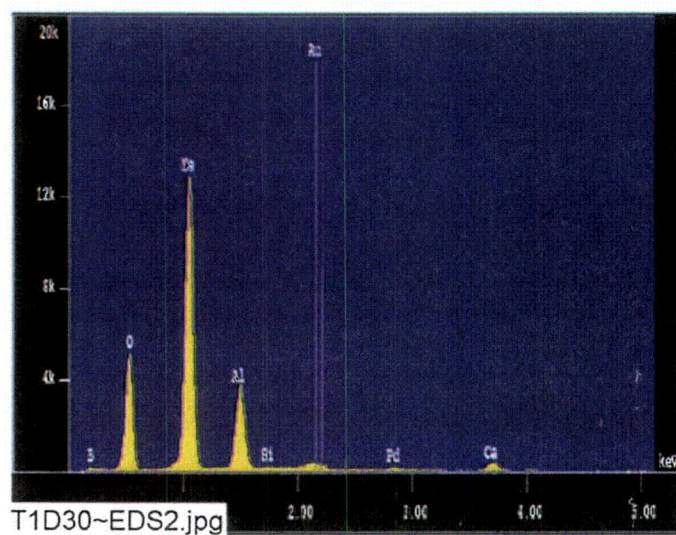


Figure D-120. Day-30, high-volume sample counting spectrum (T1D30~EDS2) on the filter, as shown in Figure D-119.



The results from the chemical composition analysis for EDS (T1D30-EDS2) are given in Table D-43.

**Table D-43. The Chemical Compositions for EDS (T1D30-EDS2)**

Feb 25 10:36 2005 /tmp/eds\_pout.log Page 1

Group : NRC  
 Sample : T1D30\_EDS2 ID# : 2  
 Comment : filtrate  
 Condition : Full Scale : 20KeV(10eV/ch,2Kch)  
 Live Time : 60.000 sec Aperture # : 2  
 Acc. Volt : 15.0 KV Probe Current : 2.841E-08 A  
 Stage Point : X=51.946 Y=63.301 Z=10.071  
 Acq. Date : Fri Feb 25 10:32:31 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	49.2514	0.0089	43458 / 178
Al K	Normal	1.26- 1.78	7.4252	0.0032	31056 / 234
Si K	Normal	1.50- 2.07	0.1899	0.0016	794 / 1939
Ca K	Normal	3.40- 4.30	1.9646	0.0133	4344 / 84
Na K	Normal	0.83- 1.28	37.3248	0.0465	103570 / 196
B K	Normal	0.00- 0.36	2.1713	0.0005	797 / 62

Chi\_square = 63.9091

Element	Mass%	Atomic%	ZAF	Z	A	F
O	39.105	40.6471	0.8807	0.9629	0.9147	0.9999
Al	8.360	5.1523	1.2488	0.9759	1.2797	0.9999
Si	0.207	0.1224	1.2075	0.9643	1.2523	1.0000
Ca	1.696	0.7035	0.9573	0.9790	0.9778	1.0001
Na	30.078	21.7569	0.8938	0.9676	0.9227	1.0011
B	20.555	31.6177	10.4997	1.1180	9.3919	1.0000

Total 100.000 100.0000  
 Normalization factor = 0.9016