

Appendix A

ESEM/EDS Data for Test #4, Day-5 Fiberglass in Low-Flow Zone

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During ICET Test #4, work was continued for the purpose of identifying the origin and chemical composition of the products that were formed during the test. One objective of ICET is to identify the composition of debris on fiberglass and the particulate substances in the test solution. To address this question partially, low-flow fiberglass samples on Test #4, Day 5 were examined by ESEM/EDS, including both of the exterior and the interior location of the fiberglass samples.

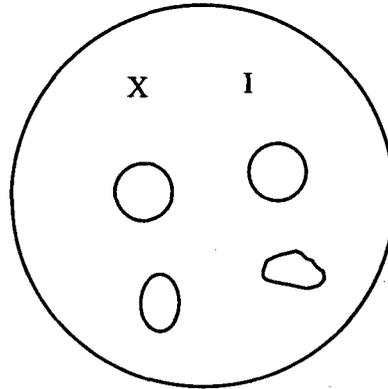
ESEM was employed to analyze the hydrated fiberglass samples without any coating under a low-vacuum condition (i.e., 80 Pa). This process minimizes the modification of the fiberglass samples as compared with normal SEM that would involve a drying process. EDS results provide a semi-quantitative elemental analysis of the debris attached on fiberglass.

Test #4, Day-5 low-flow fiberglass samples were obtained on May 29, 2005 (fifth date for Test #4). ESEM/EDS data presented here were obtained on May 31, 2005.

Transcribed Laboratory Log

Laboratory session from May 31, 2005.

ESEM/EDS Test #4, Day-5 Fiberglass in Low-Flow Zone



ESEM Exterior Low-Flow Fiberglass Samples

Image:	T4D5LFX1	80 ×	ESEM image	Figure A-1
	t4d5lfx4	80 ×	ESEM at higher magnification	Figure A-2
	t4d5lfx2	500 ×		Figure A-3
	t4d5lfx3	1000 ×		Figure A-4
	t4d5lx11	1000 ×		Figure A-5
	t4d5lx14	500 ×		Figure A-6
	t4d5lx12	1000 ×		Figure A-7
EDS:	t4d5lx13			Figure A-8

ESEM Interior Low-Flow Fiberglass Samples

Image:	t4d5lfi5	80 ×	ESEM image	Figure A-9
	t4d5lfi6	500 ×	ESEM at higher magnification	Figure A-10
	t4d5lfi7	500 ×		Figure A-11
	t4d5lfi8	2000 ×		Figure A-12
	t4d5lfi9	1000 ×		Figure A-13
	t4d5li10	1000 ×		Figure A-14
	t4d5li15	500 ×		Figure A-15

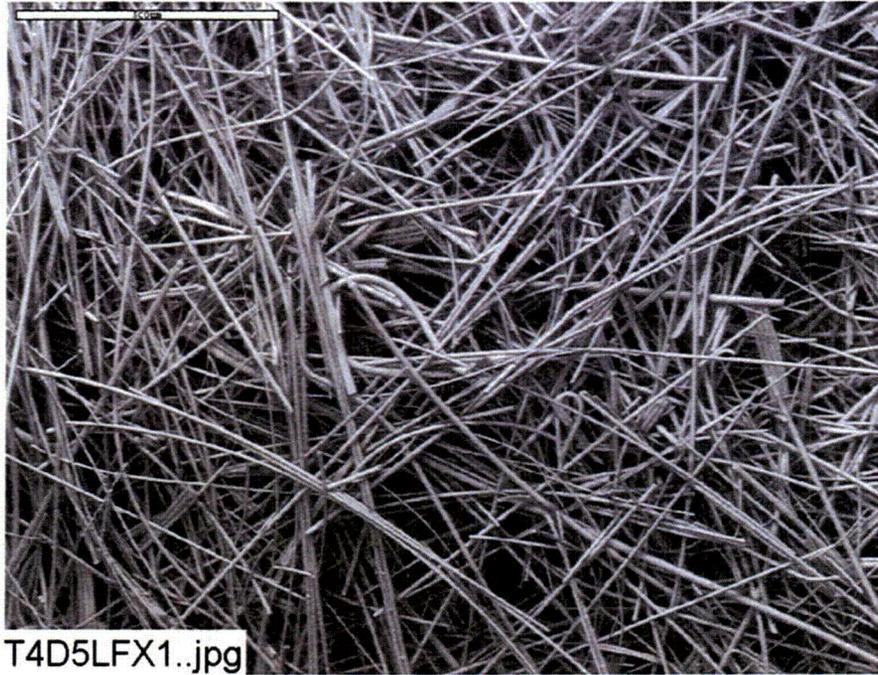


Figure A-1. Environmental SEM image magnified 80 times for a Test #4, Day-5 low-flow exterior fiberglass sample. (T4D5LFX1.jpg)

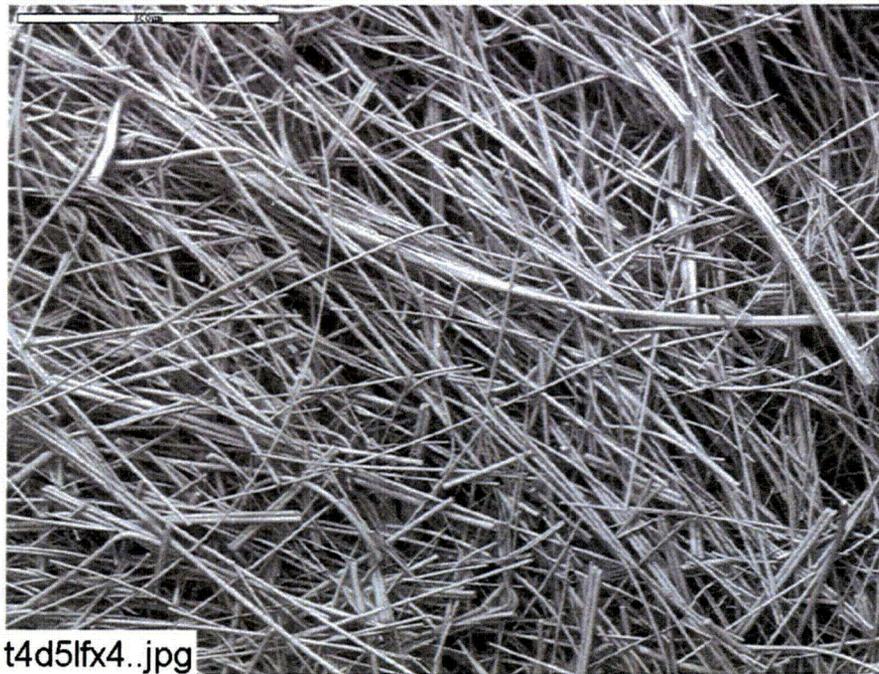
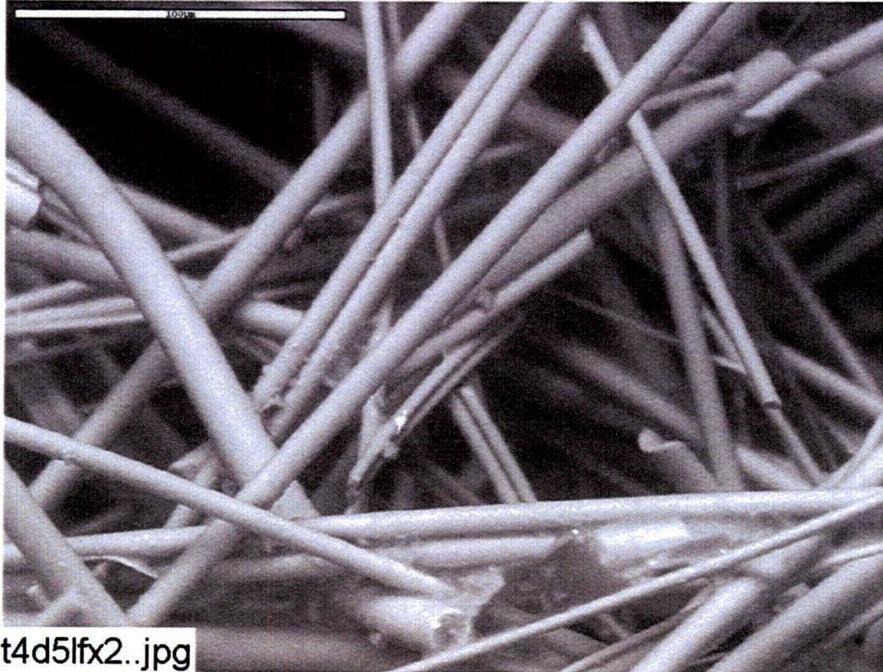
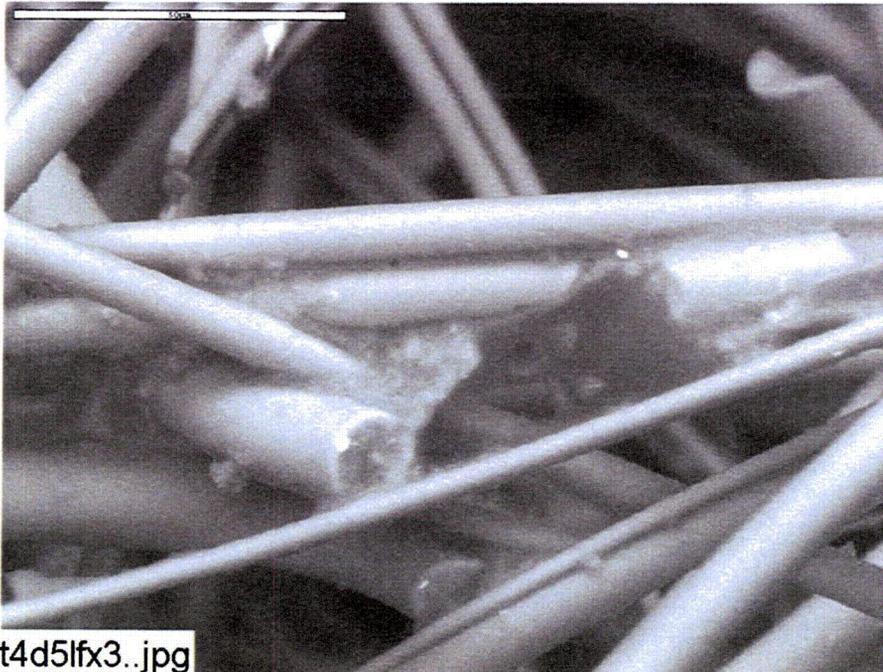


Figure A-2. Environmental SEM image magnified 80 times for a Test #4, Day-5 low-flow exterior fiberglass sample. (t4d5lfx4.jpg)



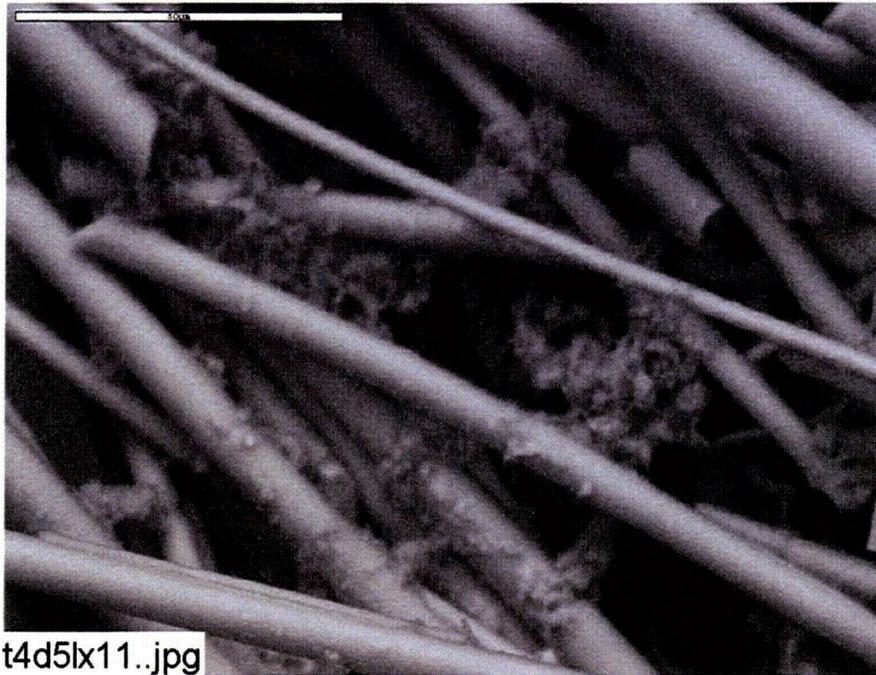
t4d5lfx2..jpg

Figure A-3. Environmental SEM image magnified 500 times for a Test #4, Day-5 low-flow exterior fiberglass sample. (t4d5lfx2.jpg)



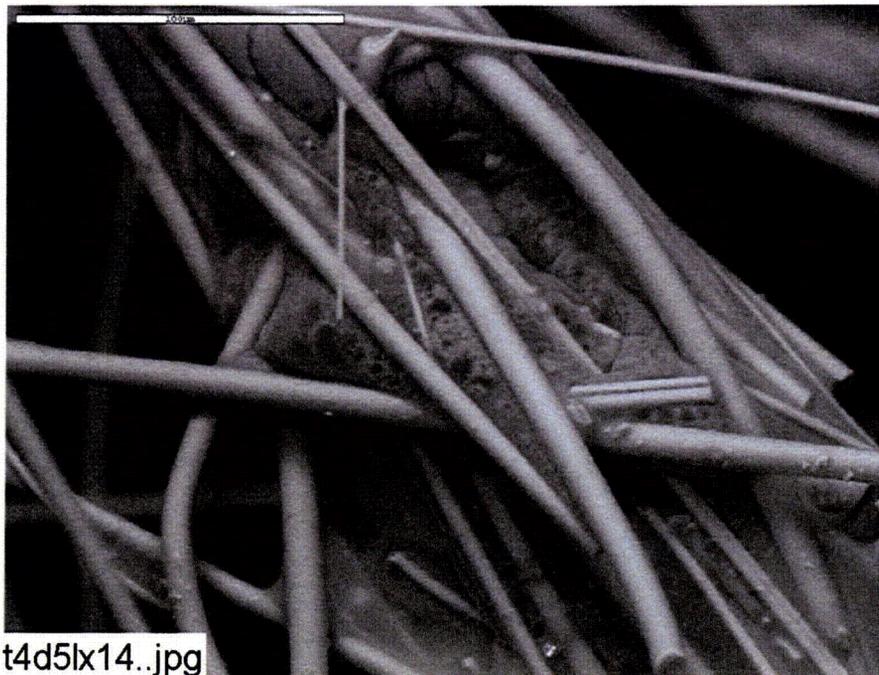
t4d5lfx3..jpg

Figure A-4. Environmental SEM image magnified 1000 times for a Test #4, Day-5 low-flow exterior fiberglass sample. (t4d5lfx3.jpg)



t4d5lx11..jpg

Figure A-5. Environmental SEM image magnified 1000 times for a Test #4, Day-5 low-flow exterior fiberglass sample. (t4d5lx11.jpg)



t4d5lx14..jpg

Figure A-6. Environmental SEM image magnified 500 times for a Test #4, Day-5 low-flow exterior fiberglass sample. (t4d5lx14.jpg)

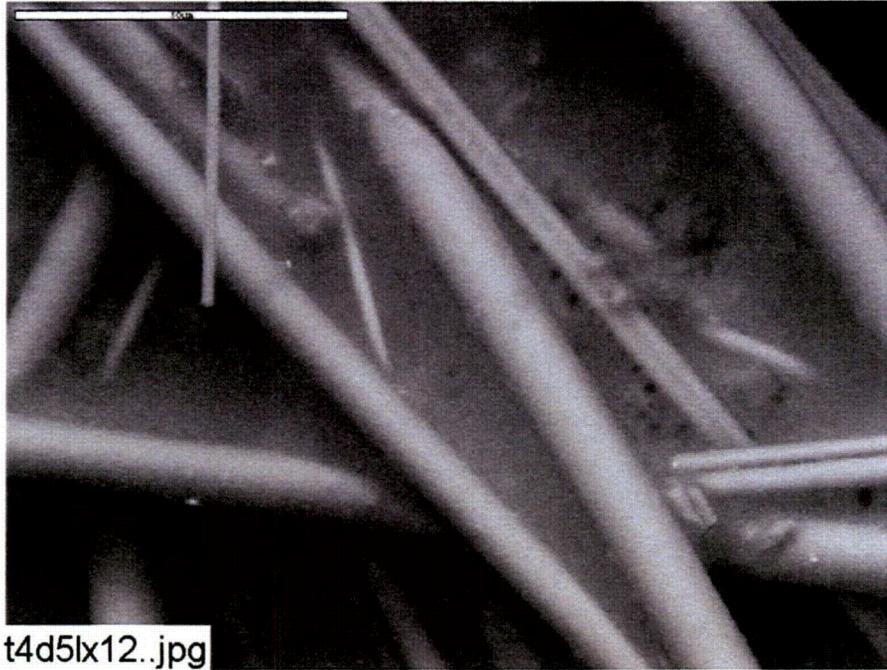


Figure A-7. Environmental SEM image magnified 1000 times for a Test #4, Day-5 low-flow exterior fiberglass sample. (t4d5lx12.jpg)

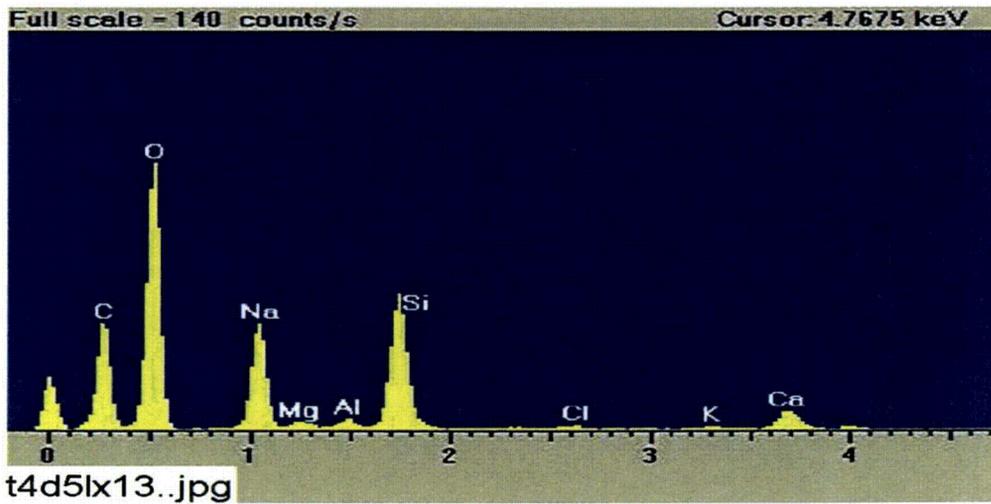


Figure A-8. EDS counting spectrum for the film between the fibers shown in Figure A-7. (t4d5lx13.jpg)

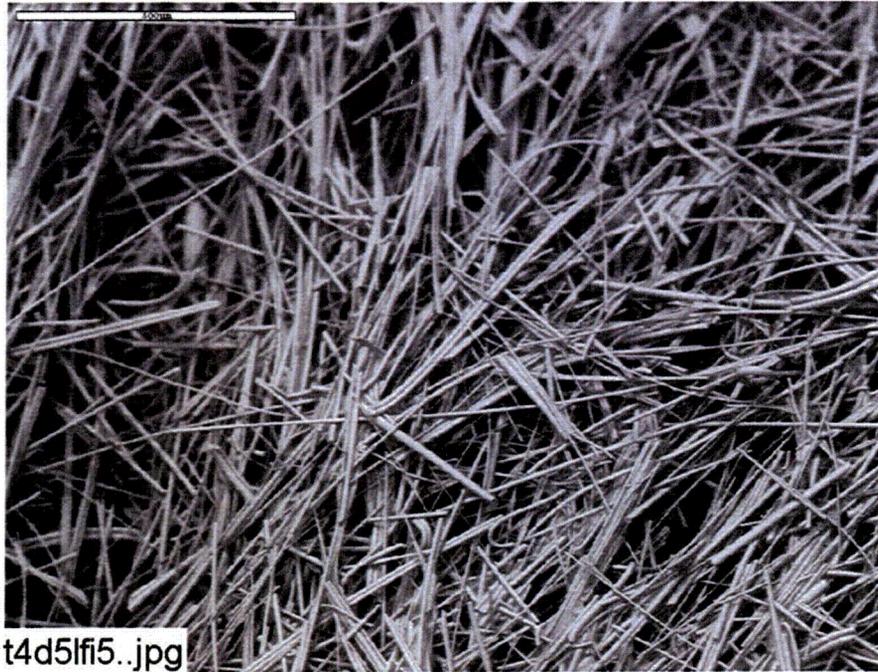


Figure A-9. Environmental SEM image magnified 80 times for a Test #4, Day-5 low-flow interior fiberglass sample. (t4d5lf5.jpg)

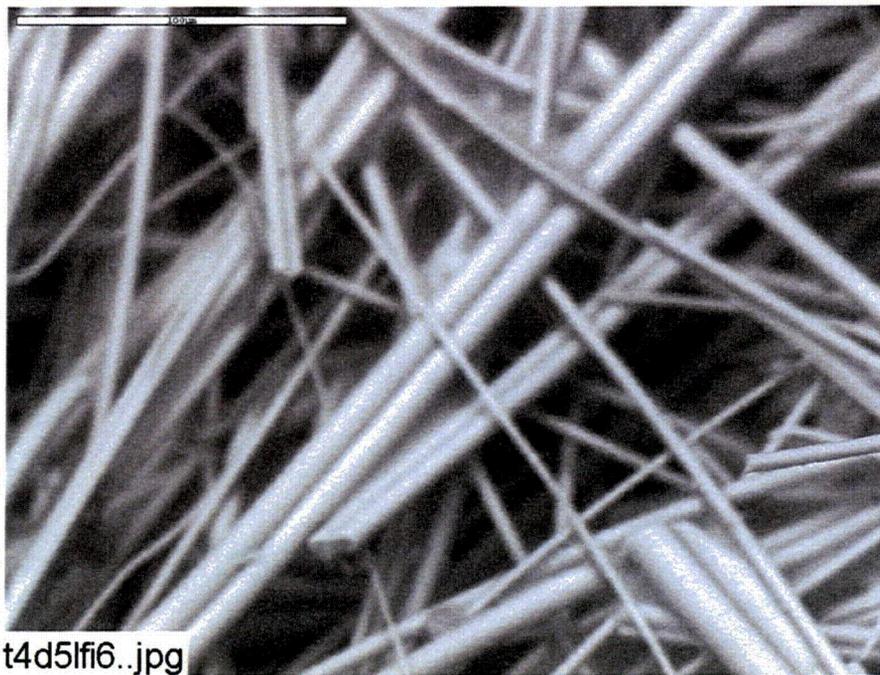
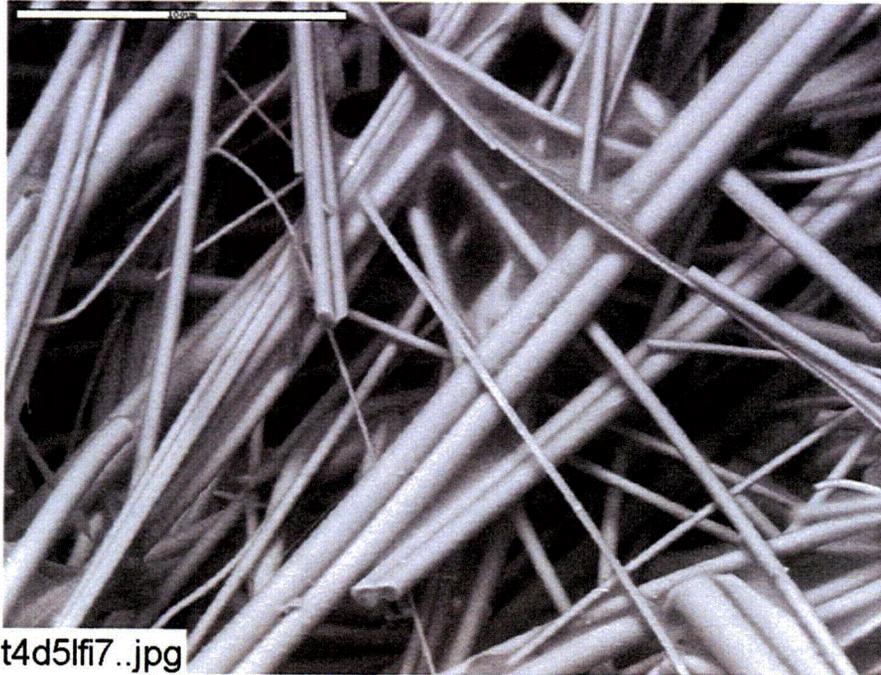
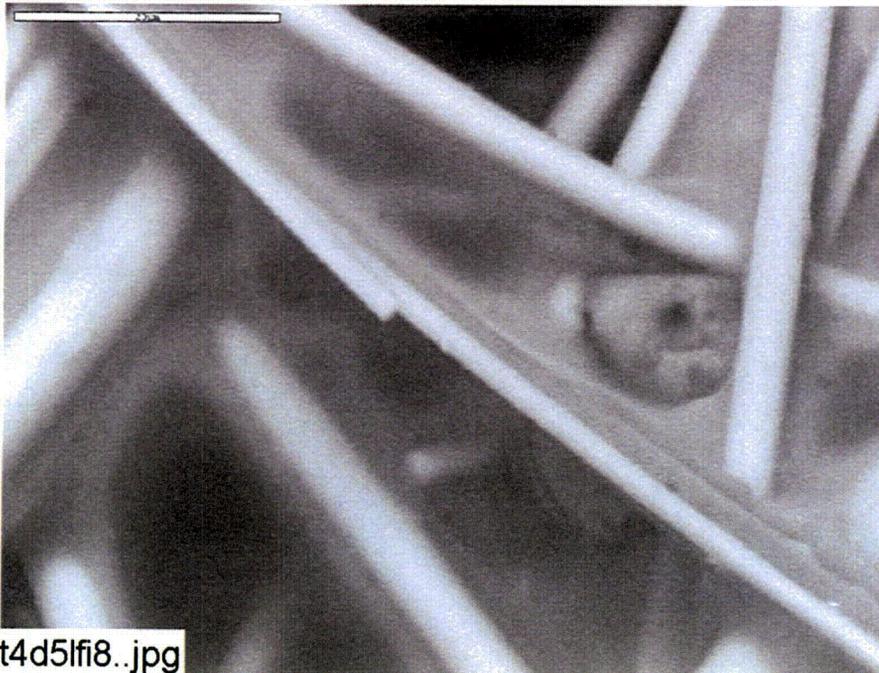


Figure A-10. Environmental SEM image magnified 500 times for a Test #4, Day-5 low-flow interior fiberglass sample. (t4d5lf6.jpg)



t4d5lf17..jpg

Figure A-11. Environmental SEM image magnified 500 times for a Test #4, Day-5 low-flow interior fiberglass sample. (t4d5lf17.jpg)



t4d5lf18..jpg

Figure A-12. Environmental SEM image magnified 2000 times for a Test #4, Day-5 low-flow interior fiberglass sample. (t4d5lf18.jpg)

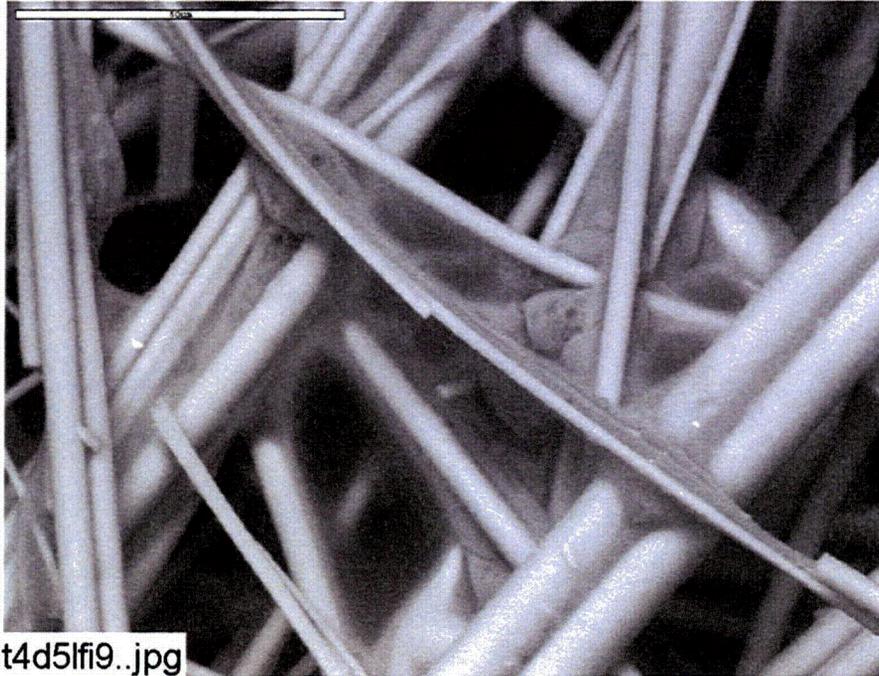


Figure A-13. Environmental SEM image magnified 1000 times for a Test #4, Day-5 low-flow interior fiberglass sample. (t4d5lf9.jpg)

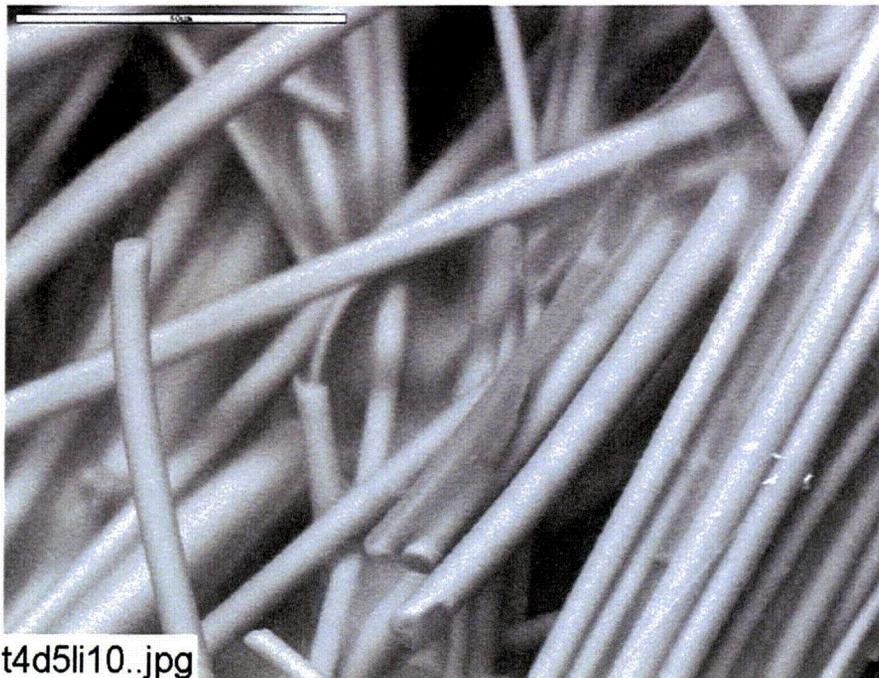
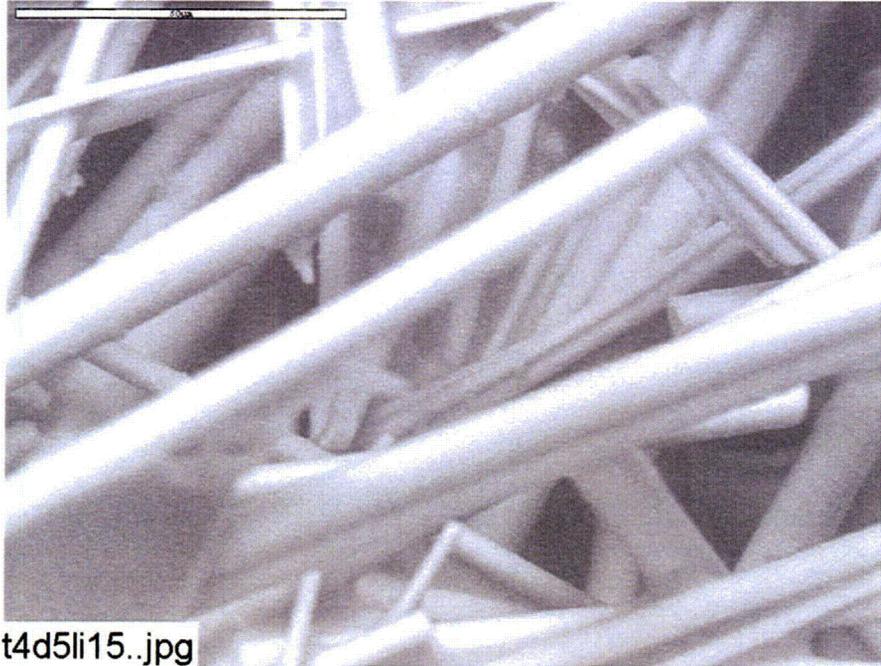


Figure A-14. Environmental SEM image magnified 1000 times for a Test #4, Day-5 low-flow interior fiberglass sample. (t4d5li10.jpg)



t4d5li15..jpg

Figure A-15. Environmental SEM image magnified 500 times for a Test #4, Day-5 low-flow interior fiberglass sample. (t4d5li15)



Appendix B1

ESEM/EDS Data for Test #4, Day-15 Fiberglass in Low-Flow Zones

Figures

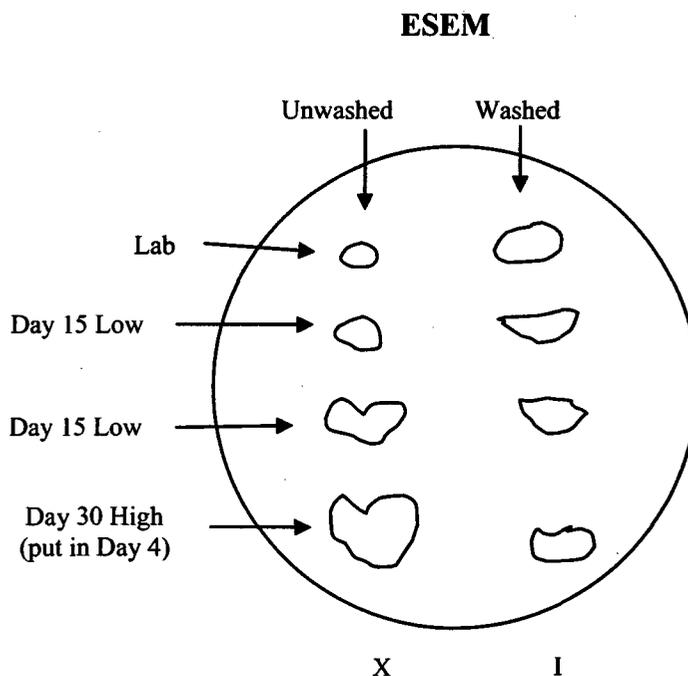
- Figure B1-1. Annotated environmental SEM image magnified 100 times for a Test #4, Day-15 exterior low-flow fiberglass sample. (t4d15lx3.jpg)..... B1-4
- Figure B1-2. EDS counting spectrum for the particulate deposit on fiberglass shown in Figure B1-1. (t4d15lx2.jpg) B1-4
- Figure B1-3. Environmental SEM image magnified 500 times for a Test #4, Day-15 exterior low-flow fiberglass sample. (t4d15lx4.jpg)..... B1-5
- Figure B1-4. Environmental SEM image magnified 1000 times for a Test #4, Day-15 exterior low-flow fiberglass sample. (t4d15lx5.jpg)..... B1-5
- Figure B1-5. Environmental SEM image magnified 100 times for a Test #4, Day-15 interior low-flow fiberglass sample. (t4d15li6.jpg) B1-6
- Figure B1-6. Environmental SEM image magnified 500 times for a Test #4, Day-15 interior low-flow fiberglass sample. (t4d15li7.jpg) B1-6
- Figure B1-7. Environmental SEM image magnified 1000 times for a Test #4, Day-15 interior low-flow fiberglass sample. (t4d15li8.jpg) B1-7

This appendix shows the ESEM/EDS results on ICET Test #4, Day-15 low-flow zone fiberglass samples. The samples were obtained on June 8, 2005 (fifteenth date for Test #4). Both exterior and interior locations of the fiberglass samples were examined. ESEM/EDS data presented here were obtained on June 23, 2005. The hydrated fiberglass samples without any coating were examined by ESEM under a low-vacuum condition (i.e., 80 Pa). EDS results provide a semi-quantitative elemental analysis of the debris attached on fiberglass.

Transcribed Laboratory Log

Laboratory session from June 23, 2005.

Test #4, Day-15 Fiberglass In Low-Flow Zones



ESEM Fiberglass Low-Flow Exterior

Image: t4d15lx3	100 ×	ESEM annotated image	Figure B1-1
EDS: t4d15lx2		EDS image on particles in t4d15lx3	Figure B1-2
Image: t4d15lx4	500 ×	ESEM image of fiberglass	Figure B1-3
t4d15lx5	1000 ×	ESEM image at higher magnification	Figure B1-4

ESEM Fiberglass Low-Flow Interior

Image: t4d15li6	100 ×	ESEM image of fiberglass	Figure B1-5
t4d15li7	500 ×	ESEM image of fiberglass	Figure B1-6
t4d15li8	1000 ×	ESEM image at higher magnification	Figure B1-7

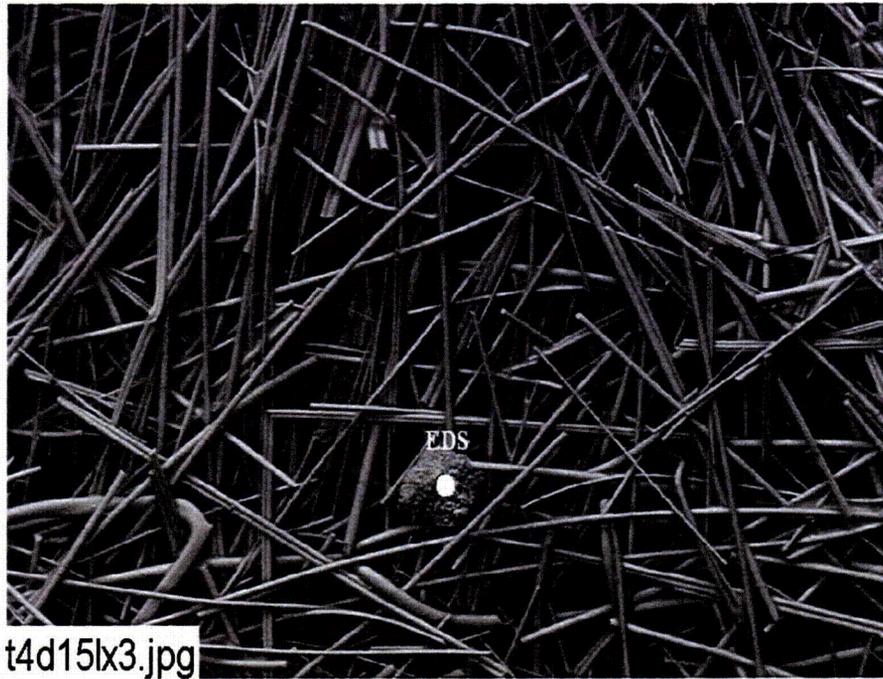


Figure B1-1. Annotated environmental SEM image magnified 100 times for a Test #4, Day-15 exterior low-flow fiberglass sample. (t4d15lx3.jpg)

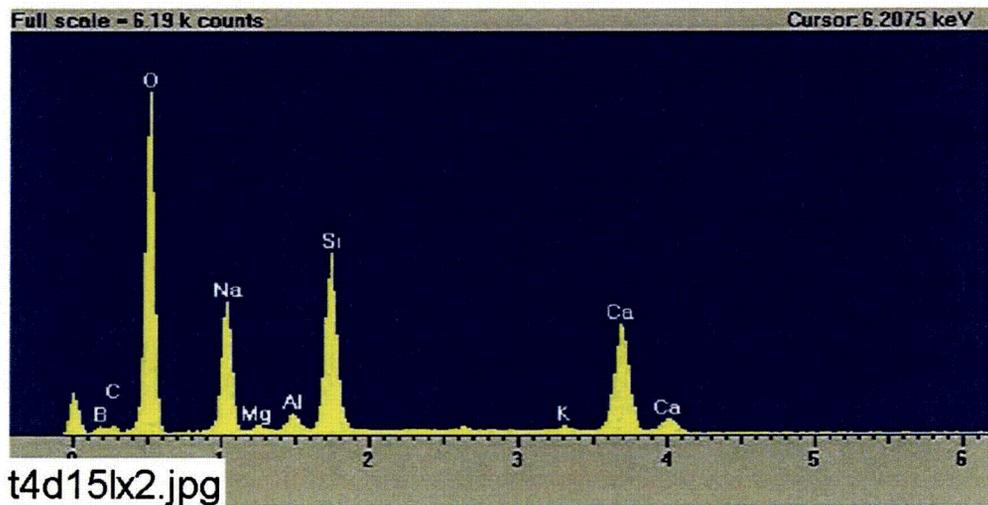
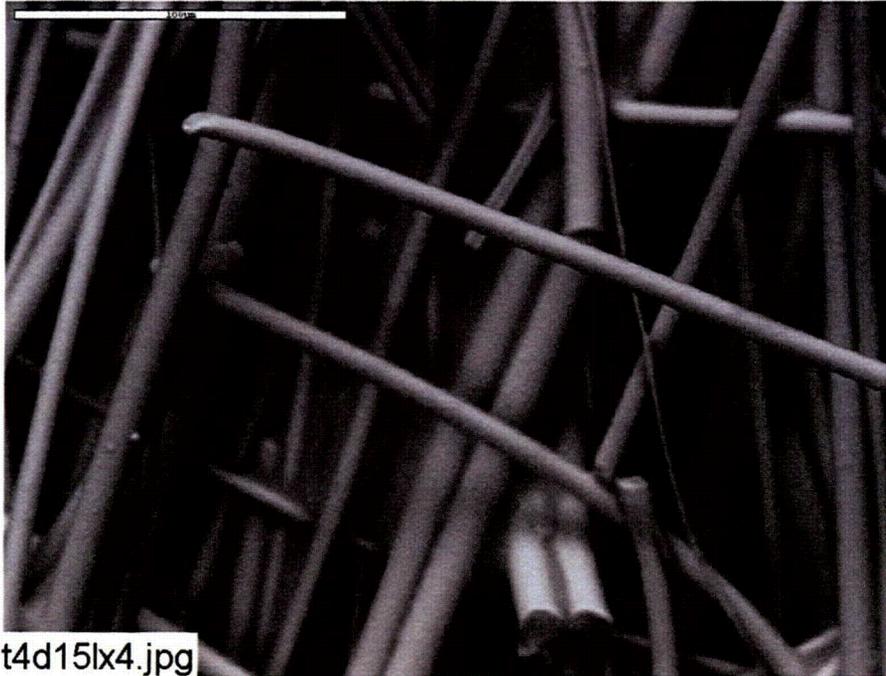
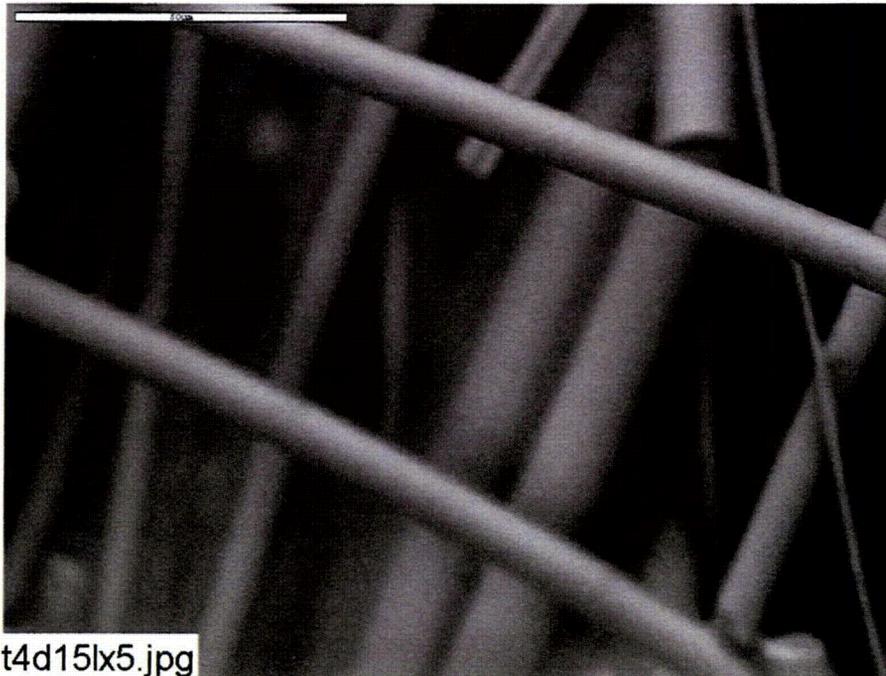


Figure B1-2. EDS counting spectrum for the particulate deposit on fiberglass shown in Figure B1-1. (t4d15lx2.jpg)



t4d15lx4.jpg

Figure B1-3. Environmental SEM image magnified 500 times for a Test #4, Day-15 exterior low-flow fiberglass sample. (t4d15lx4.jpg)



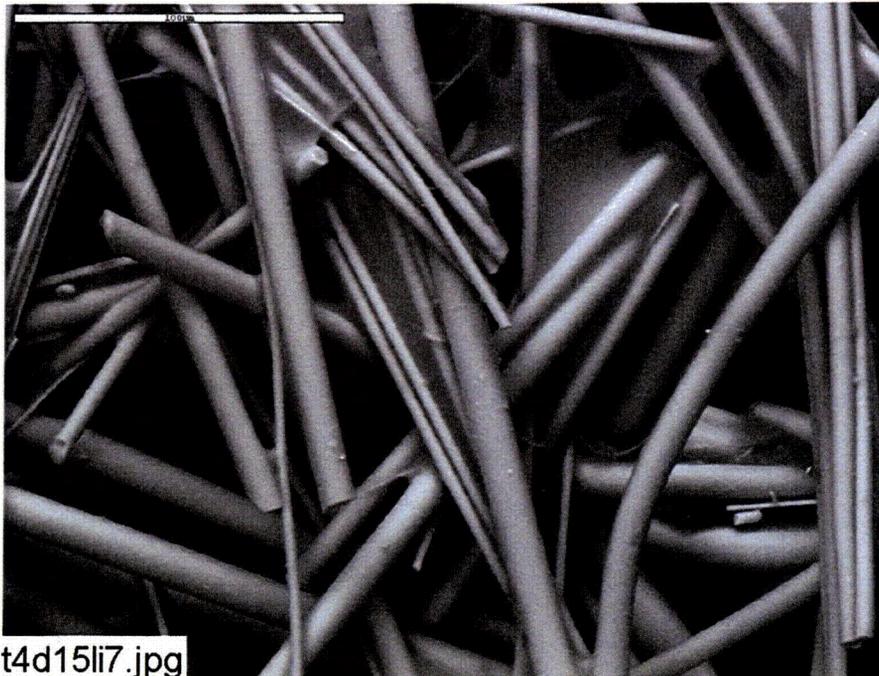
t4d15lx5.jpg

Figure B1-4. Environmental SEM image magnified 1000 times for a Test #4, Day-15 exterior low-flow fiberglass sample. (t4d15lx5.jpg)



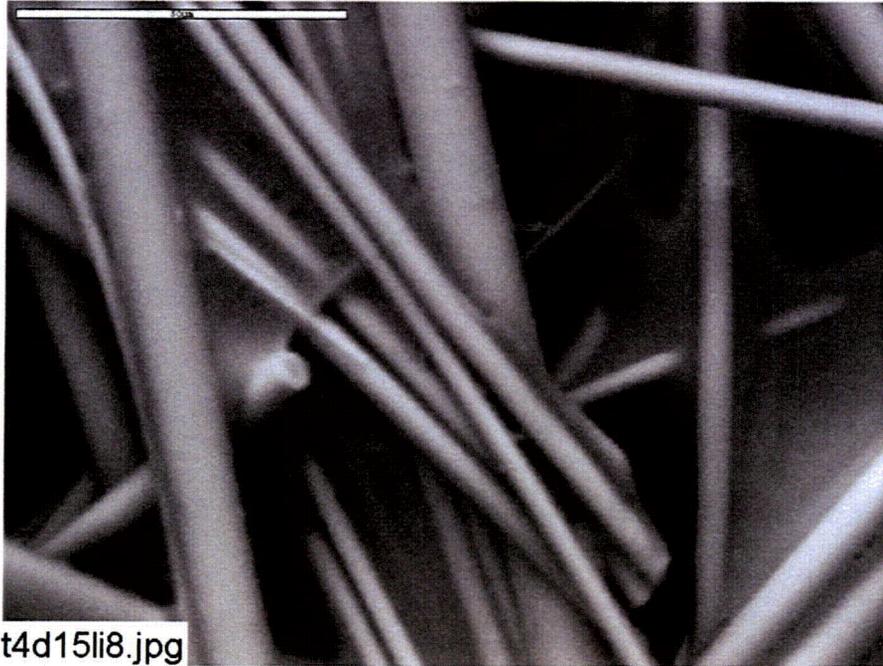
t4d15li6.jpg

Figure B1-5. Environmental SEM image magnified 100 times for a Test #4, Day-15 interior low-flow fiberglass sample. (t4d15li6.jpg)



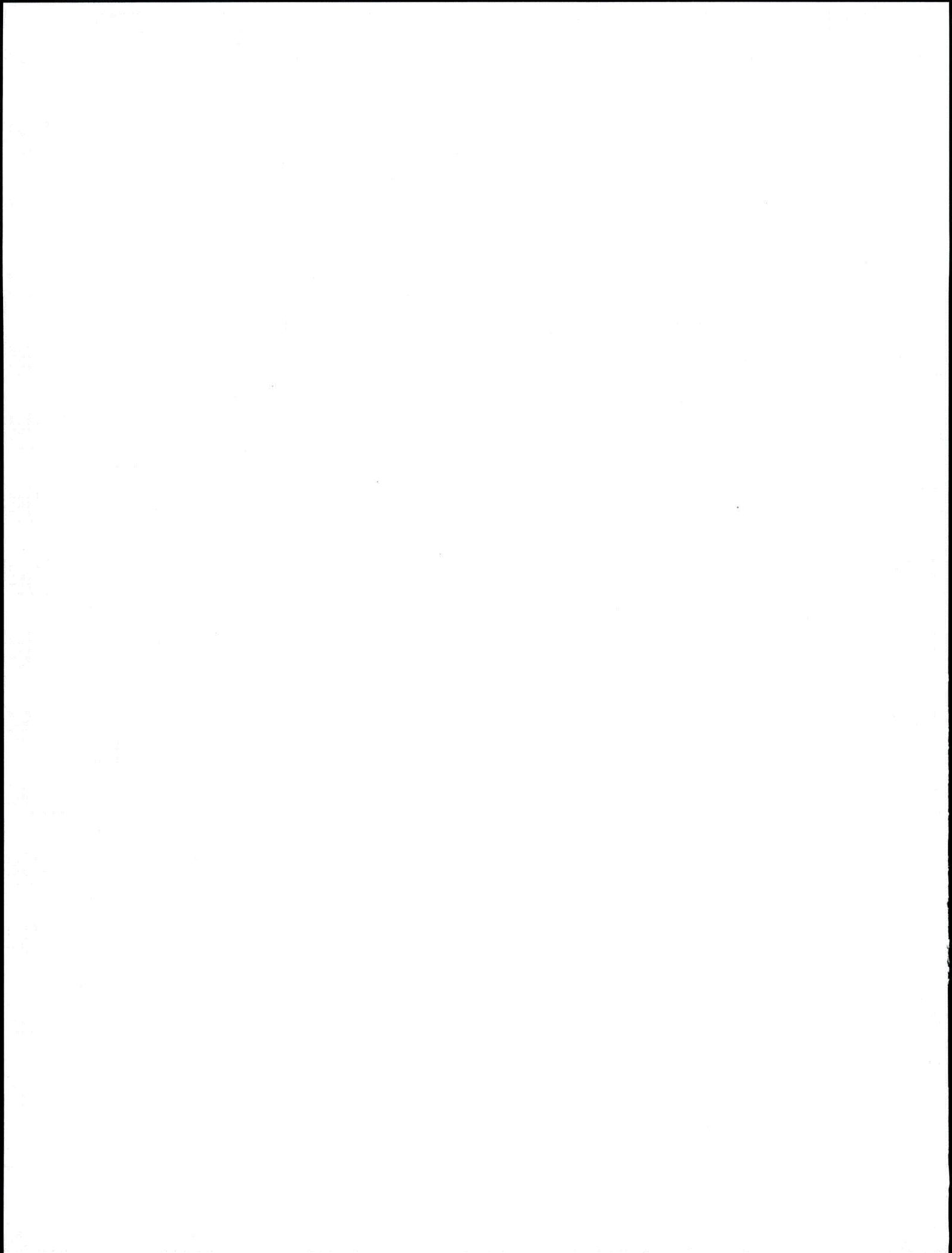
t4d15li7.jpg

Figure B1-6. Environmental SEM image magnified 500 times for a Test #4, Day-15 interior low-flow fiberglass sample. (t4d15li7.jpg)



t4d15li8.jpg

Figure B1-7. Environmental SEM image magnified 1000 times for a Test #4, Day-15 interior low-flow fiberglass sample. (t4d15li8.jpg)



Appendix B2

ESEM/EDS Data for Test #4, Day-15 Fiberglass in High-Flow Zones

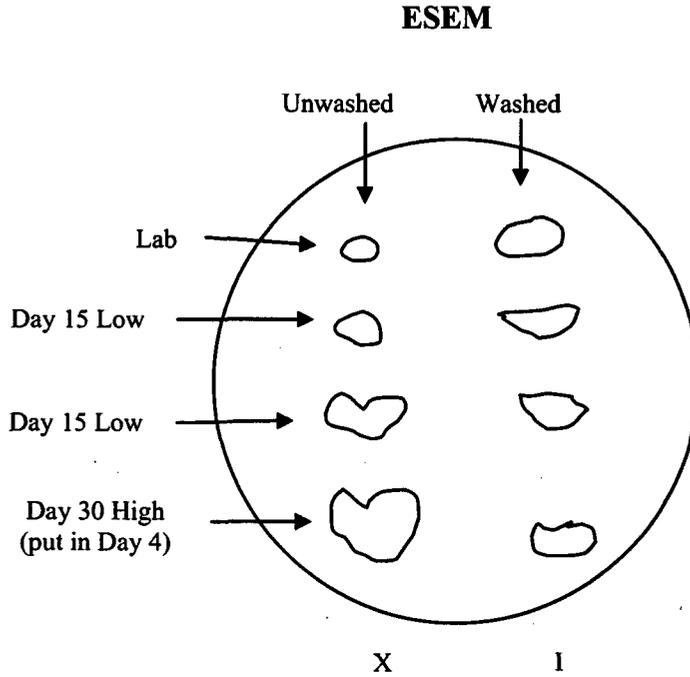
Figures

- Figure B2-1. Environmental SEM image magnified 100 times for a Test #4, Day-15 exterior high-flow fiberglass sample. (t4d15hx8.jpg)..... B2-4
- Figure B2-2. Environmental SEM image magnified 400 times for a Test #4, Day-15 exterior high-flow fiberglass sample. (t4d15hx9.jpg)..... B2-4
- Figure B2-3. Annotated environmental SEM image magnified 750 times for a Test #4, Day-15 exterior high-flow fiberglass sample. The white spot shows the area for EDS analysis. (t4d15hx7.jpg)..... B2-5
- Figure B2-4. EDS counting spectrum for the spot of the film between the fibers shown in Figure B2-3. (t4d15hx6.jpg) B2-5
- Figure B2-5. Environmental SEM image magnified 100 times for a Test #4, Day-15 interior high-flow fiberglass sample. (t4d15hi1.jpg) B2-6
- Figure B2-6. Environmental SEM image magnified 100 times for a Test #4, Day-15 interior high-flow fiberglass sample. (t4d15hi3.jpg) B2-6
- Figure B2-7. Environmental SEM image magnified 800 times for a Test #4, Day-15 interior high-flow fiberglass sample. (t4d15hi2.jpg) B2-7

This appendix lists the ESEM/EDS results on ICET Test #4, Day-15 high-flow zone fiberglass samples. The samples were obtained on June 8, 2005 (fifteenth date for Test #4). Both exterior and interior locations of the fiberglass samples were examined. ESEM/EDS data presented here were obtained on June 23, 2005. The hydrated fiberglass samples without any coating were examined by ESEM under a low-vacuum condition (i.e., 80 Pa). EDS results provide a semi-quantitative elemental analysis of the debris attached on fiberglass.

Transcribed Laboratory Log

Laboratory session from June 23, 2005.
 Test #4, Day-15 Fiberglass In High-Flow Zones



ESEM Fiberglass High-Flow Exterior

Image: t4d15hx8	100 ×	ESEM image	Figure B2-1
t4d15hx9	400 ×		Figure B2-2
t4d15hx7	750 ×	ESEM Annotated Image	Figure B2-3
EDS: t4d15hx6		EDS on web material for t4d15hx7	Figure B2-4

ESEM Fiberglass High-Flow Interior

Image: t4d15hi1	100 ×	ESEM image	Figure B2-5
t4d15hi3	100 ×		Figure B2-6
t4d15hi2	800 ×		Figure B2-7



Figure B2-1. Environmental SEM image magnified 100 times for a Test #4, Day-15 exterior high-flow fiberglass sample. (t4d15hx8.jpg)

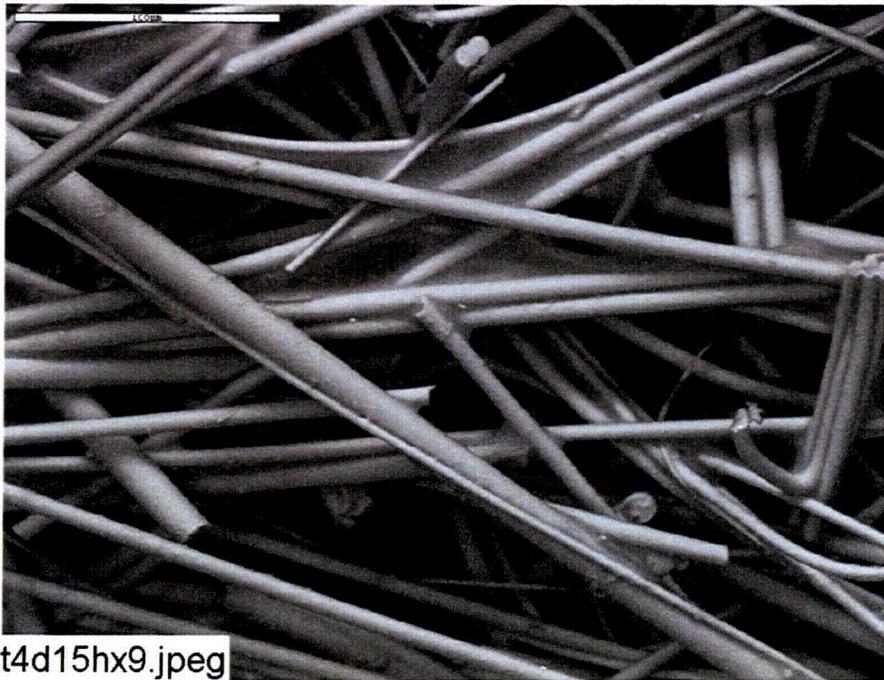


Figure B2-2. Environmental SEM image magnified 400 times for a Test #4, Day-15 exterior high-flow fiberglass sample. (t4d15hx9.jpeg)

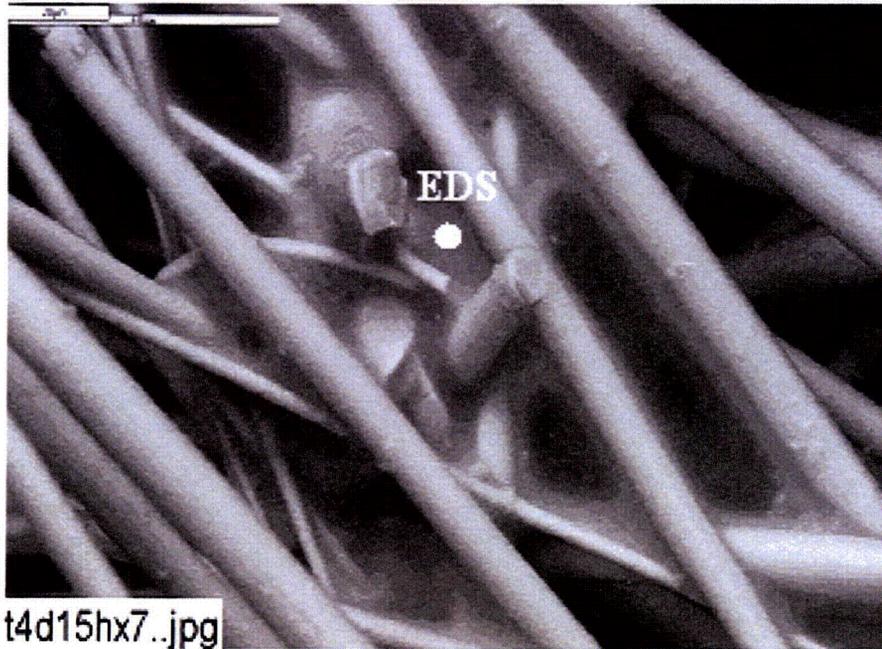


Figure B2-3. Annotated environmental SEM image magnified 750 times for a Test #4, Day-15 exterior high-flow fiberglass sample. The white spot shows the area for EDS analysis. (t4d15hx7.jpg)

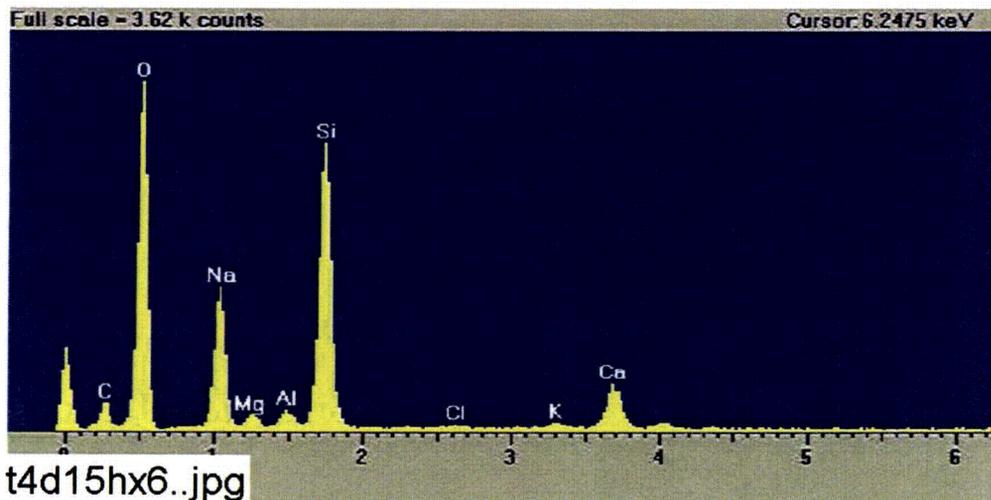


Figure B2-4. EDS counting spectrum for the spot of the film between the fibers shown in Figure B2-3. (t4d15hx6.jpg)



Figure B2-5. Environmental SEM image magnified 100 times for a Test #4, Day-15 interior high-flow fiberglass sample. (t4d15hi1.jpg)



Figure B2-6. Environmental SEM image magnified 100 times for a Test #4, Day-15 interior high-flow fiberglass sample. (t4d15hi3.jpg)

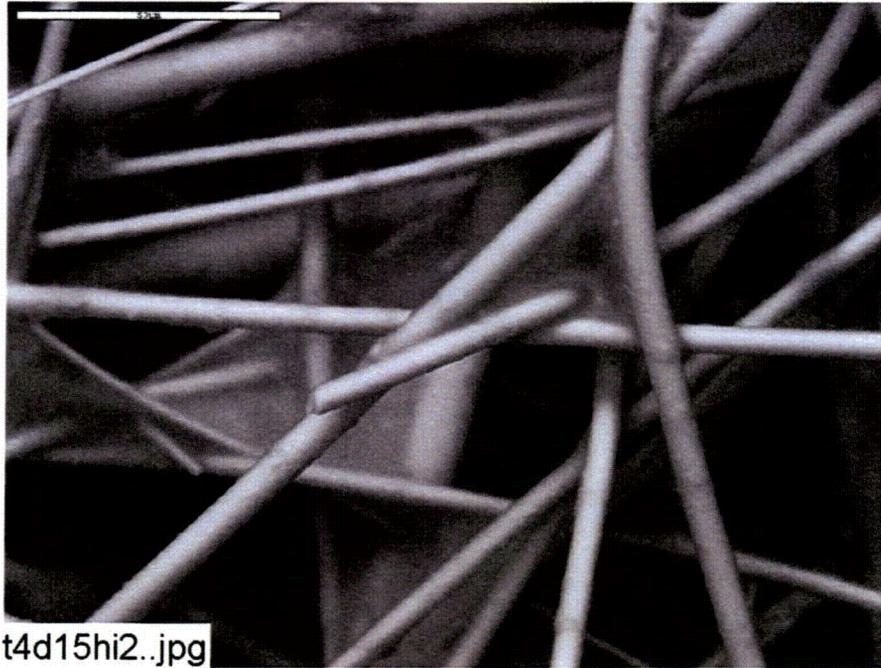
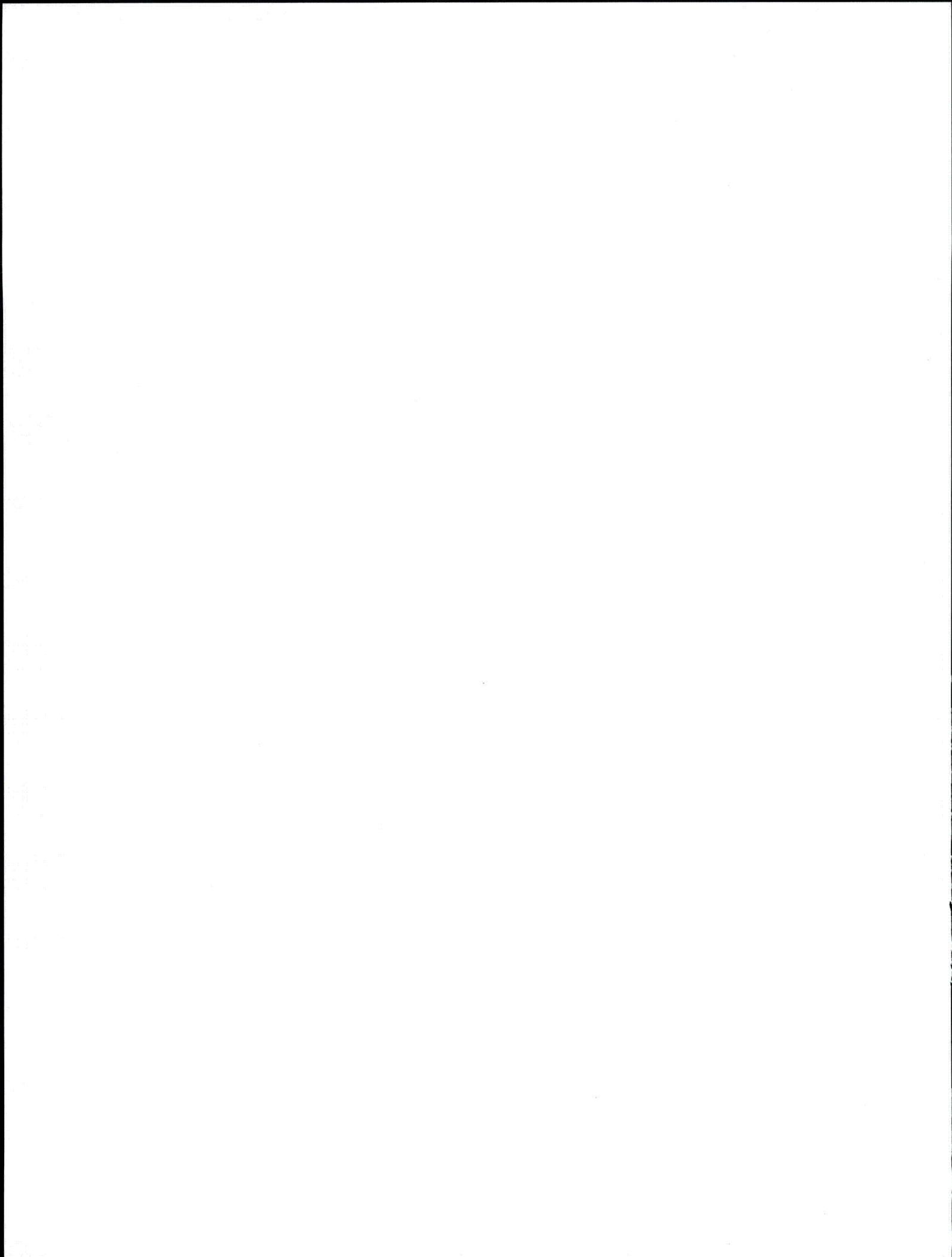


Figure B2-7. Environmental SEM image magnified 800 times for a Test #4, Day-15 interior high-flow fiberglass sample. (t4d15hi2.jpg)



Appendix C1

ESEM/EDS Data for Test #4, Day-30 Fiberglass in Low-Flow Zones

Figures

- Figure C1-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior low-flow fiberglass sample. (t4d30lx1.jpg)..... C1-4
- Figure C1-2. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior low-flow fiberglass sample. (t4d30lx2.jpg)..... C1-4
- Figure C1-3. Annotated environmental SEM image magnified 1000 times for a Test #4, Day-30 exterior low-flow fiberglass sample. (t4d30lx5.jpg)..... C1-5
- Figure C1-4. EDS counting spectrum for the spot of coating substance on fiberglass shown in Figure C1-3. (t4d30lx4.jpg) C1-5
- Figure C1-5. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample. (T4D30LI6.jpg)..... C1-6
- Figure C1-6. Annotated environmental SEM image magnified 500 times for a Test #4, Day-30 interior low-flow fiberglass sample. EDS spot is shown in the picture (t4d30li9.jpg) C1-6
- Figure C1-7. EDS counting spectrum for the film between fibers shown in Figure C1-6. (t4d30li8.jpg) C1-7

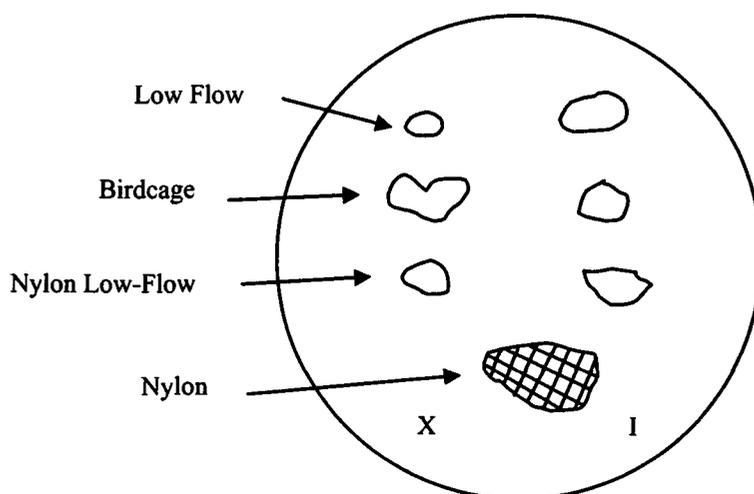
This appendix shows the ESEM/EDS results on fiberglass samples submerged in a low-flow zone in the tank. The fiberglass samples were extracted on the date Test #4 was shut down (June 23, 2005). Both exterior and interior locations of the fiberglass samples were examined. ESEM was employed to analyze the hydrated fiberglass samples without any coating under a low-vacuum condition (i.e., 80 Pa) to minimize the modification of the fiberglass samples through a drying process. The results of Test #4, Day-30 low-flow fiberglass samples were obtained on June 24, 2005. EDS results provide a semi-quantitative elemental analysis of the debris attached on fiberglass.

Transcribed Laboratory Log

Laboratory session from June 24, 2005.

Test #4, Day-30 Low-Flow Fiberglass

ESEM



Low-Flow Exterior

Image: t4d30lx1	100 ×	ESEM image	Figure C1-1
t4d30lx2	500 ×	ESEM image higher magnification	Figure C1-2
t4d30lx5	1000 ×	ESEM annotated image	Figure C1-3
EDS: t4d30lx4		Spot of coating substance for t4d30lx5	Figure C1-4

Low-Flow Interior

Image: T4D30LI6	100 ×	ESEM image of fiberglass	Figure C1-5
t4d30li9	500 ×	ESEM annotated image	Figure C1-6
EDS: t4d30li8		Film on fiberglass for t4d30li9	Figure C1-7

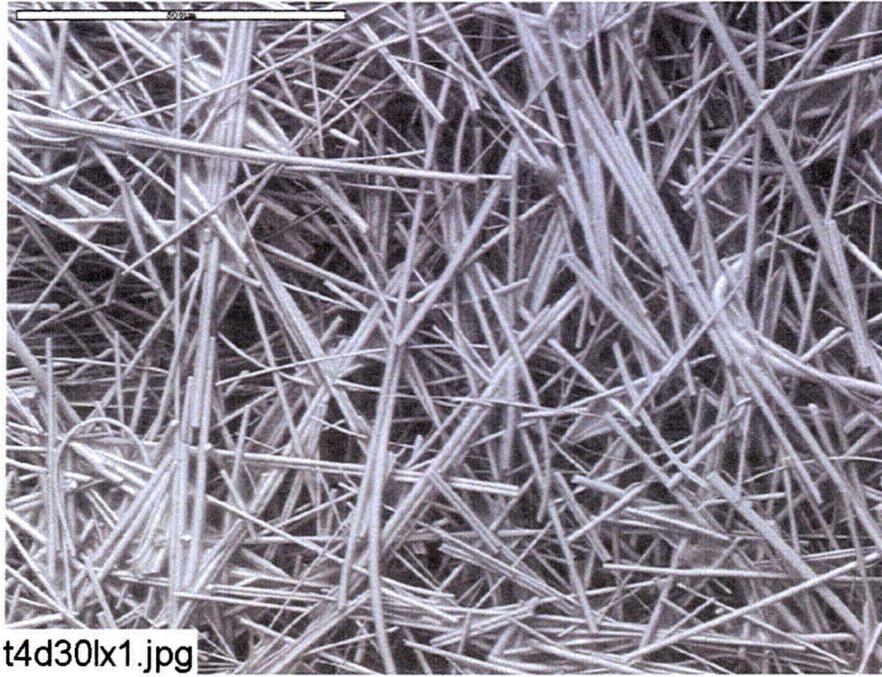


Figure C1-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior low-flow fiberglass sample. (t4d30lx1.jpg)

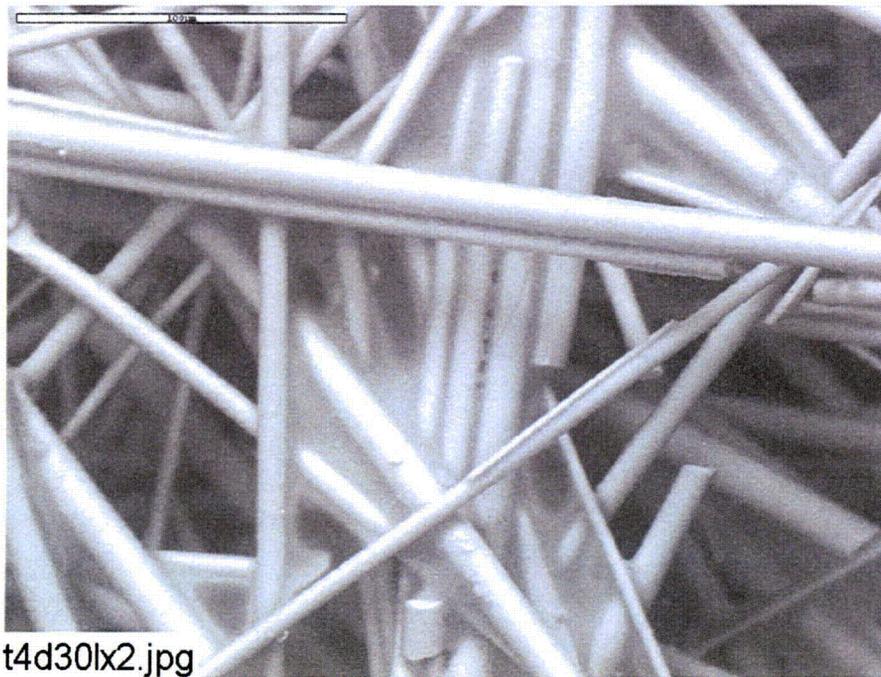


Figure C1-2. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior low-flow fiberglass sample. (t4d30lx2.jpg)

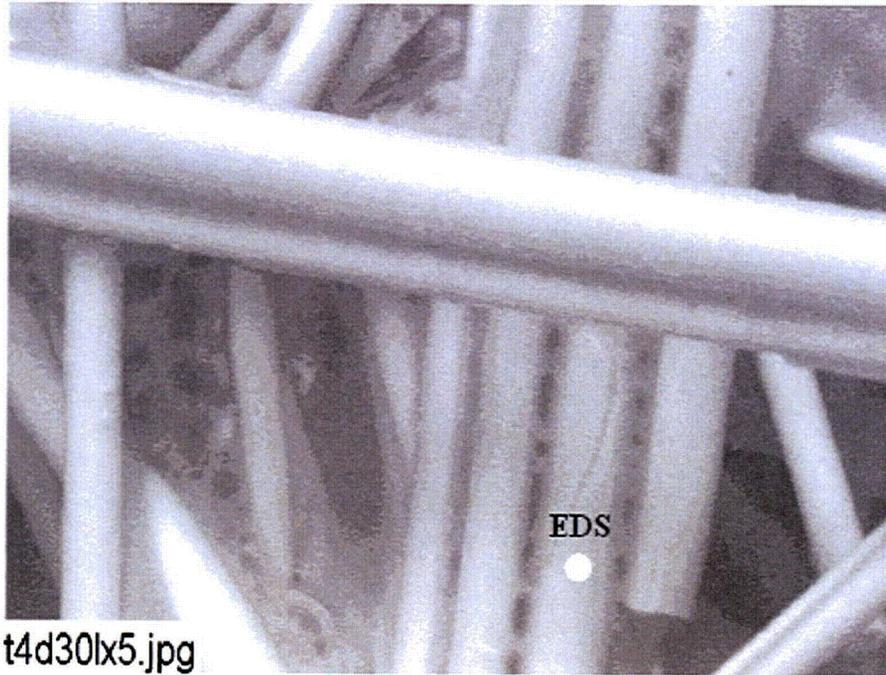


Figure C1-3. Annotated environmental SEM image magnified 1000 times for a Test #4, Day-30 exterior low-flow fiberglass sample. (t4d30lx5.jpg)

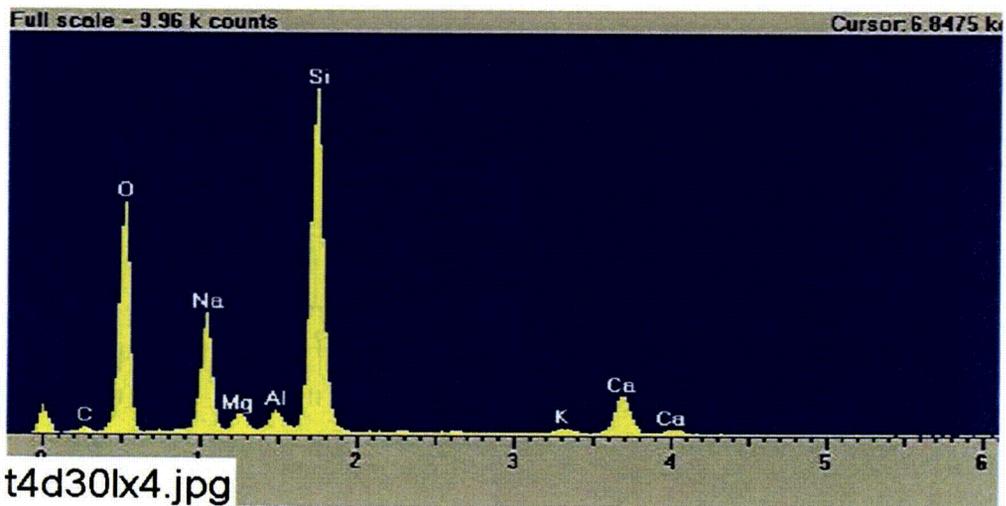


Figure C1-4. EDS counting spectrum for the spot of coating substance on fiberglass shown in Figure C1-3. (t4d30lx4.jpg)

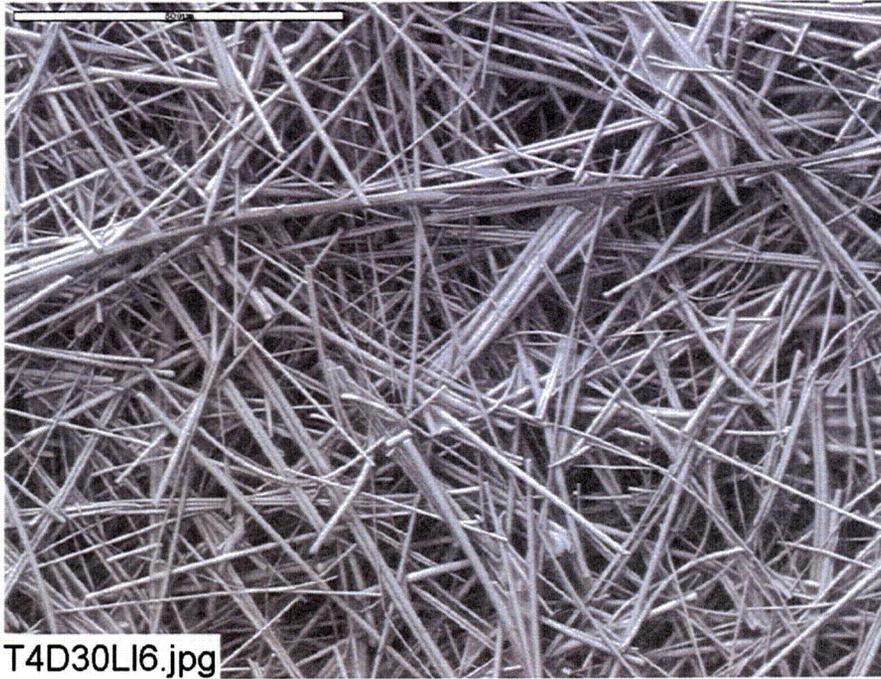


Figure C1-5. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample. (T4D30LI6.jpg)

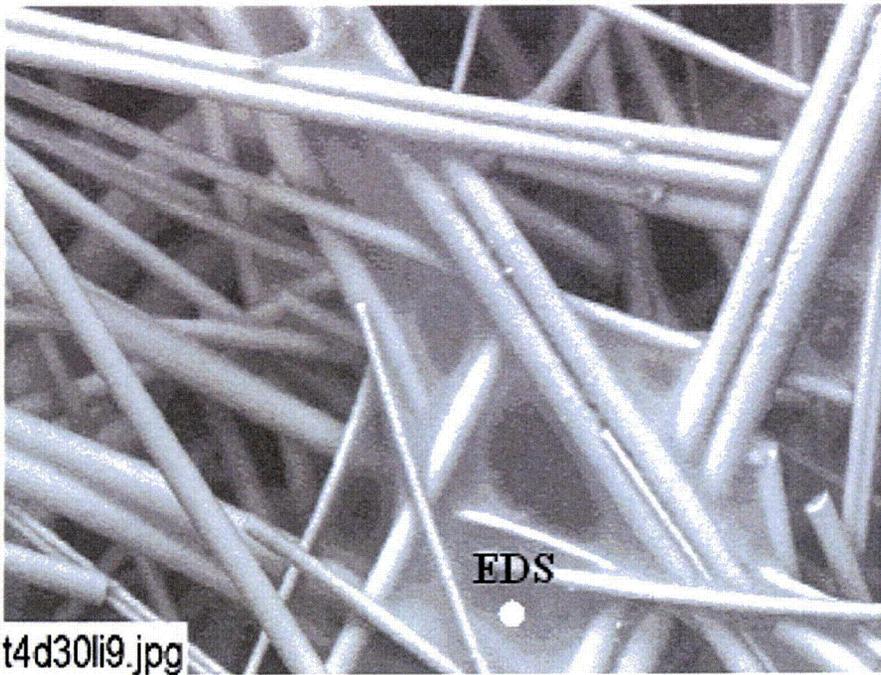


Figure C1-6. Annotated environmental SEM image magnified 500 times for a Test #4, Day-30 interior low-flow fiberglass sample. EDS spot is shown in the picture (t4d30li9.jpg)

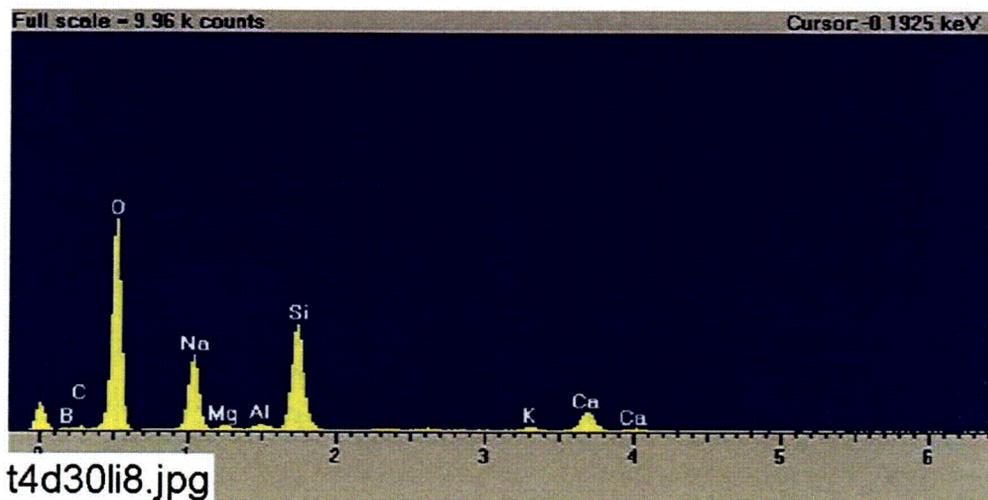
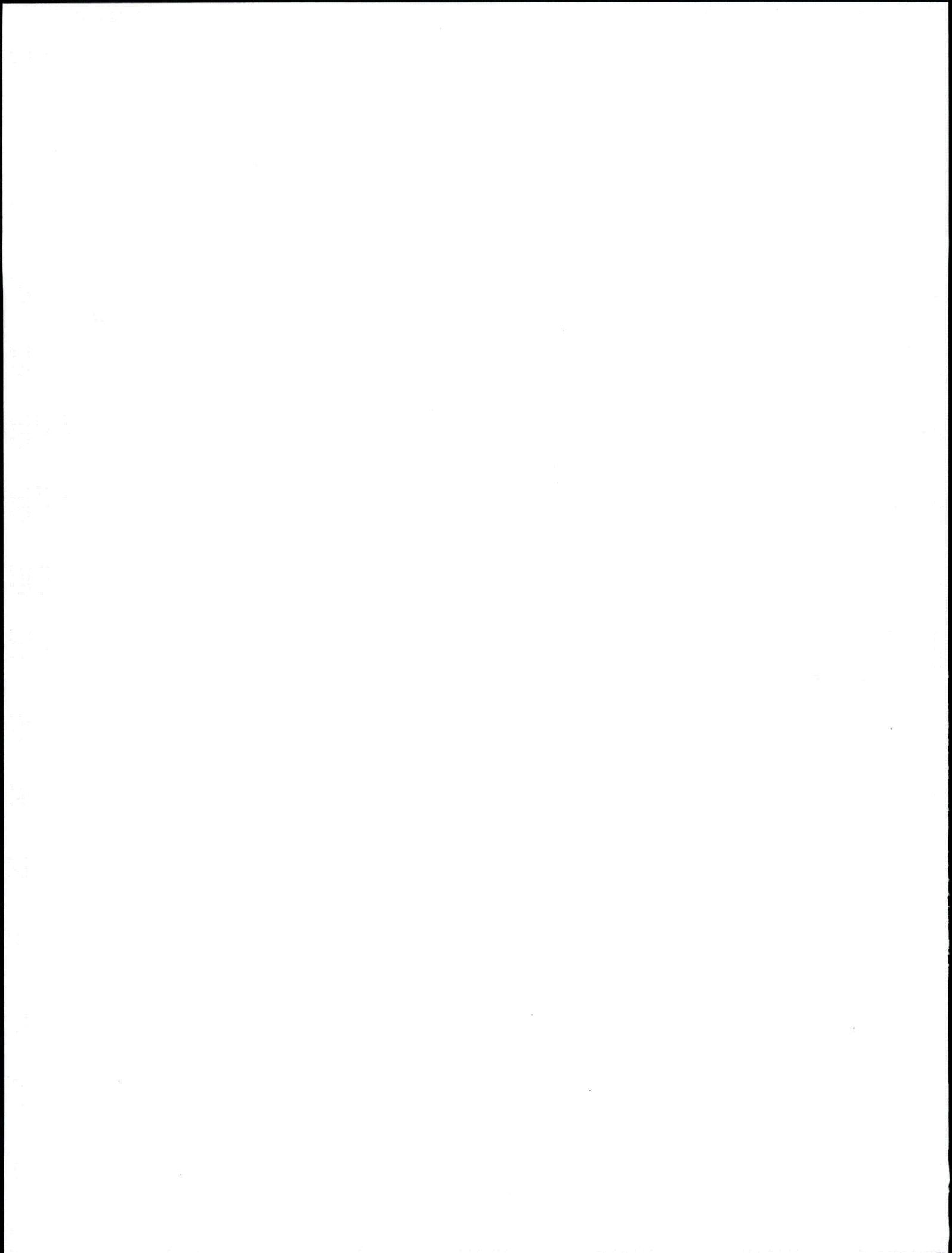


Figure C1-7. EDS counting spectrum for the film between fibers shown in Figure C1-6. (t4d30li8.jpg)



Appendix C2

ESEM/EDS Data for Test #4, Day-30 Fiberglass Inserted in Nylon Mesh in a Low-Flow Zone

Figures

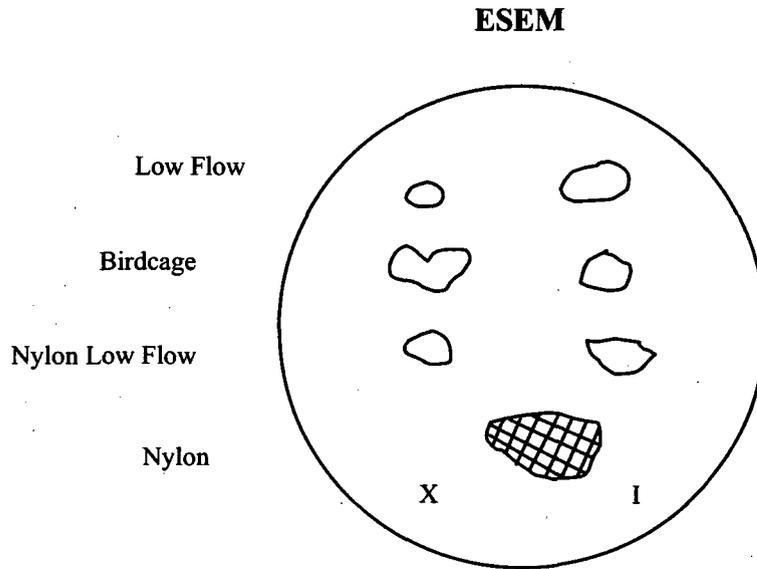
- Figure C2-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 nylon mesh submerged in low-flow area (inserted on Day 4). (t4d30n11.jpg) C2-4
- Figure C2-2. Annotated environmental SEM image magnified 500 times for a Test #4, Day-30 nylon mesh submerged in low-flow area (inserted on Day 4). The EDS spot is shown in the picture. (t4d30n14.jpg) C2-4
- Figure C2-3. EDS counting spectrum for the spot of nylon mesh shown in Figure C2-2. (t4d30n13.jpg)..... C2-5
- Figure C2-4. Environmental SEM image magnified 1000 times for a Test #4, Day-30 nylon mesh submerged in low-flow area (inserted on Day 4). (t4d30n15.jpg) C2-5
- Figure C2-5. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nLEx01.jpg)..... C2-6
- Figure C2-6. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nlex03.jpeg)..... C2-6
- Figure C2-7. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nlex02.jpg)..... C2-7
- Figure C2-8. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nlin04.jpg) C2-7
- Figure C2-9. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nlin06.jpg) C2-8
- Figure C2-10. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nlin05.jpg) C2-8

This appendix presents the ESEM results on fiberglass samples inserted in a nylon mesh submerged in a low-flow zone in the tank. The purpose of using a nylon mesh is to determine if the mesh material (i.e., stainless steel or nylon) affects the deposits on fiberglass samples. The fiberglass samples were extracted on the date Test #4 was shut down (June 23, 2005). Both exterior and interior locations of the fiberglass samples were examined. ESEM was employed to analyze the wet fiberglass samples without any coating under a low-vacuum condition (i.e., 80 Pa) to minimize the modification of the fiberglass samples through a drying process. The results of Test #4, Day-30 low-flow fiberglass samples in a nylon mesh were obtained on June 24, 2005.

Transcribed Laboratory Log

Laboratory session from June 24, 2005.

Test #4, Day-30 Low-Flow Fiberglass Inserted in Nylon Mesh



Nylon Mesh in Low-Flow Area after 30 Days (inserted on Day 4)

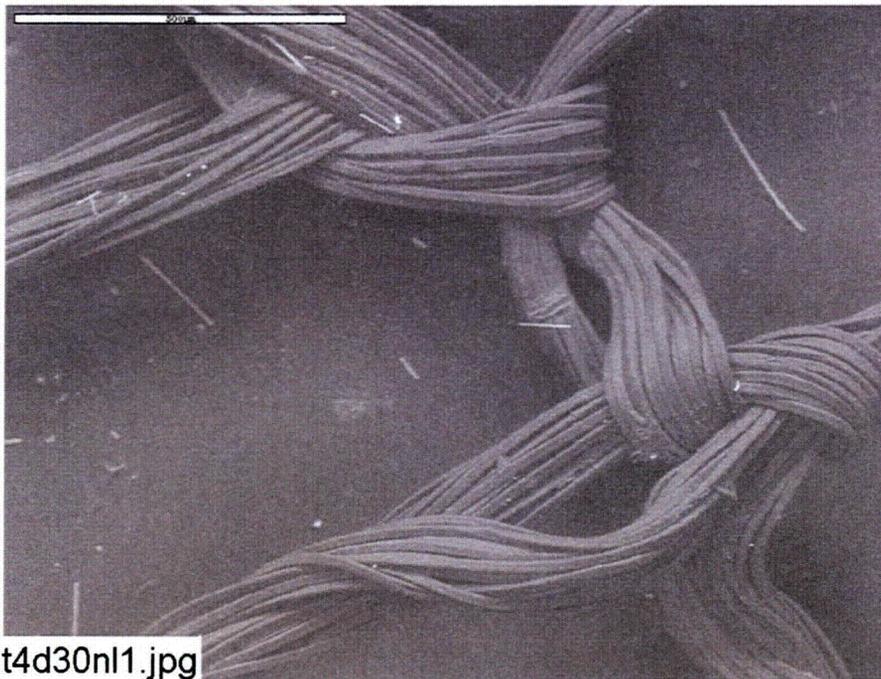
Image: t4d30n11	100 ×	ESEM image	Figure C2-1
t4d30n14	500 ×	ESEM annotated image	Figure C2-2
EDS: t4d30n13		EDS on spot on mesh, t4d30n14	Figure C2-3
Image: t4d30n15	1000 ×	ESEM high magnification	Figure C2-4

Exterior Low-Flow Fiberglass in Nylon Mesh

Image: t4NLEx01	100 ×	ESEM image	Figure C2-5
t4nlex03	100 ×	ESEM image higher magnification	Figure C2-6
t4nlex02	500 ×	ESEM image	Figure C2-7

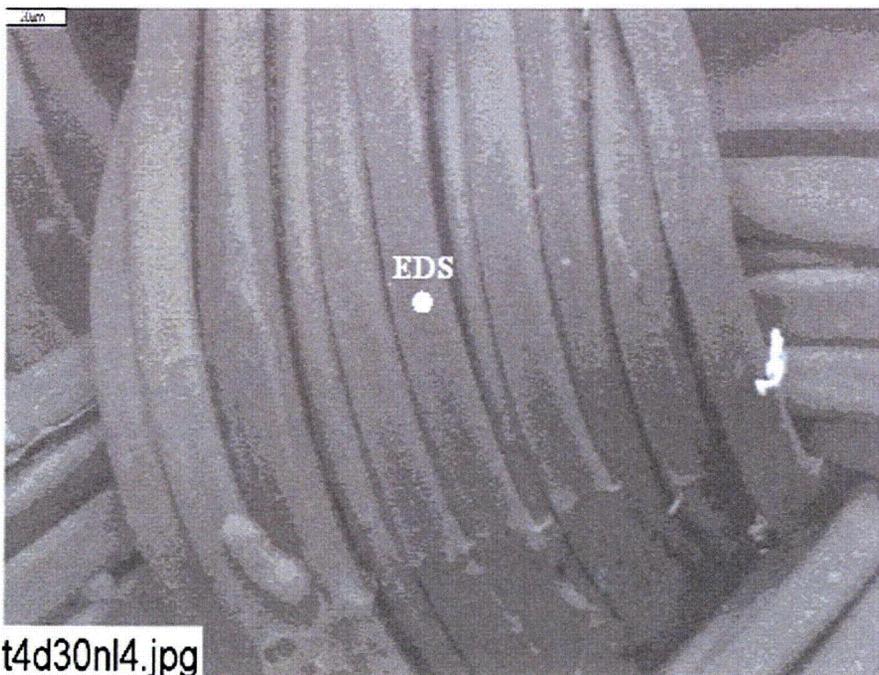
Interior Low-Flow Fiberglass in Nylon Mesh

Image: t4nlin04	100 ×	ESEM image	Figure C2-8
t4nlin06	100 ×	ESEM image	Figure C2-9
t4nlin05	500 ×	ESEM image higher magnification	Figure C2-10



t4d30nl1.jpg

Figure C2-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 nylon mesh submerged in low-flow area (inserted on Day 4). (t4d30nl1.jpg)



t4d30nl4.jpg

Figure C2-2. Annotated environmental SEM image magnified 500 times for a Test #4, Day-30 nylon mesh submerged in low-flow area (inserted on Day 4). The EDS spot is shown in the picture. (t4d30nl4.jpg)

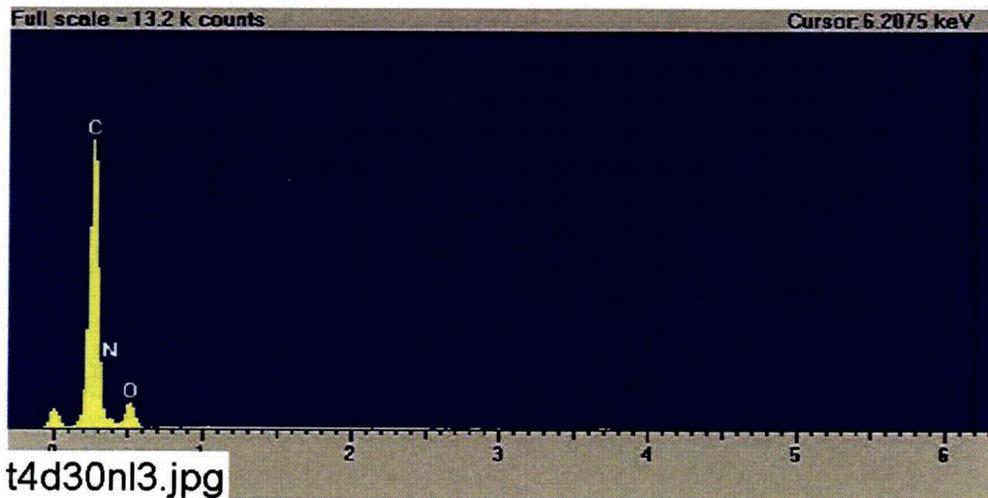


Figure C2-3. EDS counting spectrum for the spot of nylon mesh shown in Figure C2-2. (t4d30nl3.jpg)

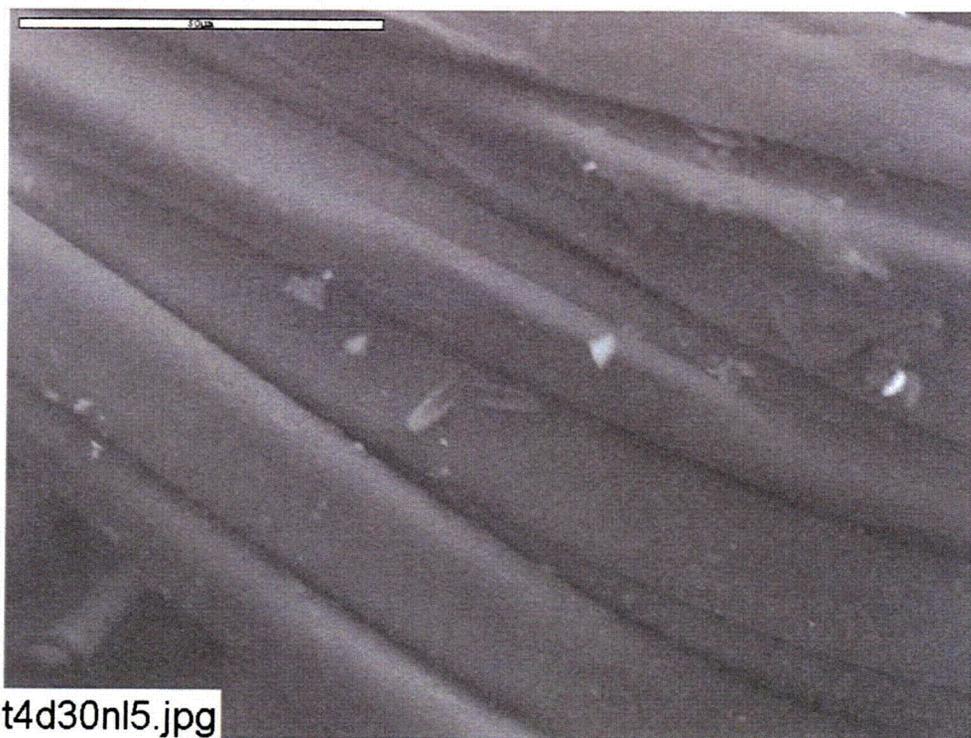


Figure C2-4. Environmental SEM image magnified 1000 times for a Test #4, Day-30 nylon mesh submerged in low-flow area (inserted on Day 4). (t4d30nl5.jpg)

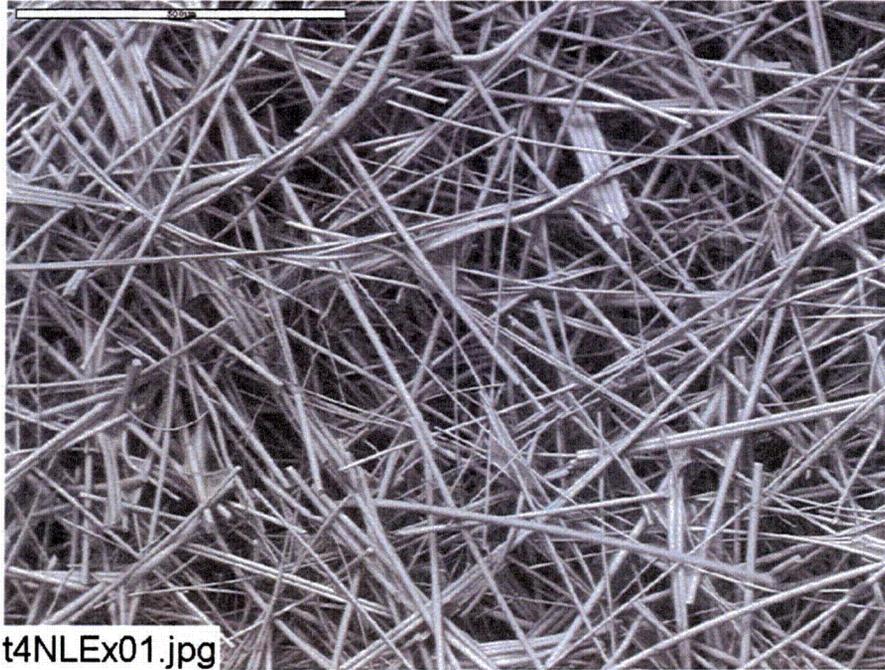


Figure C2-5. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4NLEx01.jpg)

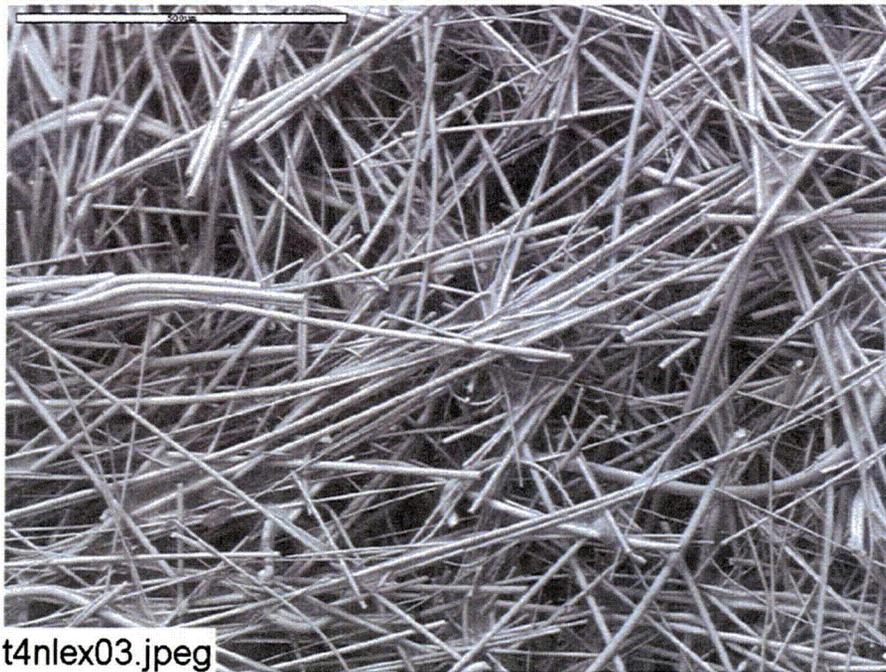


Figure C2-6. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nlex03.jpeg)

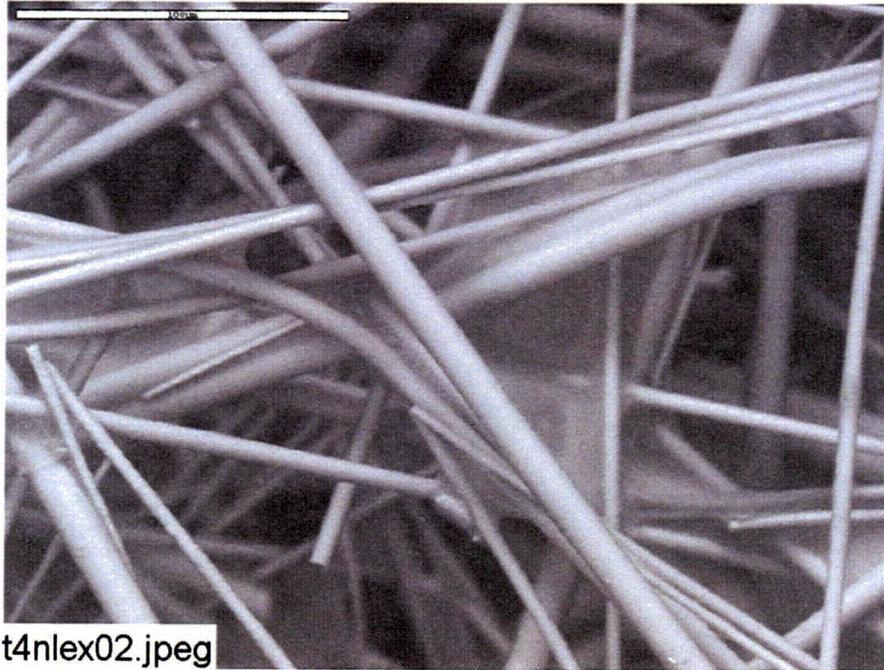


Figure C2-7. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nlex02.jpg)

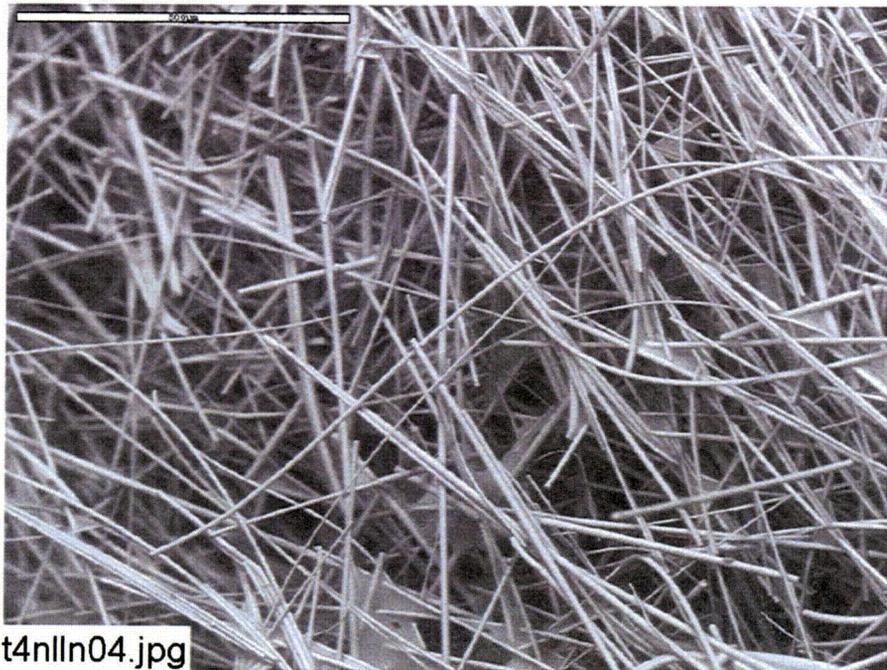
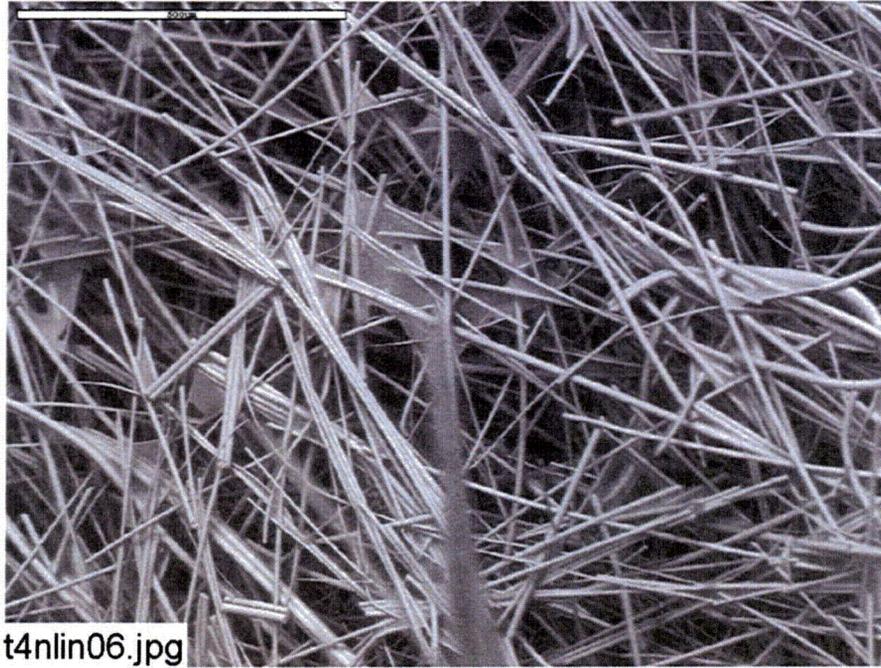
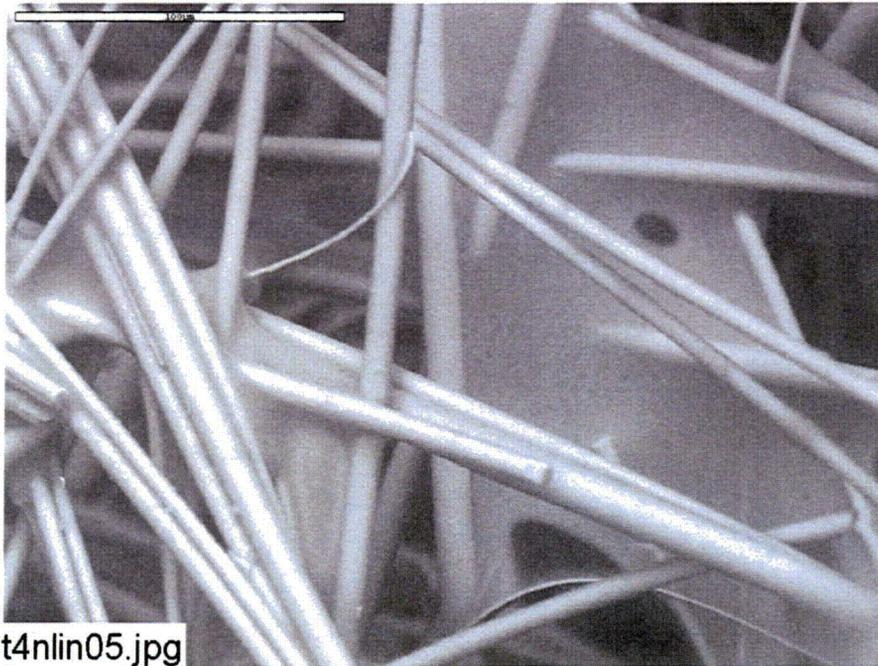


Figure C2-8. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nlln04.jpg)



t4nlin06.jpg

Figure C2-9. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nlin06.jpg)



t4nlin05.jpg

Figure C2-10. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior low-flow fiberglass sample contained in a nylon mesh (inserted on Day 4). (t4nlin05.jpg)

Appendix C3

ESEM Data for Test #4, Day-30 Low-Flow Fiberglass Samples in a Big Envelope

Figures

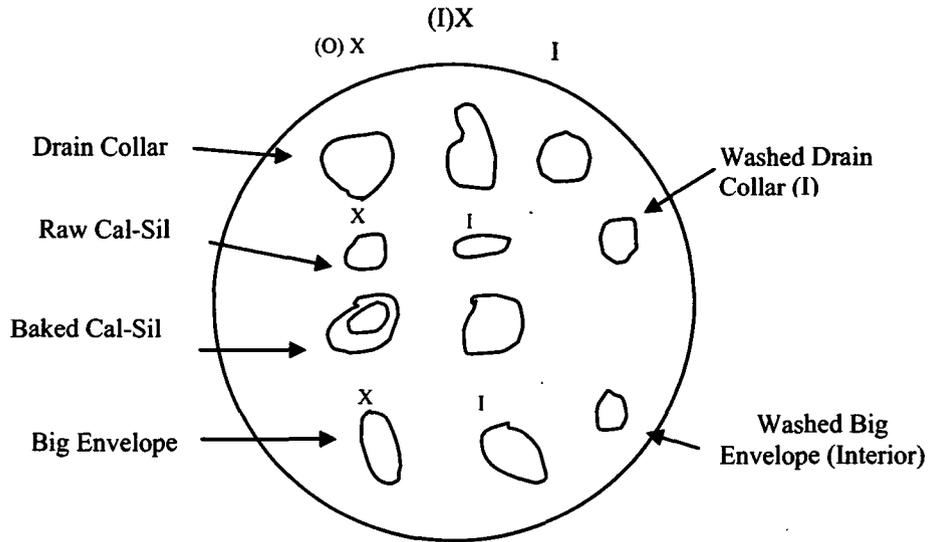
- Figure C3-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior low-flow fiberglass sample in a big envelope. (T4EVLX1.jpg)..... C3-4
- Figure C3-2. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior low-flow fiberglass sample in a big envelope. (t4evlx3.jpg)..... C3-4
- Figure C3-3. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior low-flow fiberglass sample in a big envelope. (t4evlx2.jpg)..... C3-5
- Figure C3-4. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample in a big envelope. (t4evli4.jpg) C3-5
- Figure C3-5. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample in a big envelope. (t4evli5.jpg) C3-6
- Figure C3-6. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample in a big envelope. (t4evli6.jpg) C3-6
- Figure C3-7. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior low-flow fiberglass sample in a big envelope. (t4evli7.jpg) C3-7

In this appendix, the fiberglass samples were extracted on June 23, 2005, the date Test #4 was shut down. Both exterior and interior locations of the fiberglass samples were examined. ESEM was employed to analyze the hydrated fiberglass samples without any coating under a low-vacuum condition (i.e., 80 Pa) to minimize the modification of the fiberglass samples through a drying process. The results of Test #4, Day-30 low-flow fiberglass samples in a big envelope were obtained on June 30, 2005. EDS results provide a semi-quantitative elemental analysis of the debris attached on fiberglass.

Transcribed Laboratory Log

Laboratory session from June 30, 2005.

Test #4, Day-30 Low-Flow Fiberglass in a Big Envelope



Exterior Low Flow for Big Envelope

Image: T4EVLX1	100 ×	ESEM image	Figure C3-1
t4evlx3	100 ×	ESEM image	Figure C3-2
t4evlx2	500 ×	ESEM image higher magnification	Figure C3-3

Interior Low Flow for Big Envelope

Image: t4evli4	100 ×	ESEM image	Figure C3-4
t4evli5	100 ×	ESEM image	Figure C3-5
t4evli6	100 ×	ESEM image	Figure C3-6
t4evli7	500 ×	ESEM image higher magnification	Figure C3-7

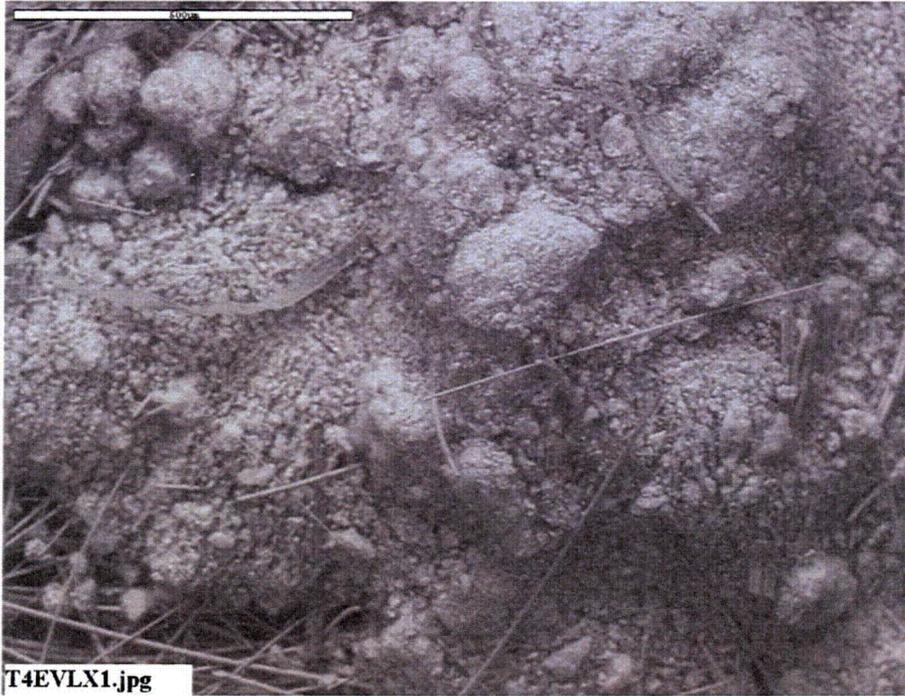


Figure C3-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior low-flow fiberglass sample in a big envelope. (T4EVLX1.jpg)



Figure C3-2. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior low-flow fiberglass sample in a big envelope. (t4evlx3.jpg)



Figure C3-3. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior low-flow fiberglass sample in a big envelope. (t4evlx2.jpg)

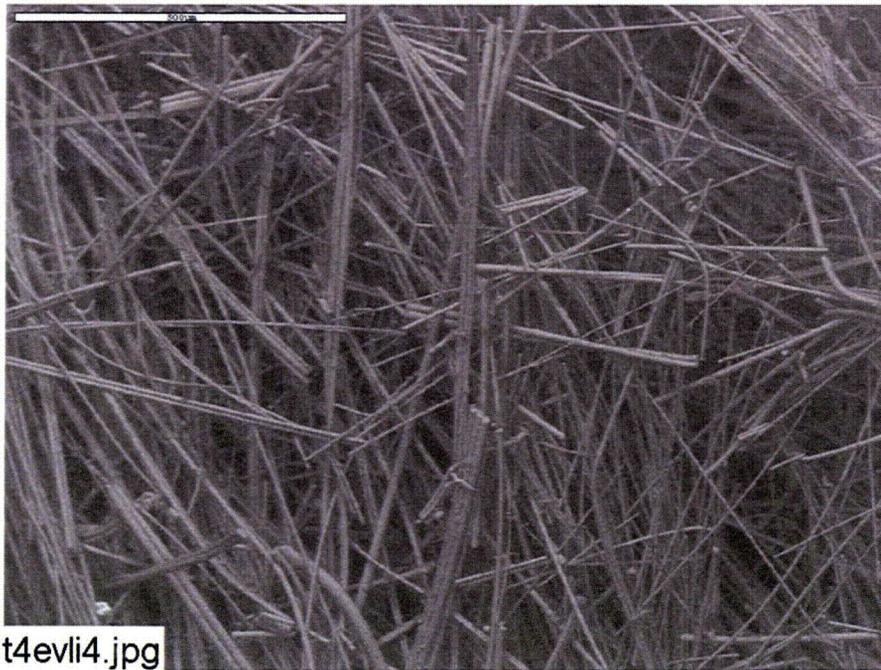


Figure C3-4. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample in a big envelope. (t4evli4.jpg)

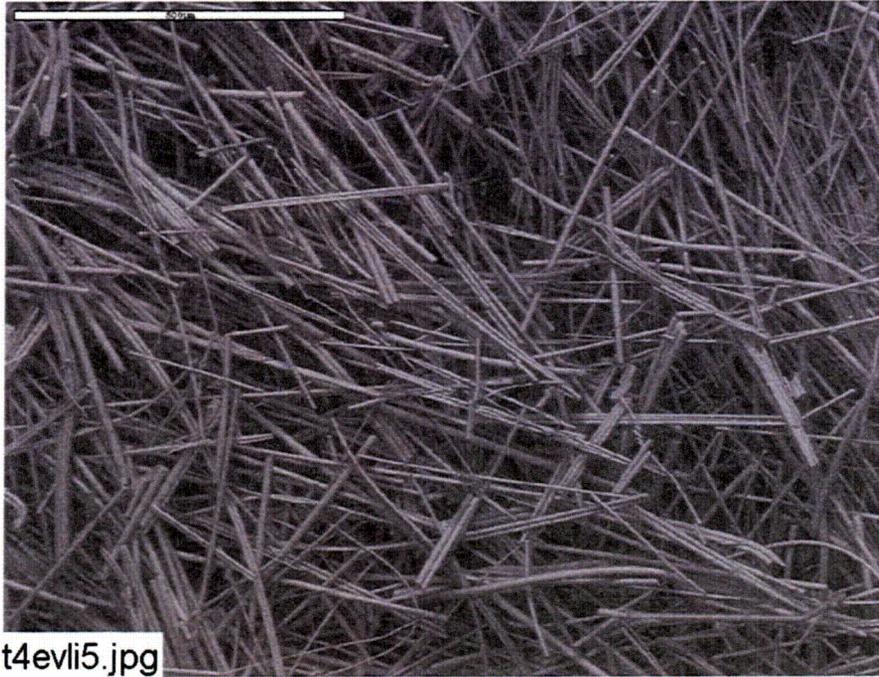


Figure C3-5. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample in a big envelope. (t4evli5.jpg)

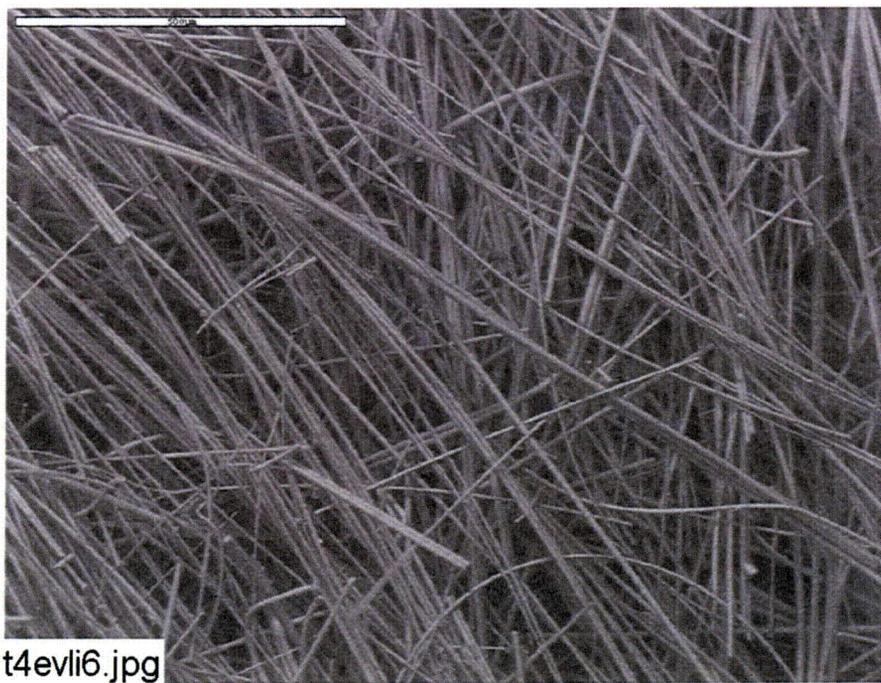


Figure C3-6. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior low-flow fiberglass sample in a big envelope. (t4evli6.jpg)

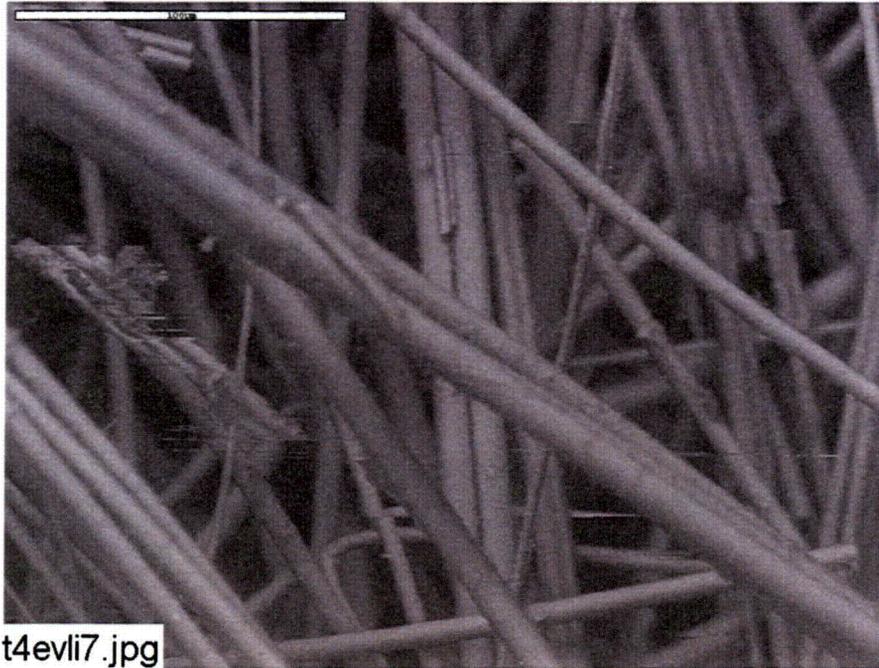


Figure C3-7. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior low-flow fiberglass sample in a big envelope. (t4evli7.jpg)

Appendix C4

ESEM/EDS Data for Test #4, Day-30 Fiberglass in High-Flow Zones

Figures

- Figure C4-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior high-flow fiberglass sample. (T4HFEx01.jpg)..... C4-4
- Figure C4-2. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior high-flow fiberglass sample. (t4hfex02.jpg)..... C4-4
- Figure C4-3. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior high-flow fiberglass sample. (t4hfex07.jpg)..... C4-5
- Figure C4-4. Annotated environmental SEM image magnified 800 times for a Test #4, Day-30 exterior high-flow fiberglass sample. EDS spot is shown in the picture. (t4hfex06.jpg) C4-5
- Figure C4-5. EDS counting spectrum for the spot of film between fibers shown in Figure C4-4. (t4hfex05.jpg)..... C4-6
- Figure C4-6. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior high-flow fiberglass sample. (t4hfin01.jpg)..... C4-6
- Figure C4-7. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior high-flow fiberglass sample. (t4hfin02.jpg)..... C4-7
- Figure C4-8. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. (t4hfin03.jpg)..... C4-7
- Figure C4-9. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. (t4hfin04.jpg)..... C4-8
- Figure C4-10. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (T4Rnd01.jpg) C4-8
- Figure C4-11. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (t4rnd02.jpg)..... C4-9

Figure C4-12. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (t4rnd03.jpg)..... C4-9

Figure C4-13. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (t4rnd04.jpg)..... C4-10

Figure C4-14. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (t4rnd05.jpg)..... C4-10

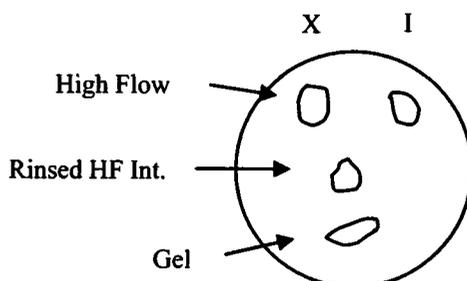
Figure C4-15. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (t4rnd06.jpg)..... C4-11

In this appendix, the fiberglass samples submerged in a high-flow zone were extracted on the date Test #4 was shut down (June 23, 2005). Both exterior and interior locations of the fiberglass samples were examined. ESEM was employed to analyze the hydrated fiberglass samples without any coating under a low-vacuum condition (i.e., 80 Pa) to minimize the modification of the fiberglass samples through a drying process. The results of Test #4, Day-30 high-flow fiberglass samples were obtained on June 24, 2005. EDS results provide a semi-quantitative elemental analysis of the debris attached on fiberglass.

Transcribed Laboratory Log

Laboratory session from June 24, 2005.

Test #4, Day-30 High-Flow Fiberglass



High-Flow Exterior

Image:	T4HFEx01	100 ×	ESEM image	Figure C4-1
	t4hfex02	100 ×	ESEM image	Figure C4-2
	t4hfex07	500 ×	ESEM image	Figure C4-3
	t4hfex06	800 ×	ESEM annotated image	Figure C4-4
EDS:	t4hfex05		Spot of film for t4hfex06	Figure C4-5

High-Flow Interior

Image:	t4hfin01	100 ×	ESEM image of fiberglass	Figure C4-6
	t4hfin02	100 ×	ESEM image	Figure C4-7
	t4hfin03	500 ×	ESEM image high magnification	Figure C4-8
	t4hfin04	500 ×	ESEM image high magnification	Figure C4-9

Washed (with RO Water) High-Flow Interior

Image:	T4Rnd01	100 ×	ESEM image	Figure C4-10
	t4rnd02	100 ×	ESEM image	Figure C4-11
	t4rnd03	500 ×	ESEM image	Figure C4-12
	t4rnd04	500 ×	ESEM image	Figure C4-13
	t4rnd05	500 ×	ESEM image	Figure C4-14
	t4rnd06	500 ×	ESEM image	Figure C4-15



Figure C4-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior high-flow fiberglass sample. (T4HFEx01.jpeg)

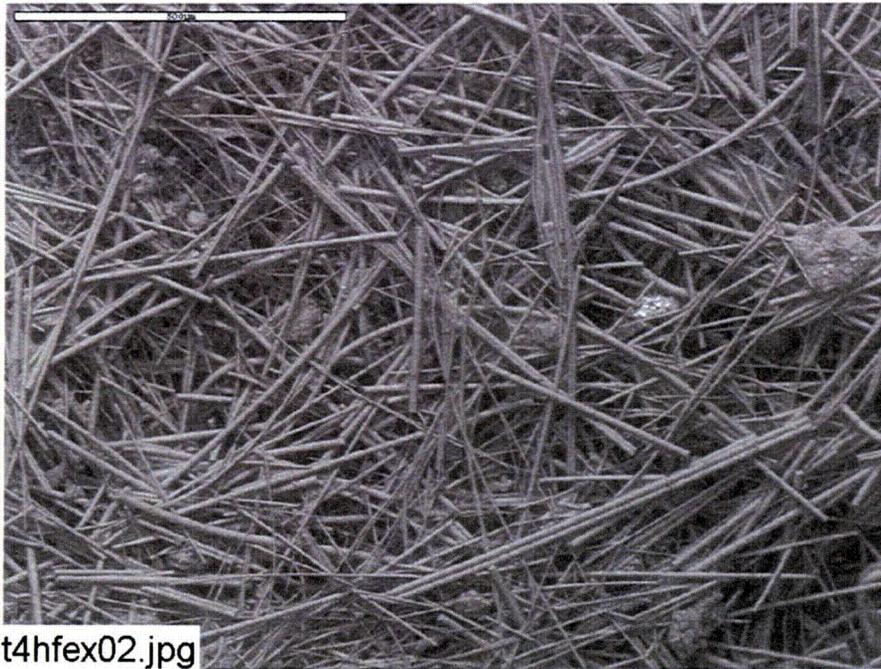


Figure C4-2. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior high-flow fiberglass sample. (t4hfex02.jpg)



Figure C4-3. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior high-flow fiberglass sample. (t4hfex07.jpg)

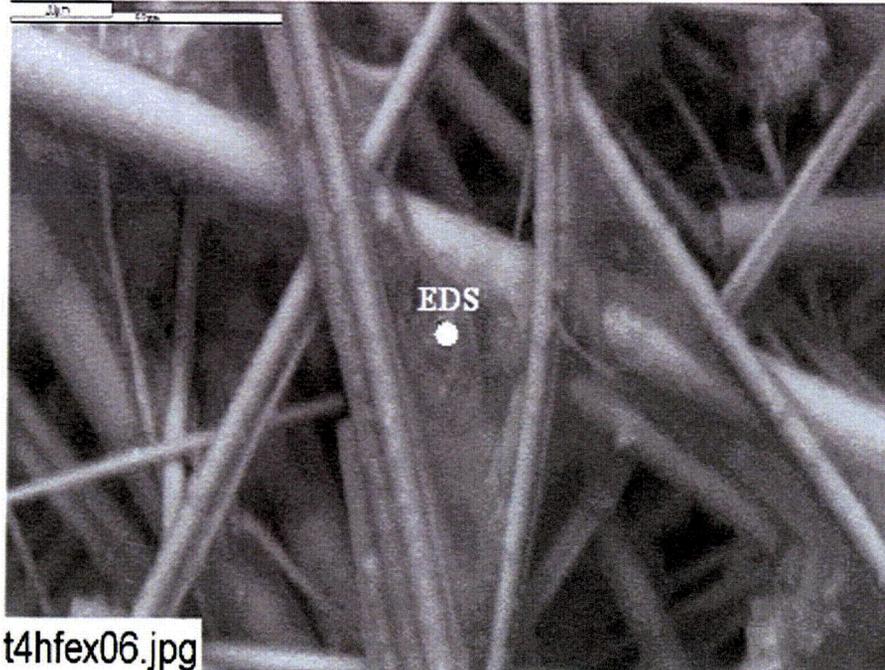


Figure C4-4. Annotated environmental SEM image magnified 800 times for a Test #4, Day-30 exterior high-flow fiberglass sample. EDS spot is shown in the picture. (t4hfex06.jpg)

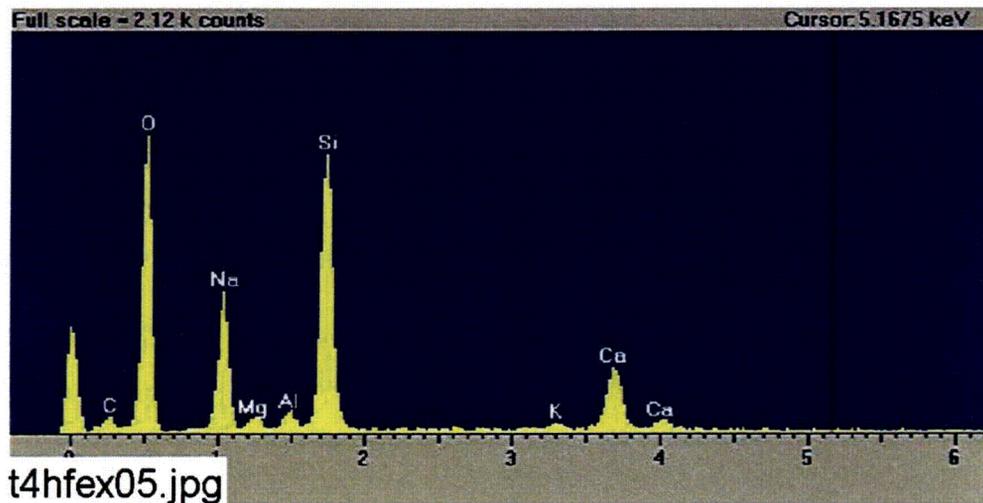


Figure C4-5. EDS counting spectrum for the spot of film between fibers shown in Figure C4-4. (t4hfex05.jpg)

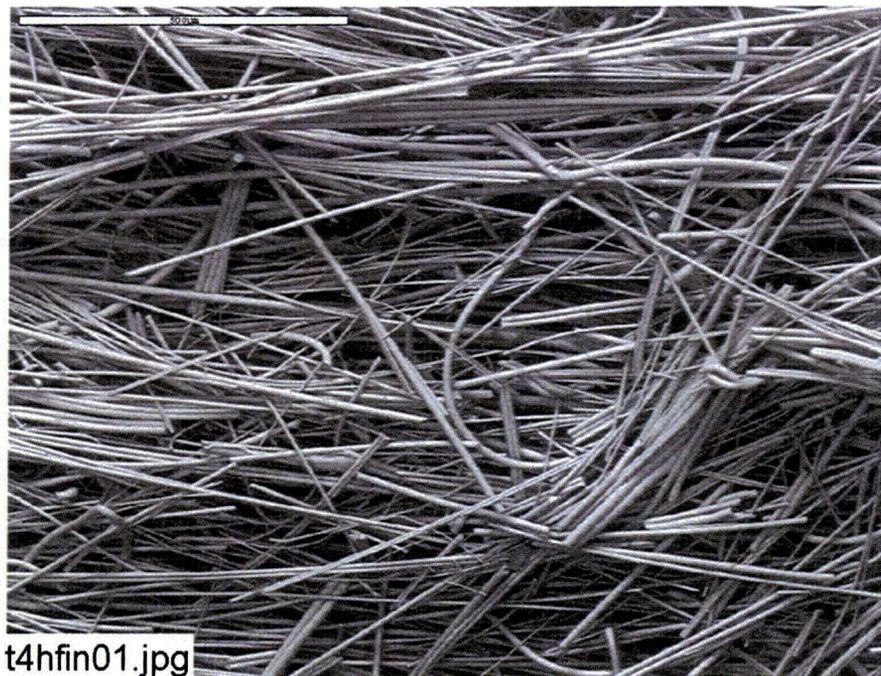


Figure C4-6. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior high-flow fiberglass sample. (t4hfin01.jpg)

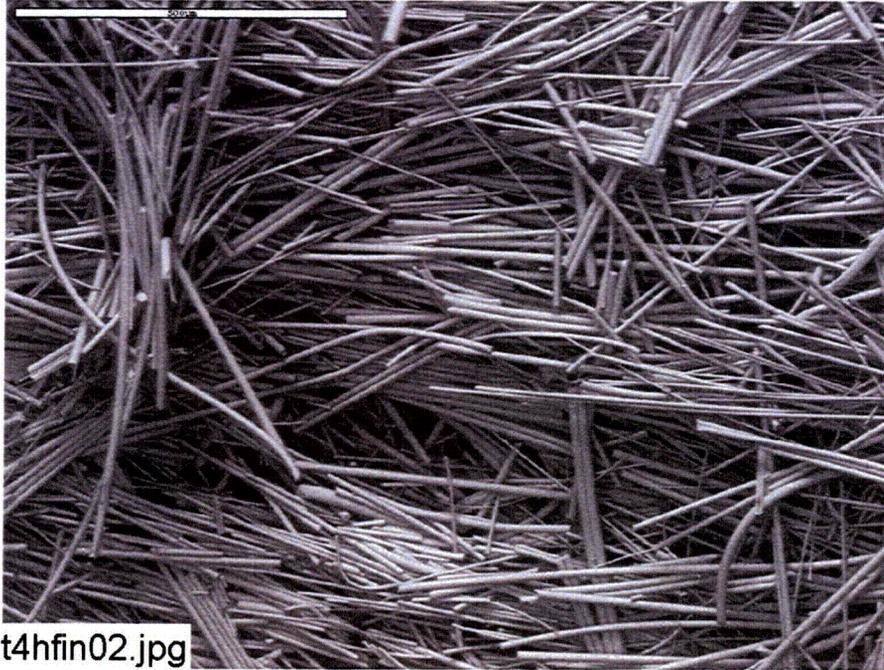


Figure C4-7. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior high-flow fiberglass sample. (t4hfin02.jpg)

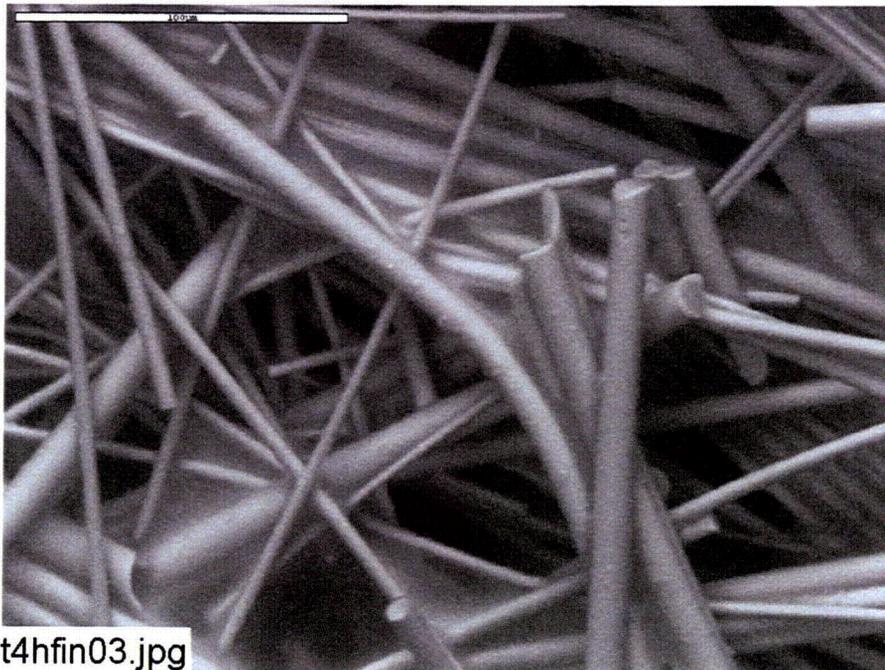


Figure C4-8. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. (t4hfin03.jpg)

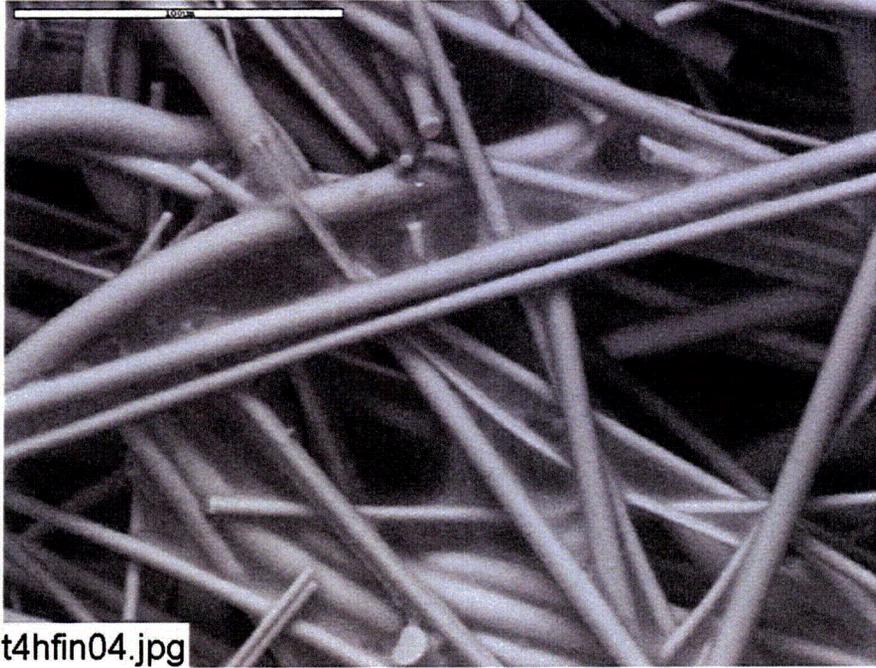


Figure C4-9. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. (t4hfin04.jpg)

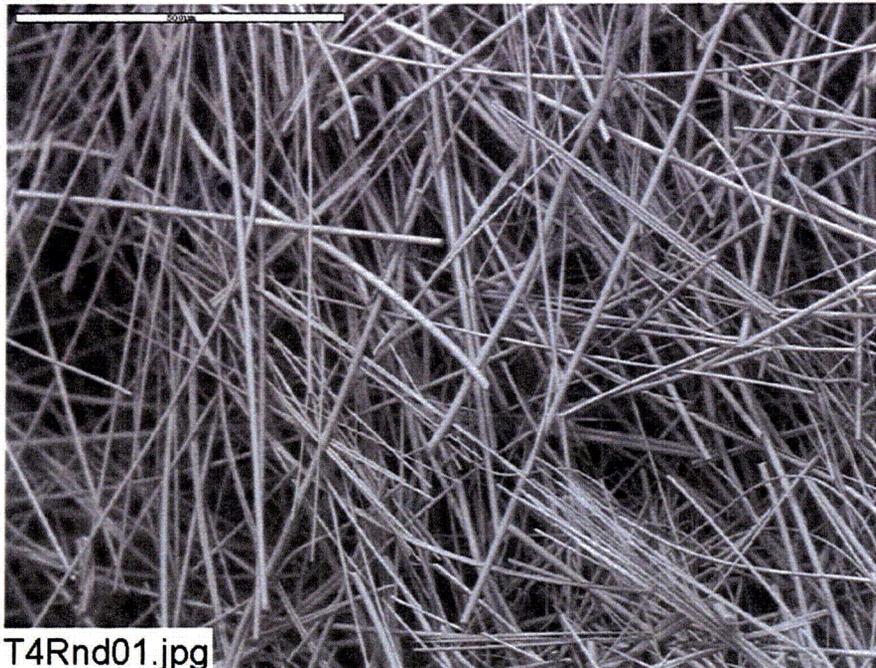


Figure C4-10. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (T4Rnd01.jpg)

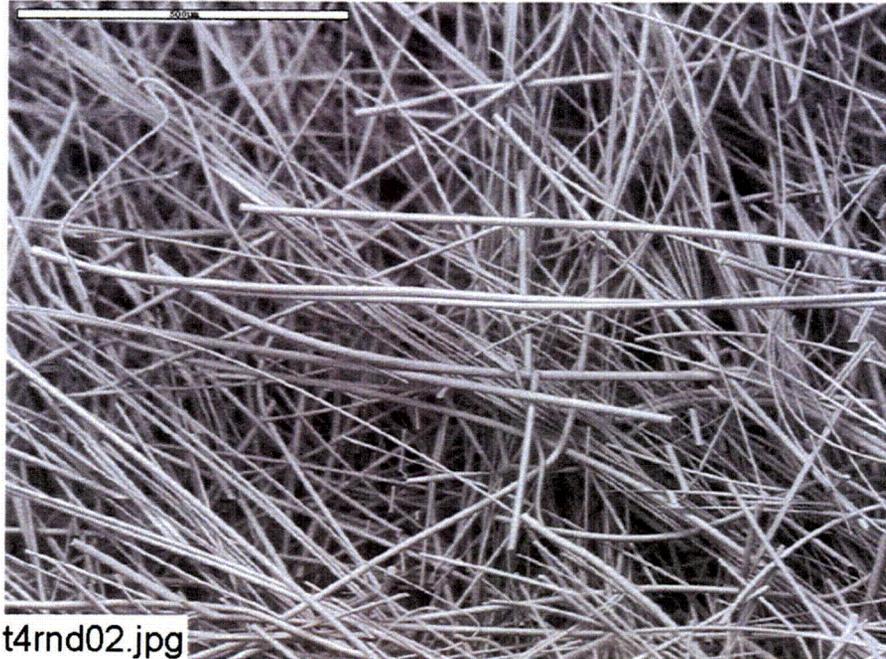


Figure C4-11. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (t4rnd02.jpg)

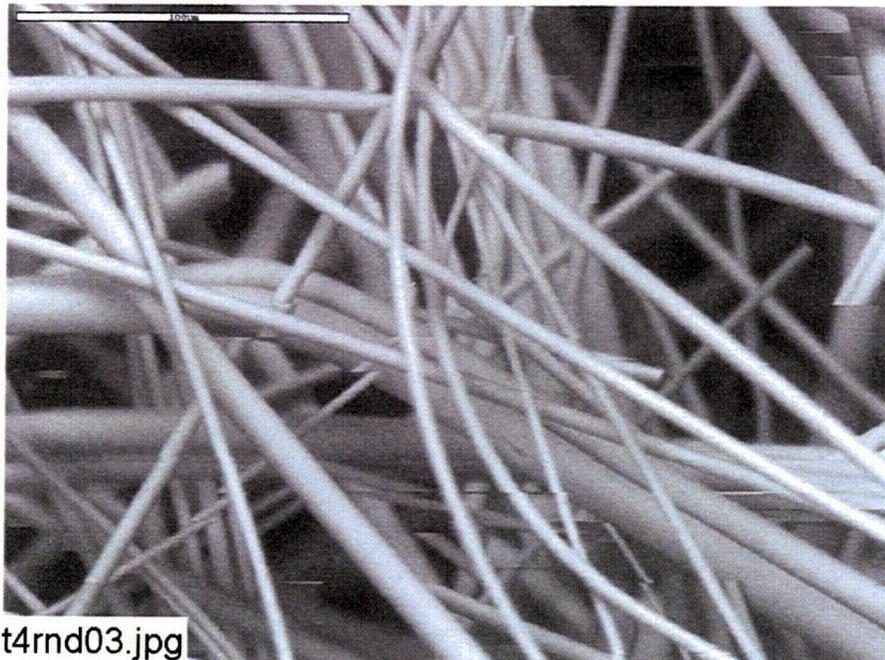


Figure C4-12. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (t4rnd03.jpg)

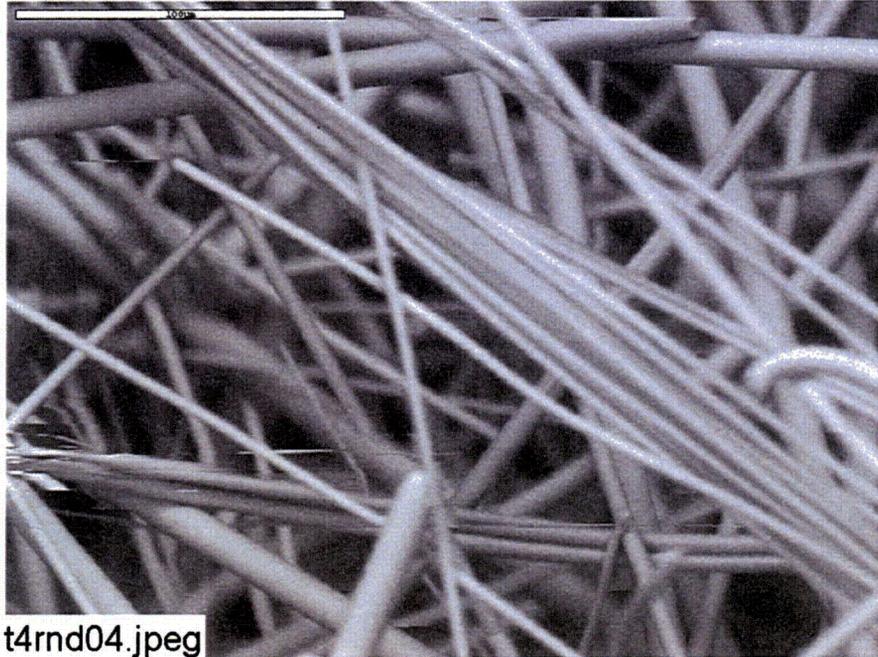


Figure C4-13. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (t4rnd04.jpeg)

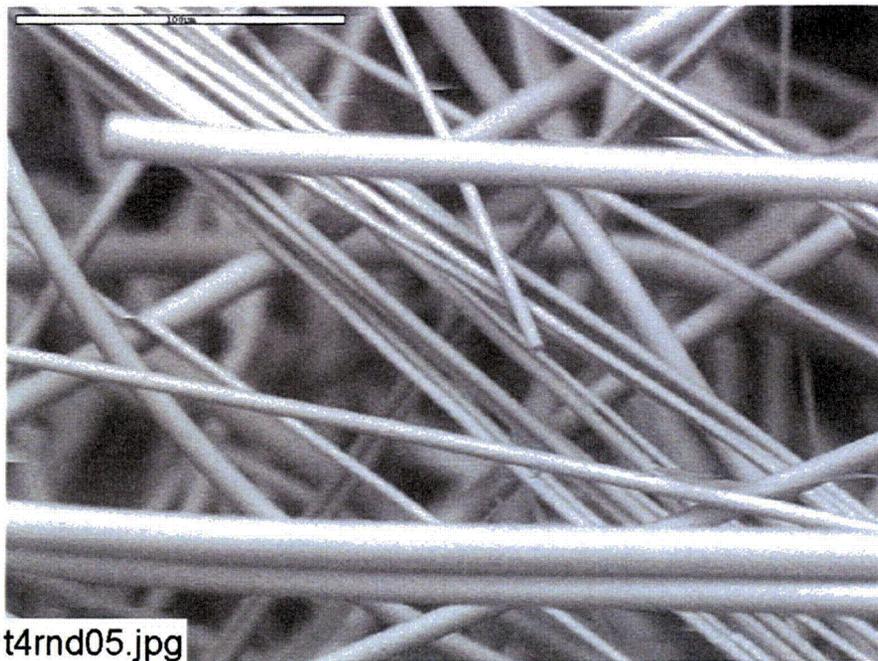


Figure C4-14. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (t4rnd05.jpg)

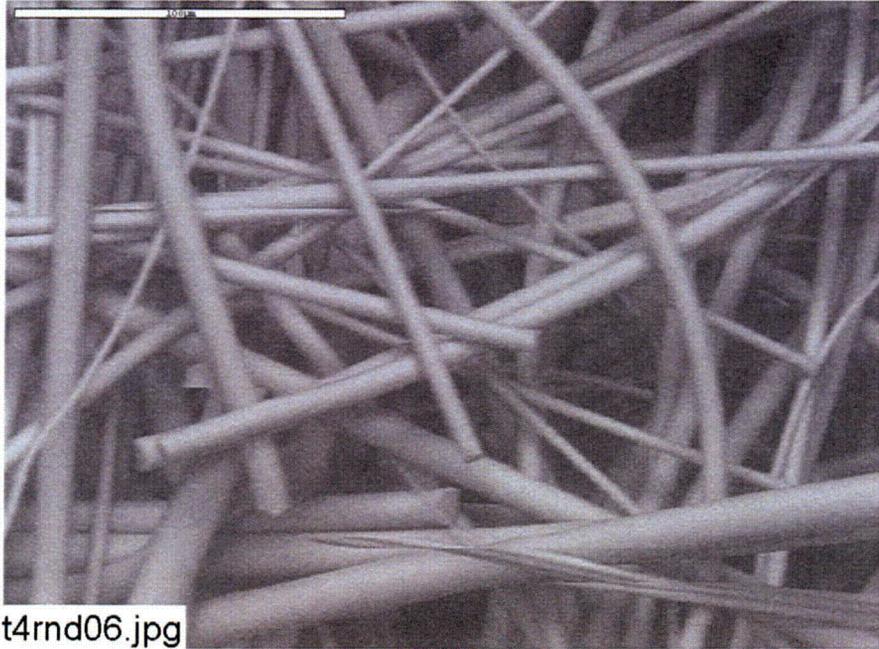
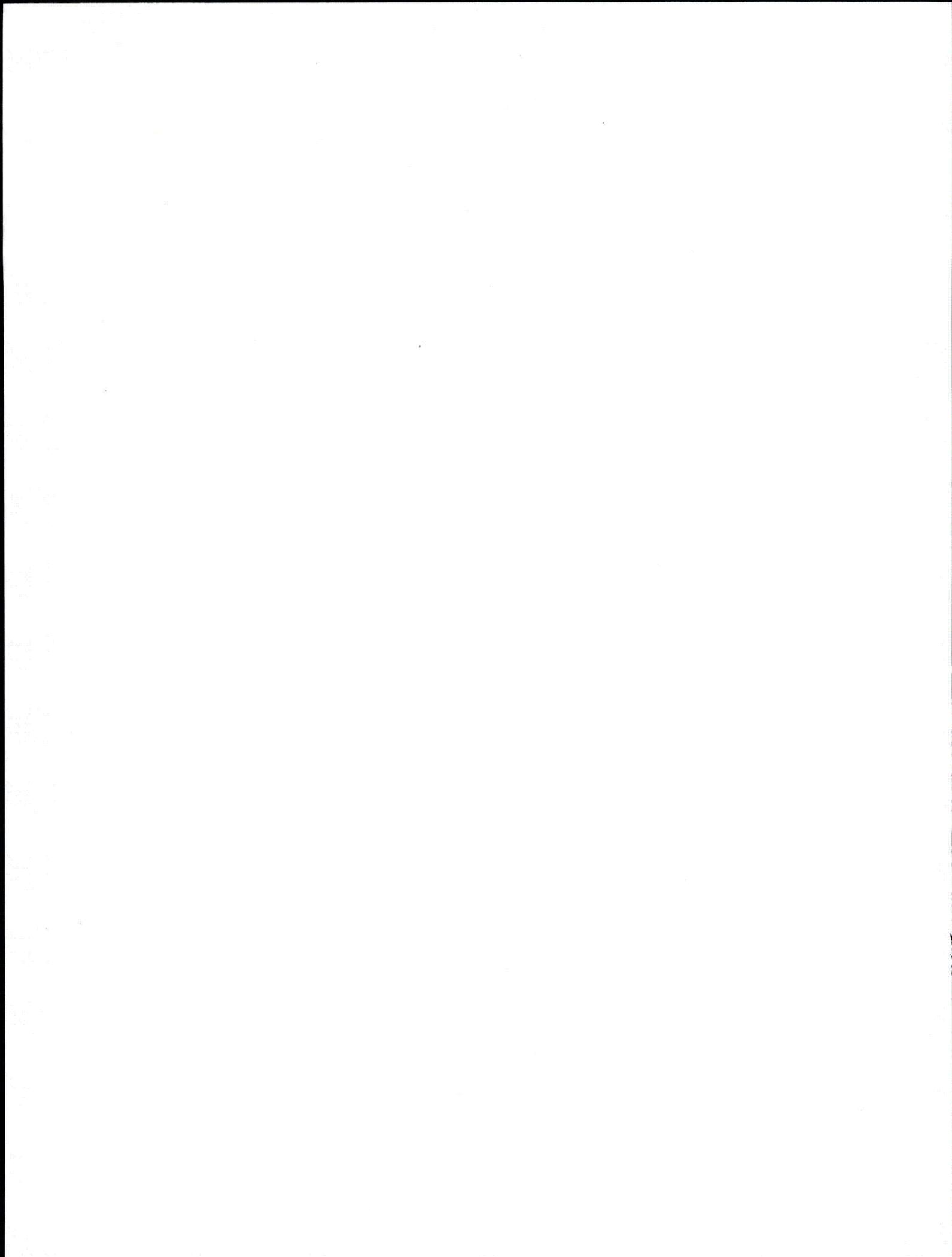


Figure C4-15. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample. The sample was gently prerinsed with RO water. (t4rnd06.jpg)



Appendix C5

ESEM/EDS Data for Test #4, Day-30 Fiberglass Inserted in Front of Header in a High-Flow Zone

Figures

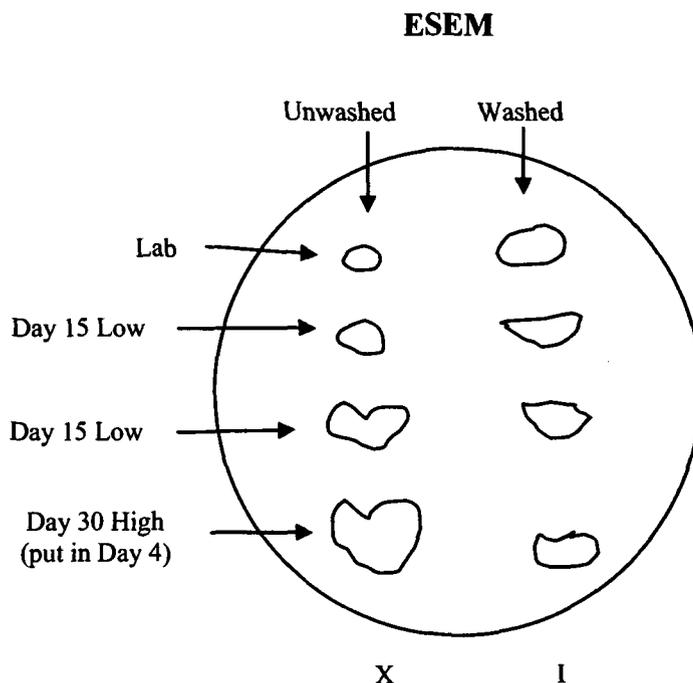
- Figure C5-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior high-flow fiberglass sample in front of the header (inserted on Day 4). (t4d30hx1.jpg) C5-4
- Figure C5-2. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior high-flow fiberglass sample in front of the header (inserted on Day 4). (t4d30hx2.jpg) C5-4
- Figure C5-3. Annotated environmental SEM image magnified 1000 times for a Test #4, Day-30 exterior high-flow fiberglass sample in front of the header (inserted on Day 4). The EDS spot is shown in the picture. (t4d30hx5.jpg) C5-5
- Figure C5-4. EDS counting spectrum for the spot of coating substance on fiberglass shown in Figure C5-3. (t4d30hx4.jpg) C5-5
- Figure C5-5. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior high-flow fiberglass sample in front of the header (inserted on Day 4). (t4d30hI6.jpg) C5-6
- Figure C5-6. Annotated environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample in front of the header (inserted on Day 4). The EDS spot is shown in the picture. (t4d30hI9.jpg)..... C5-6
- Figure C5-7. EDS counting spectrum for the spot of substance attached on fiberglass shown in Figure C5-6. (t4d30hI8.jpg)..... C5-7
- Figure C5-8. Annotated environmental SEM image magnified 1000 times for a Test #4, Day-30 interior high-flow fiberglass sample in front of the header (inserted on Day 4). The EDS spot is shown in the picture. (t4d30hi.jpg) C5-7
- Figure C5-9. EDS counting spectrum for the spot of substance attached on fiberglass shown in Figure C5-8. (t4d30hI0.jpg)..... C5-8

The high-flow fiberglass samples inserted in front of a header were extracted on June 23, 2005, the date Test #4 was shut down. Both exterior and interior locations of the fiberglass samples were examined. ESEM was employed to analyze the hydrated fiberglass samples without any coating under a low-vacuum condition (i.e., 80 Pa) to minimize the modification of the fiberglass samples through a drying process. The results of Test #4, Day-30 high-flow fiberglass samples were obtained on June 23, 2005. EDS results provide a semi-quantitative elemental analysis of the debris attached on fiberglass.

Transcribed Laboratory Log

Laboratory session from June 23, 2005.

Test #4, Day-30 High-Flow Fiberglass Inserted in Front of Header



High-Flow Exterior (put in on Day 4)

Image:	t4d30hx1	100 ×	ESEM image	Figure C5-1
	t4d30hx2	500 ×	ESEM image	Figure C5-2
	t4d30hx5	1000 ×	ESEM annotated image	Figure C5-3
EDS:	t4d30hx4		EDS on coating of fiberglass shown in t4d30hx5	Figure C5-4

High-Flow Interior (put in on Day 4)

Image:	t4d30hi6	100 ×	ESEM image of fiberglass	Figure C5-5
	t4d30hi9	500 ×	ESEM annotated image	Figure C5-6
EDS	t4d30hi8		EDS on web in t4d30hi9	Figure C5-7
Image	t4d30hi	1000 ×	ESEM annotated image	Figure C5-8
EDS	t4d30hi0		EDS on spot in t4d30hi	Figure C5-9

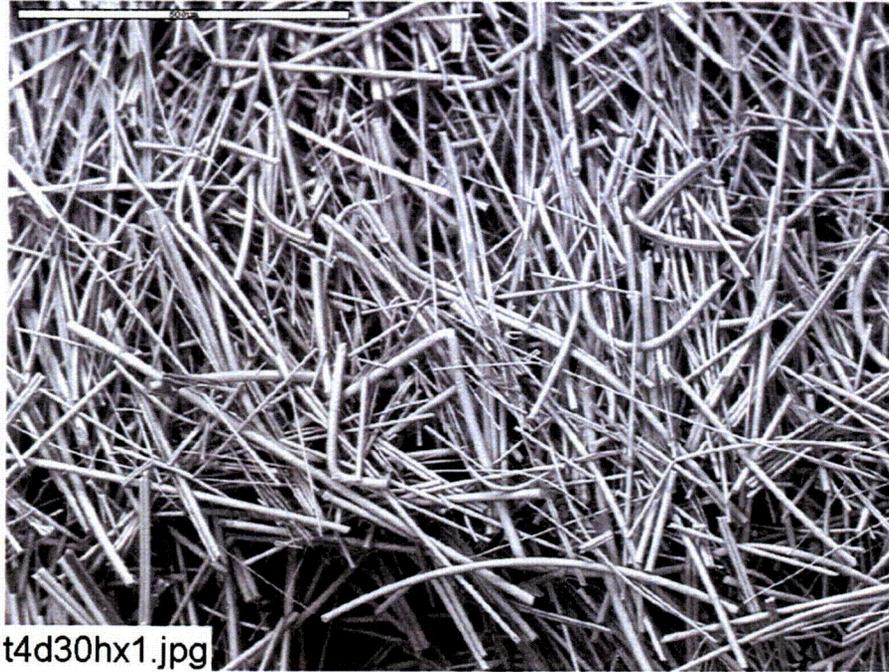


Figure C5-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior high-flow fiberglass sample in front of the header (inserted on Day 4). (t4d30hx1.jpg)

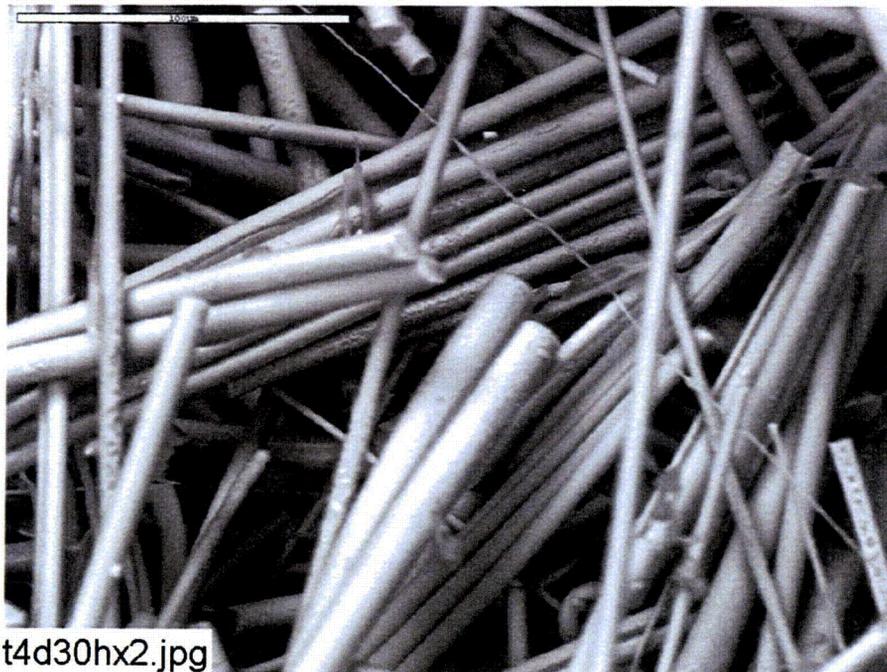


Figure C5-2. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior high-flow fiberglass sample in front of the header (inserted on Day 4). (t4d30hx2.jpg)

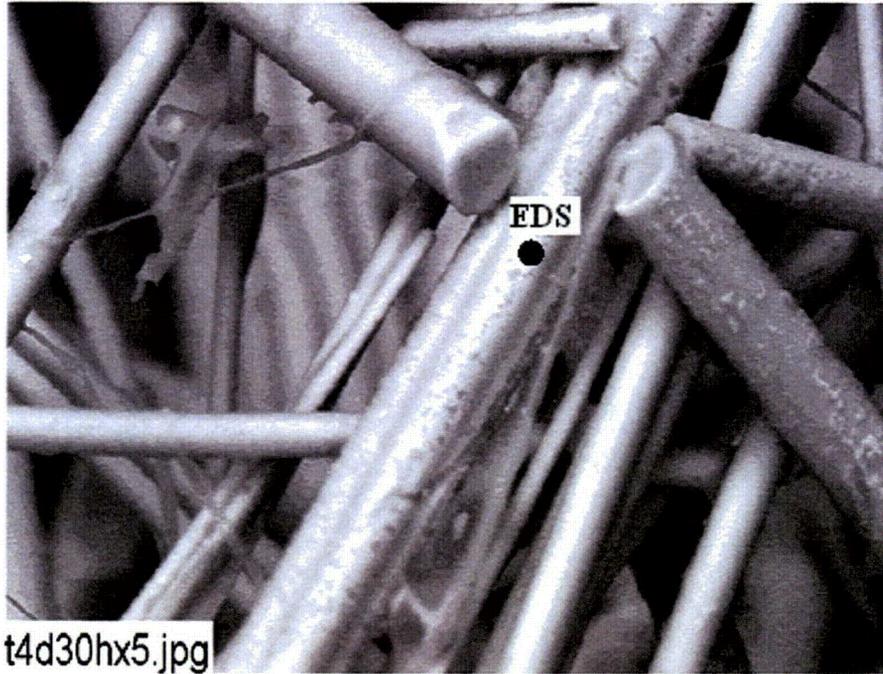


Figure C5-3. Annotated environmental SEM image magnified 1000 times for a Test #4, Day-30 exterior high-flow fiberglass sample in front of the header (inserted on Day 4). The EDS spot is shown in the picture. (t4d30hx5.jpg)

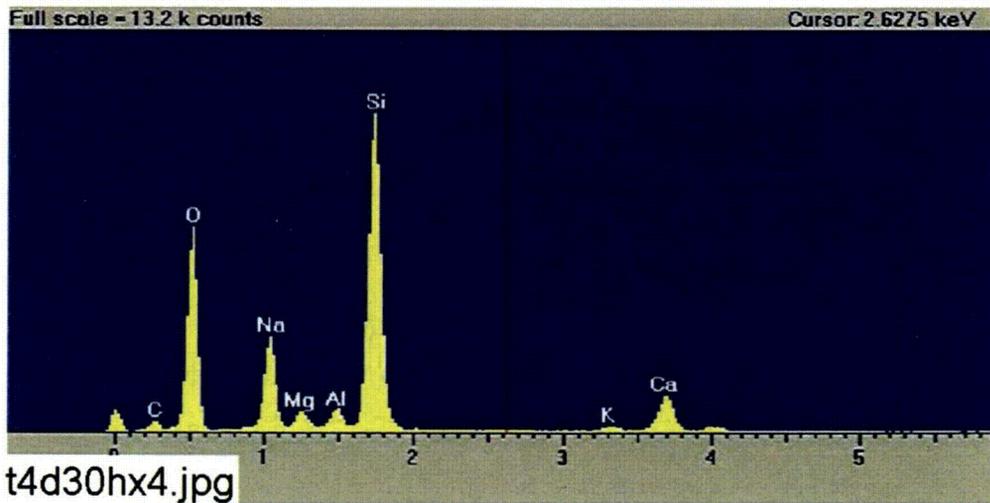


Figure C5-4. EDS counting spectrum for the spot of coating substance on fiberglass shown in Figure C5-3. (t4d30hx4.jpg)

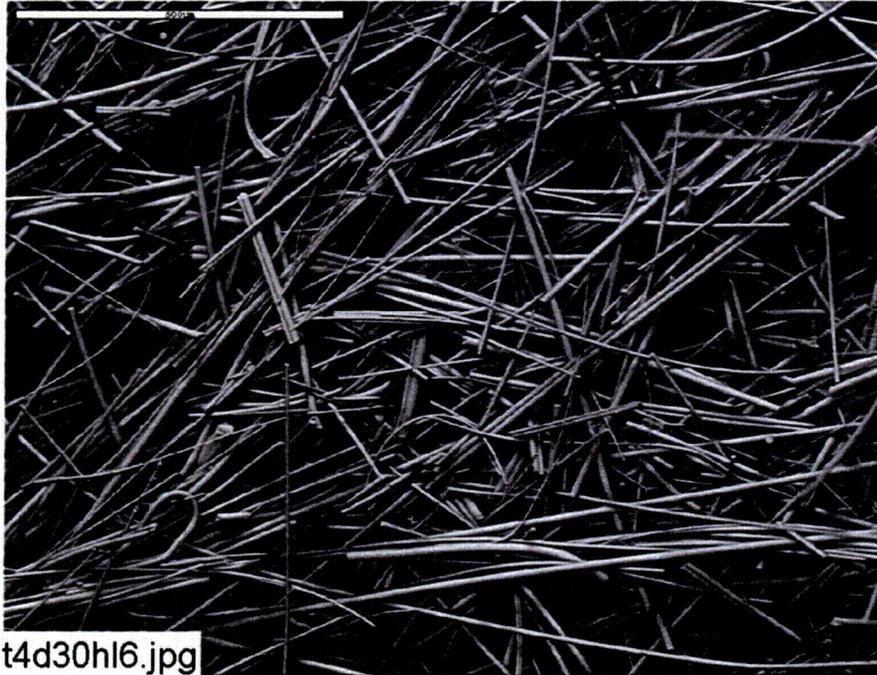


Figure C5-5. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior high-flow fiberglass sample in front of the header (inserted on Day 4). (t4d30h16.jpg)

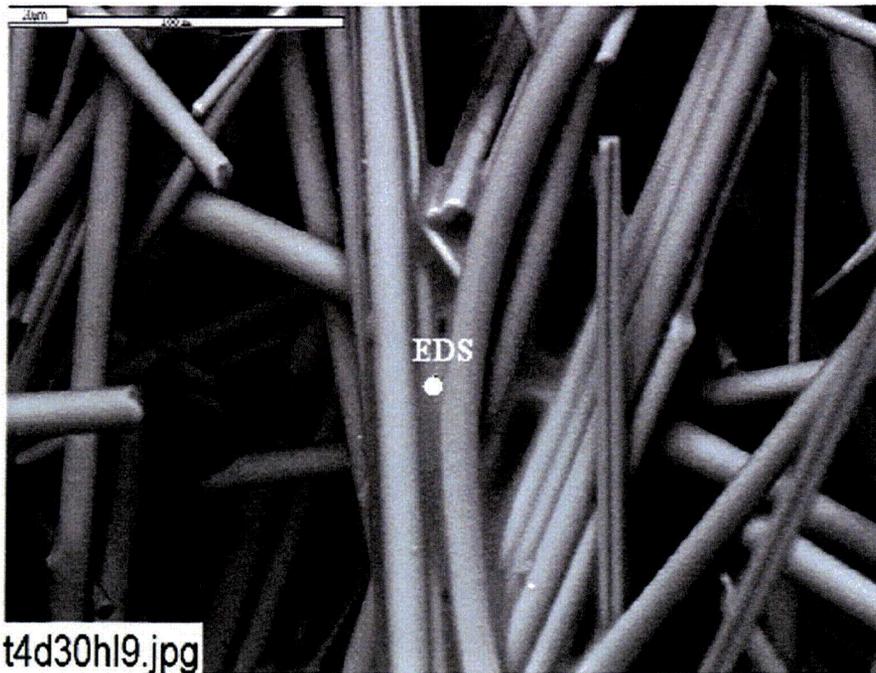


Figure C5-6. Annotated environmental SEM image magnified 500 times for a Test #4, Day-30 interior high-flow fiberglass sample in front of the header (inserted on Day 4). The EDS spot is shown in the picture. (t4d30h19.jpg)

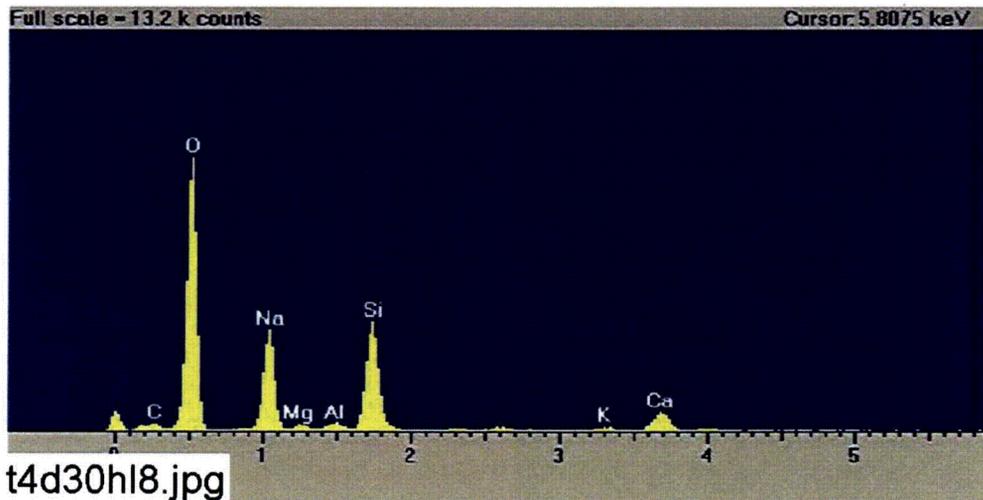


Figure C5-7. EDS counting spectrum for the spot of substance attached on fiberglass shown in Figure C5-6. (t4d30h18.jpg)



Figure C5-8. Annotated environmental SEM image magnified 1000 times for a Test #4, Day-30 interior high-flow fiberglass sample in front of the header (inserted on Day 4). The EDS spot is shown in the picture. (t4d30hi.jpg)

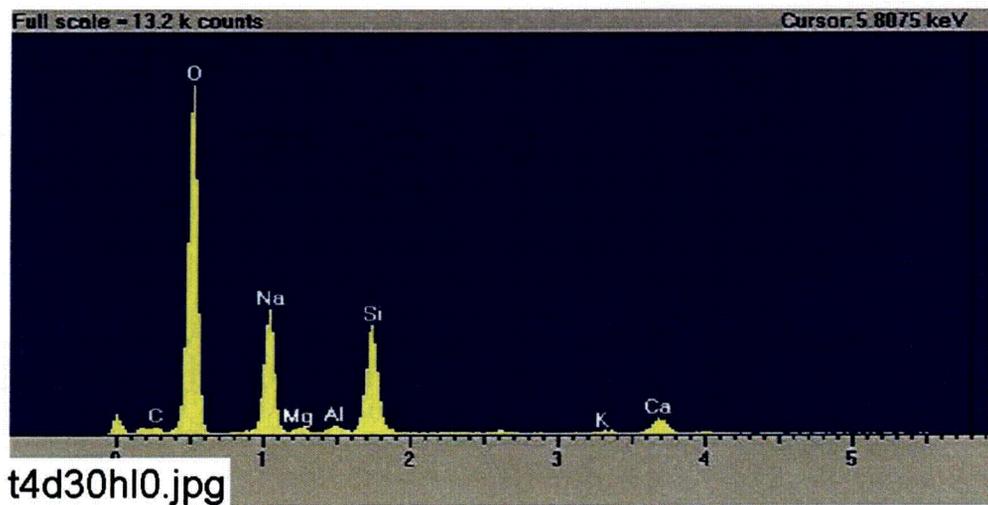


Figure C5-9. EDS counting spectrum for the spot of substance attached on fiberglass shown in Figure C5-8. (t4d30h10.jpg)

Appendix C6

ESEM/EDS Data for Test #4, Day-30 Drain Collar Fiberglass

Figures

- Figure C6-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (away from the drain screen). (T4DCOX01.jpg)..... C6-5
- Figure C6-2. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (away from the drain screen). (t4dcox05.jpg)..... C6-5
- Figure C6-3. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (away from the drain screen). (t4dcox02.jpg)..... C6-6
- Figure C6-4. Environmental SEM image magnified 1000 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (away from the drain screen). (t4dcox03.jpg)..... C6-6
- Figure C6-5. EDS counting spectrum for the large mass of particulate deposits on fiberglass shown in Figure C6-4. (t4dcox04.jpg)..... C6-7
- Figure C6-6. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior fiberglass sample on the drain collar. (t4dcin11.jpg)..... C6-7
- Figure C6-7. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior fiberglass sample on the drain collar. (t4dcin14.jpg)..... C6-8
- Figure C6-8. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior fiberglass sample on the drain collar. (t4dcin12.jpg)..... C6-8
- Figure C6-9. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior fiberglass sample on the drain collar. (t4dcin13.jpg)..... C6-9
- Figure C6-10. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior fiberglass sample on the drain collar. (t4dcin15.jpg)..... C6-9
- Figure C6-11. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (next to the drain screen). (t4dcix06.jpg)..... C6-10

Figure C6-12. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (next to the drain screen). (t4dcix10.jpg)..... C6-10

Figure C6-13. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (next to the drain screen). (t4dcix07.jpg)..... C6-11

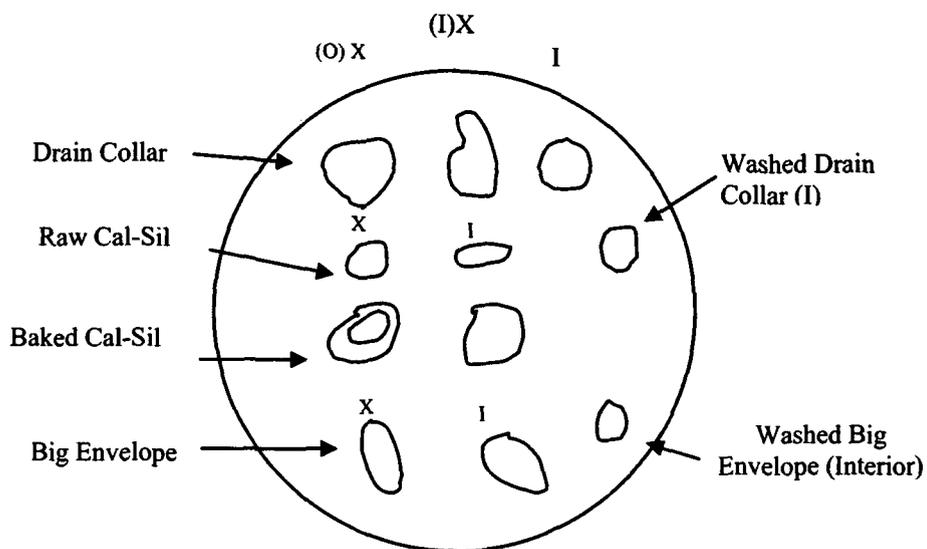
Figure C6-14. Environmental SEM image magnified 1000 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (next to the drain screen). (t4dcix08.jpg)..... C6-11

Figure C6-15. EDS counting spectrum for the large mass of particulate deposits on fiberglass shown in Figure C6-14. (t4dcix09.jpg)..... C6-12

In this appendix, ESEM/EDS results are shown from the examination of the fiberglass samples within the drain collar submerged in the tank. The fiberglass samples within the drain collar were extracted on the date Test #4 was shut down (June 23, 2005). The fiberglass samples located at the outside exterior (away from the drain screen), the inside exterior (next to the drain screen), and the interior were examined. ESEM was employed to analyze the wet fiberglass samples without any coating under a low-vacuum condition (i.e., 80 Pa) to minimize the modification of the fiberglass samples through a drying process. ESEM/EDS results of the Test #4, Day-30 drain collar fiberglass samples were obtained on June 30, 2005. EDS results provide an elemental composition analysis of the debris attached on fiberglass.

Transcribed Laboratory Log

Laboratory session from June 30, 2005.
 Test #4, Day-30 Drain Collar Fiberglass.



Drain Collar Exterior (away from the drain screen)

Image:	T4DCOX01	100 ×	ESEM image	Figure C6-1
	t4dcox05	100 ×	ESEM image	Figure C6-2
	t4dcox02	500 ×	ESEM image	Figure C6-3
	t4dcox03	1000 ×	ESEM at higher magnification	Figure C6-4
EDS:	t4dcox04		EDS on particles in t4dcox03	Figure C6-5

Drain Collar Interior

Image:	t4dcin11	100 ×	ESEM image	Figure C6-6
	t4dcin14	100 ×	ESEM image	Figure C6-7
	t4dcin12	500 ×	ESEM image higher magnification	Figure C6-8
	t4dcin13	500 ×	ESEM image high magnification	Figure C6-9
	t4dcin15	500 ×	ESEM image high magnification	Figure C6-10

Drain Collar Exterior (Next to the Drain Screen)

Image:	t4dcix06	100 ×	ESEM image	Figure C6-11
	t4dcix10	100 ×	ESEM image	Figure C6-12
	t4dcix07	500 ×	ESEM image	Figure C6-13
	t4dcix08	1000 ×	ESEM image higher magnification	Figure C6-14
EDS:	t4dcix09		EDS on particles in t4dcix08	Figure C6-15

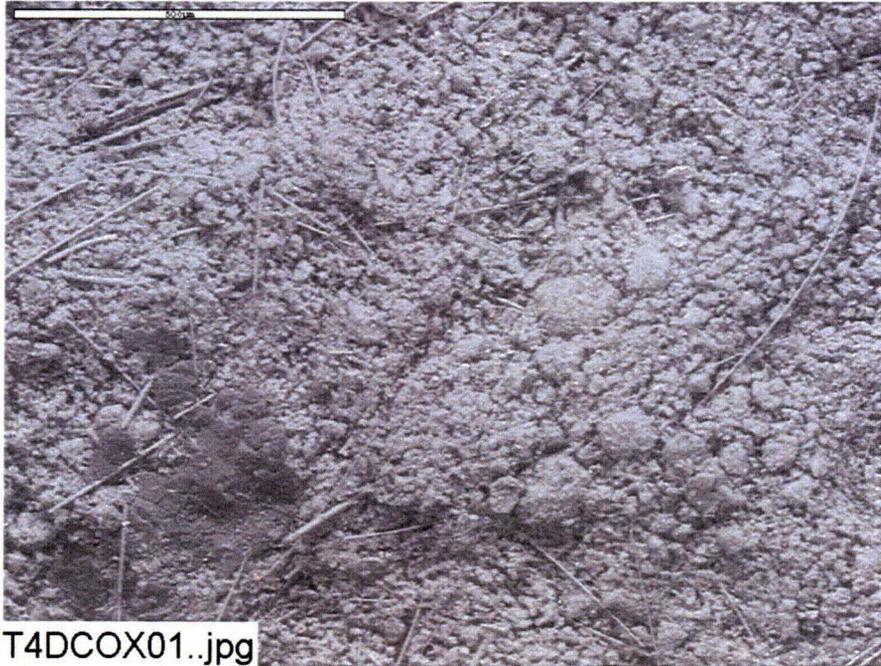


Figure C6-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (away from the drain screen). (T4DCOX01.jpg)

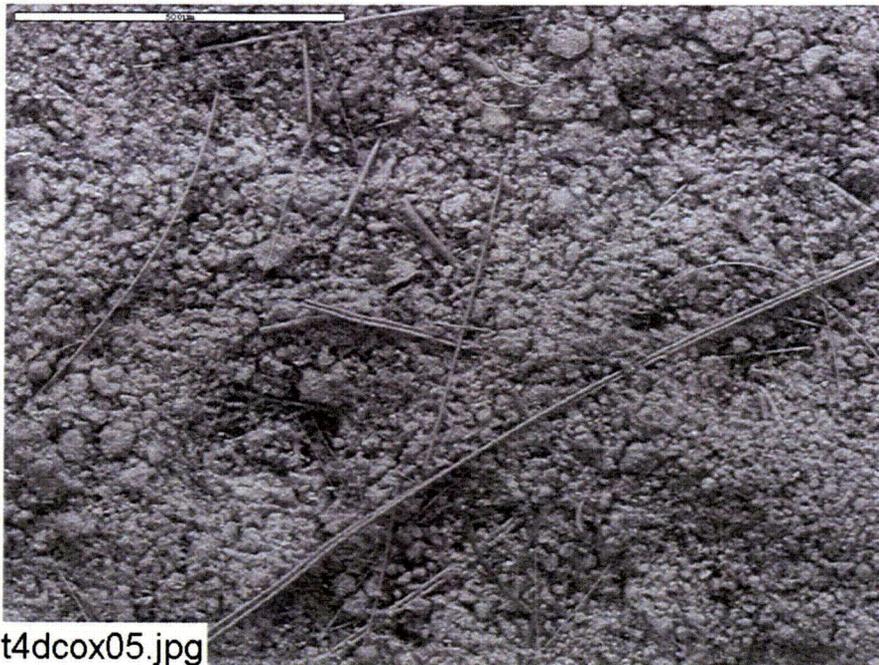
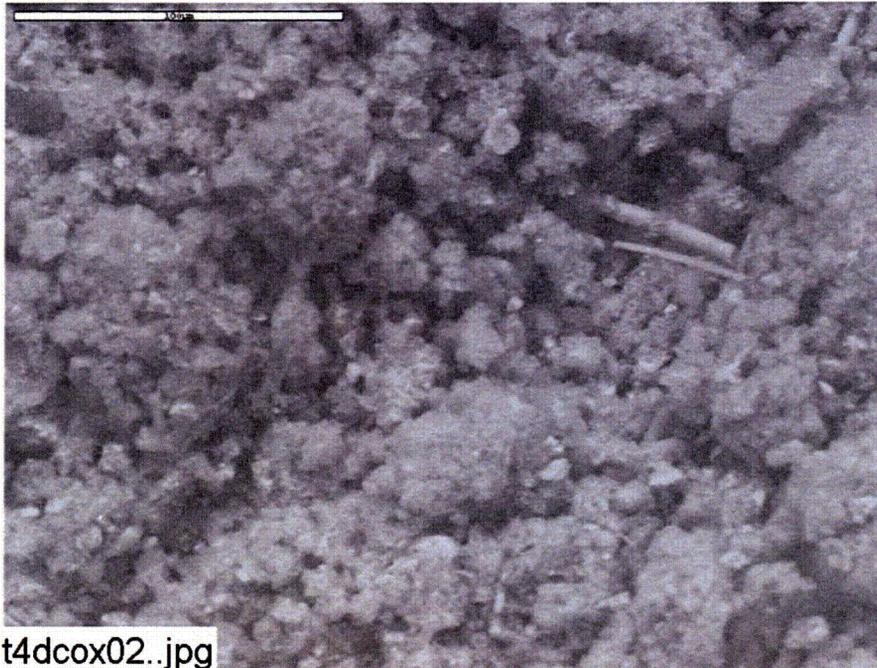
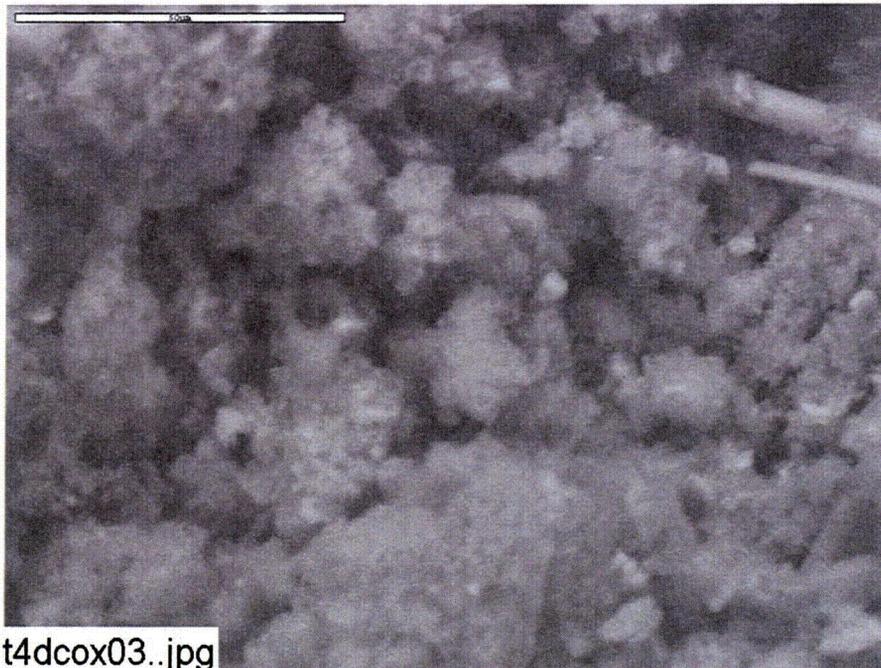


Figure C6-2. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (away from the drain screen). (t4dcox05.jpg)



t4dcox02..jpg

Figure C6-3. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (away from the drain screen). (t4dcox02.jpg)



t4dcox03..jpg

Figure C6-4. Environmental SEM image magnified 1000 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (away from the drain screen). (t4dcox03.jpg)

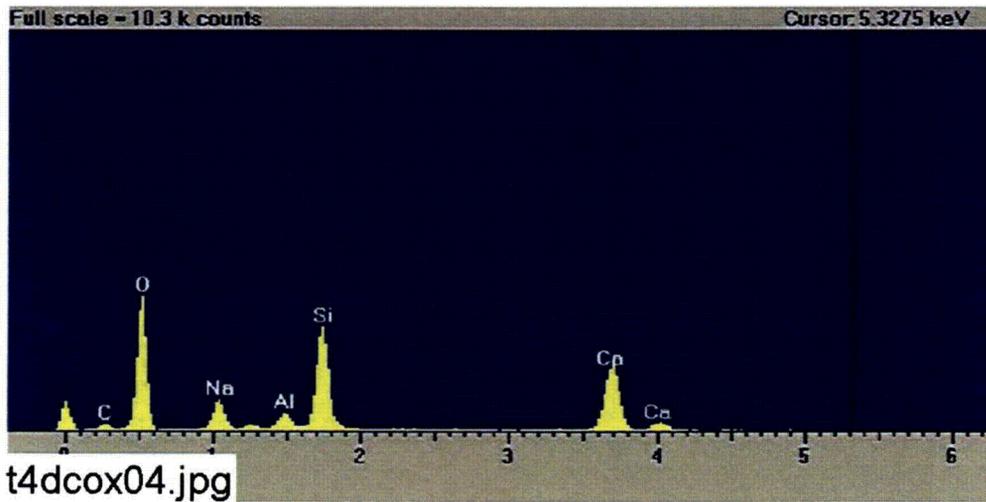
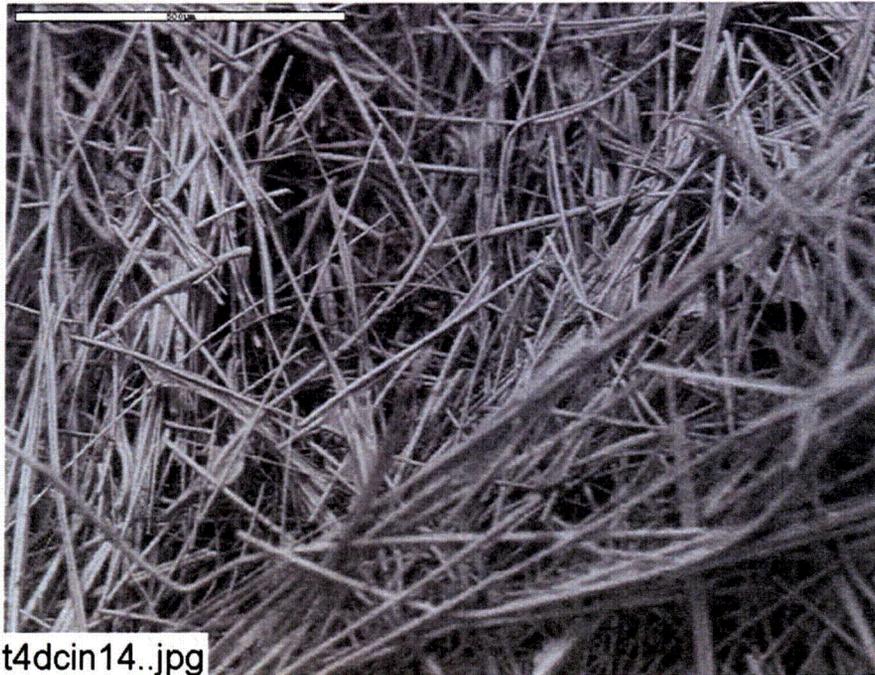


Figure C6-5. EDS counting spectrum for the large mass of particulate deposits on fiberglass shown in Figure C6-4. (t4dcox04.jpg)

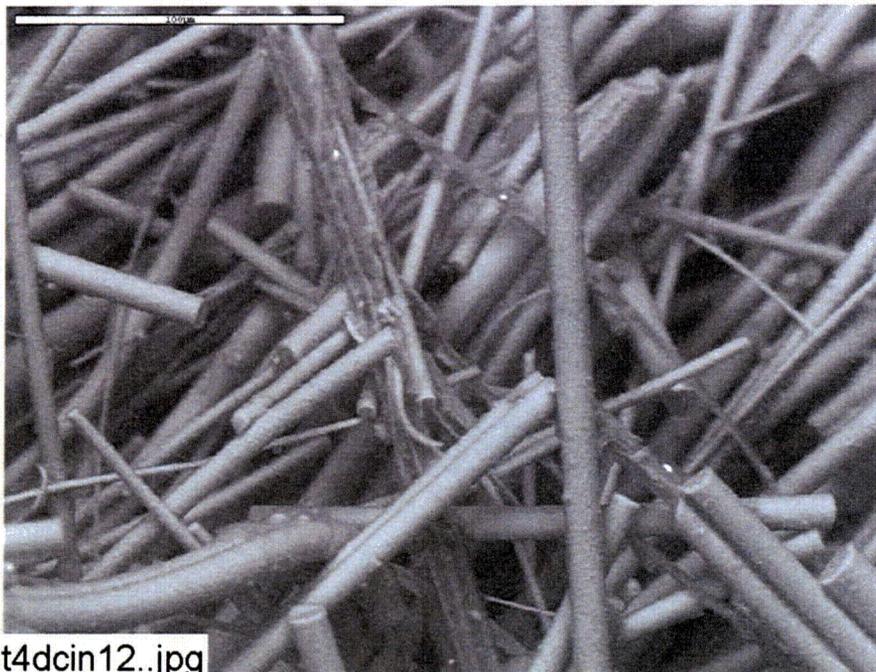


Figure C6-6. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior fiberglass sample on the drain collar. (t4dcin11..jpg)



t4dcin14..jpg

Figure C6-7. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior fiberglass sample on the drain collar. (t4dcin14.jpg)



t4dcin12..jpg

Figure C6-8. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior fiberglass sample on the drain collar. (t4dcin12.jpg)

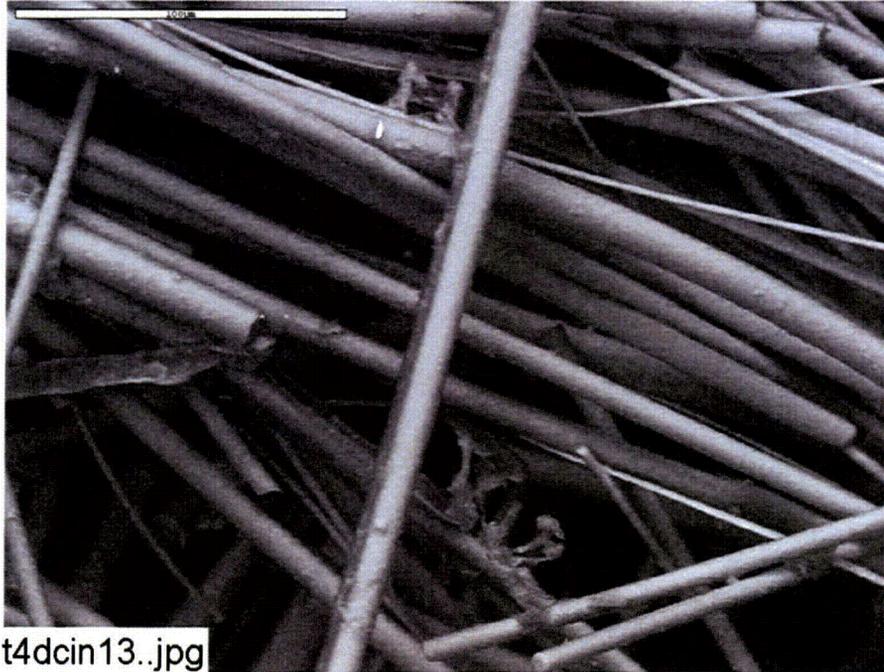


Figure C6-9. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior fiberglass sample on the drain collar. (t4dcin13.jpg)

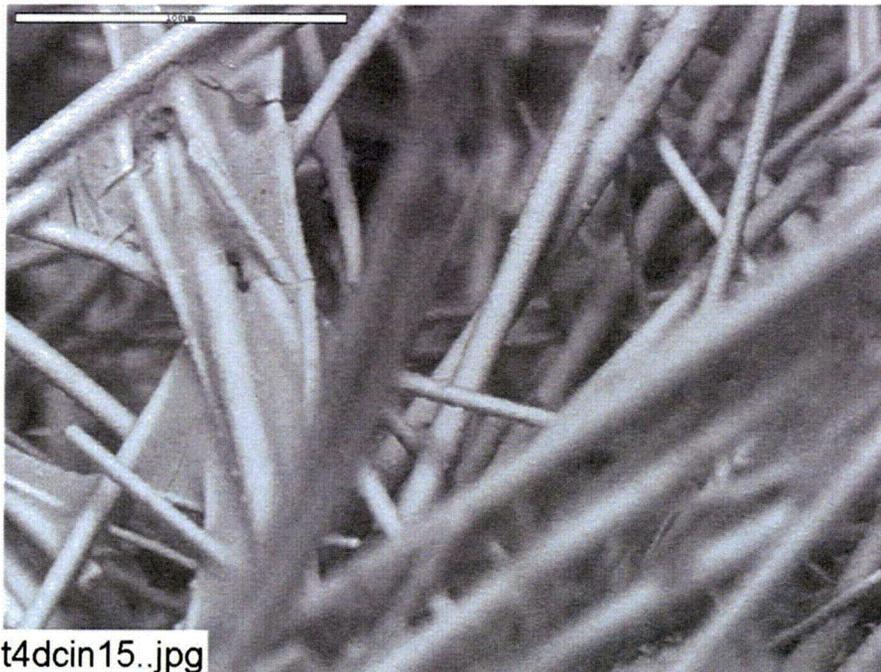
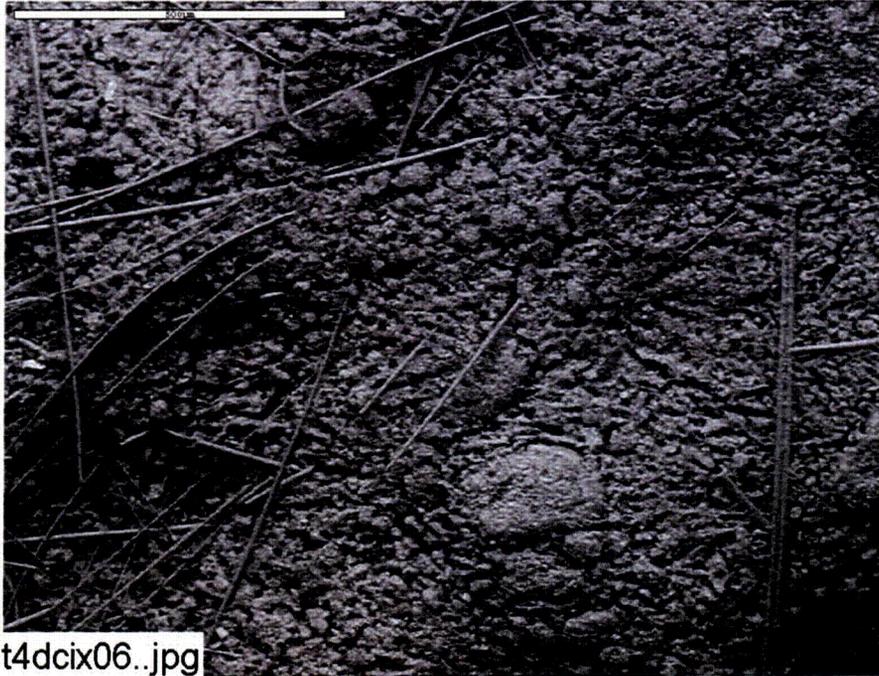
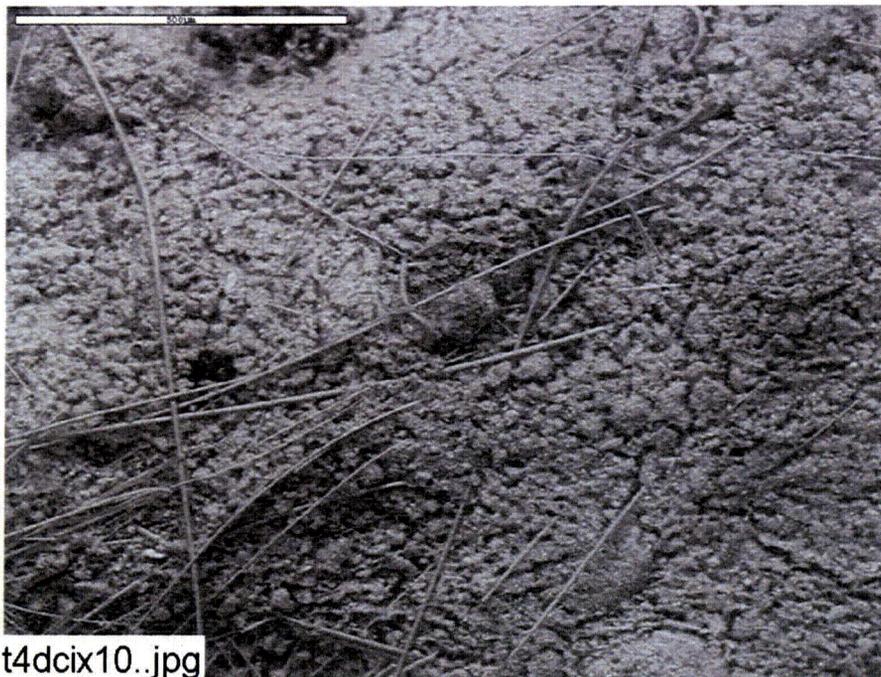


Figure C6-10. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior fiberglass sample on the drain collar. (t4dcin15.jpg)



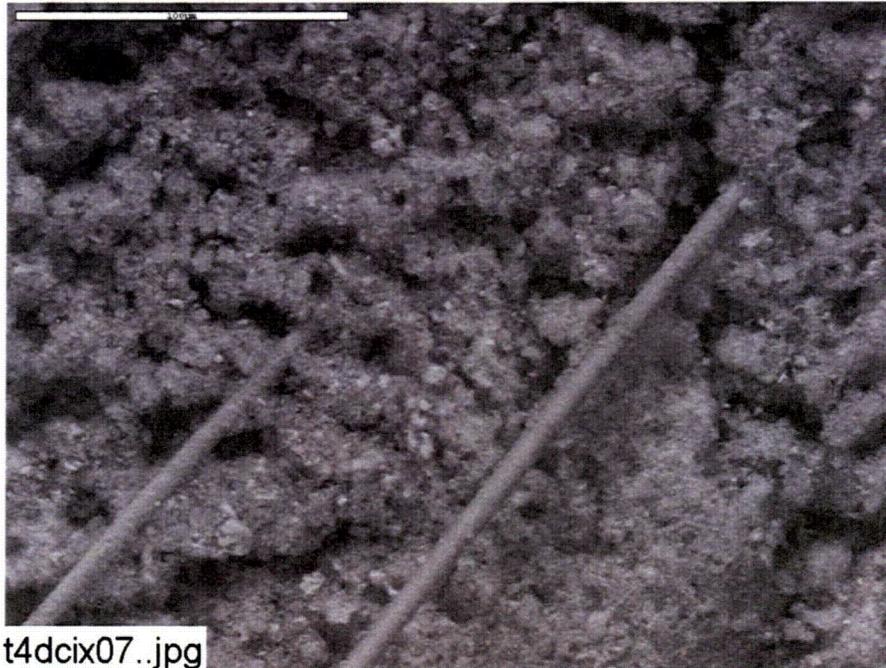
t4dcix06..jpg

Figure C6-11. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (next to the drain screen). (t4dcix06.jpg)



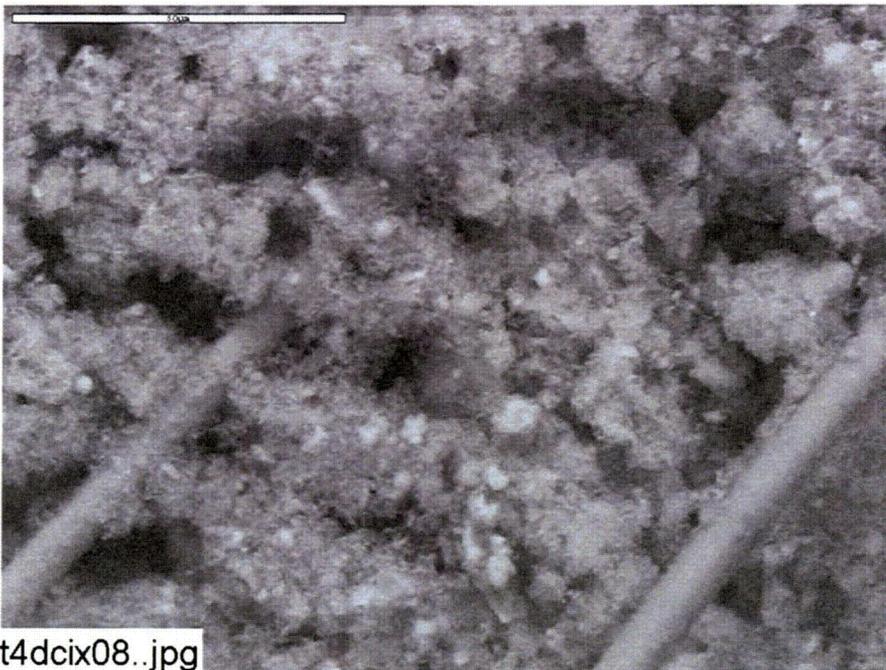
t4dcix10..jpg

Figure C6-12. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (next to the drain screen). (t4dcix10.jpg)



t4dcix07..jpg

Figure C6-13. Environmental SEM image magnified 500 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (next to the drain screen). (t4dcix07.jpg)



t4dcix08..jpg

Figure C6-14. Environmental SEM image magnified 1000 times for a Test #4, Day-30 exterior fiberglass sample on the drain collar (next to the drain screen). (t4dcix08.jpg)

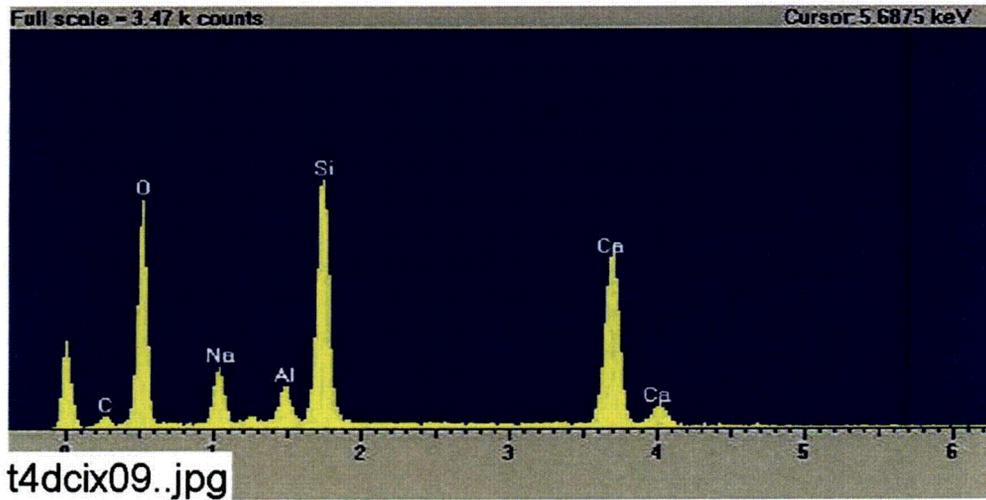


Figure C6-15. EDS counting spectrum for the large mass of particulate deposits on fiberglass shown in Figure C6-14. (t4dcix09.jpg)

Appendix C7

ESEM/EDS Data for Test #4, Day-30 Birdcage Fiberglass

Figures

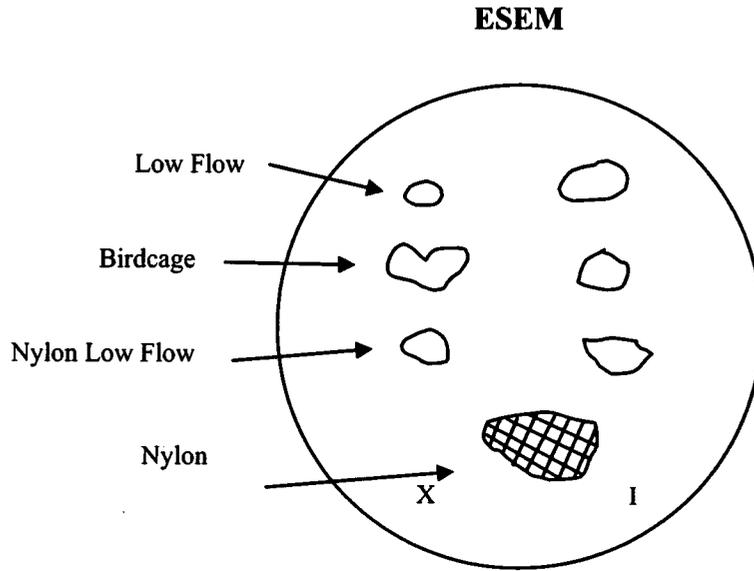
- Figure C7-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior fiberglass sample within the birdcage. (T4D30BX1.jpg)..... C7-4
- Figure C7-2. Annotated environmental SEM image magnified 500 times for a Test #4, Day-30 exterior fiberglass sample within the birdcage. (t4d30bx4.jpg)..... C7-4
- Figure C7-3. EDS counting spectrum for the particulate deposits on fiberglass shown in Figure C7-2. (T4D30bx3.jpg) C7-5
- Figure C7-4. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior fiberglass sample within the birdcage. (t4d30bi5.jpg) C7-5
- Figure C7-5. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior fiberglass sample within the birdcage. (t4d30bi6.jpg) C7-6
- Figure C7-6. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior fiberglass sample within the birdcage. (t4d30bi7.jpg) C7-6

This appendix lists the ESEM/EDS results for the fiberglass samples within a birdcage submerged in the testing solution. The purpose of this analysis was to determine the degree and the extent that particulate debris migrated and attached on fiberglass. In this appendix, the fiberglass samples within the birdcage were extracted on June 23, 2005, the date the test was shut down. Both exterior and interior fiberglass samples were examined. ESEM was employed to analyze the hydrated fiberglass samples without any coating under a low-vacuum condition (i.e., 80 Pa) to minimize the modification of the fiberglass samples through a drying process. ESEM/EDS results of the Test #4, Day-30 birdcage fiberglass samples were obtained on June 24, 2005.

Transcribed Laboratory Log

Laboratory session from June 24, 2005.

Test #4, Day-30 Birdcage Fiberglass



Birdcage Exterior

Image: T4D30BX1	100 ×	ESEM image	Figure C7-1
t4d30bx4	500 ×	ESEM annotated image	Figure C7-2
EDS: t4d30bx3		EDS on particles in t4d30bx4	Figure C7-3

Birdcage Interior

Image: t4d30bi5	100 ×	ESEM image of fiberglass	Figure C7-4
t4d30bi6	500 ×	ESEM image higher magnification	Figure C7-5
t4d30bi7	500 ×	ESEM image	Figure C7-6



Figure C7-1. Environmental SEM image magnified 100 times for a Test #4, Day-30 exterior fiberglass sample within the birdcage. (T4D30BX1.jpg)

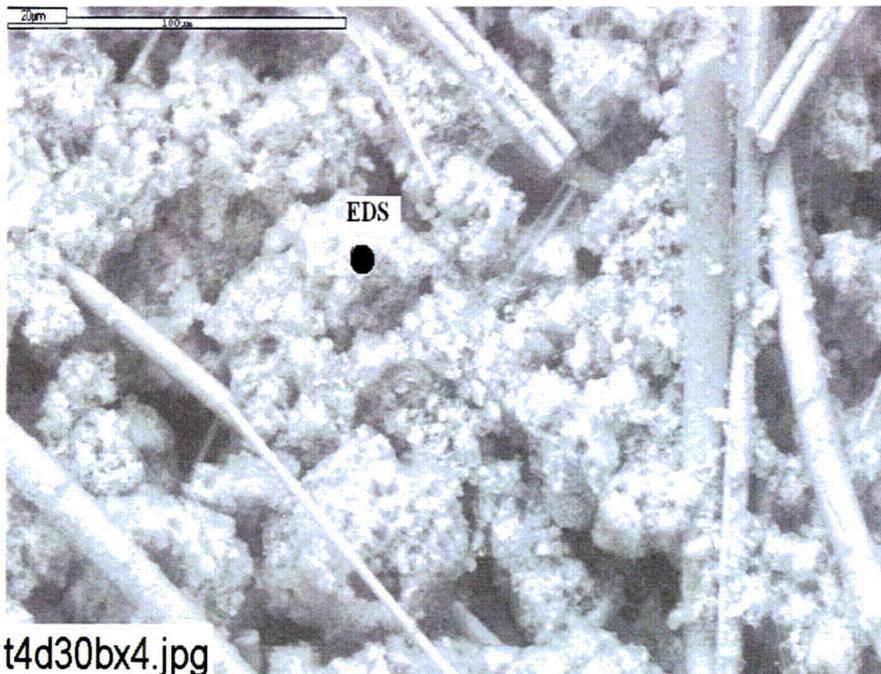


Figure C7-2. Annotated environmental SEM image magnified 500 times for a Test #4, Day-30 exterior fiberglass sample within the birdcage. (t4d30bx4.jpg)

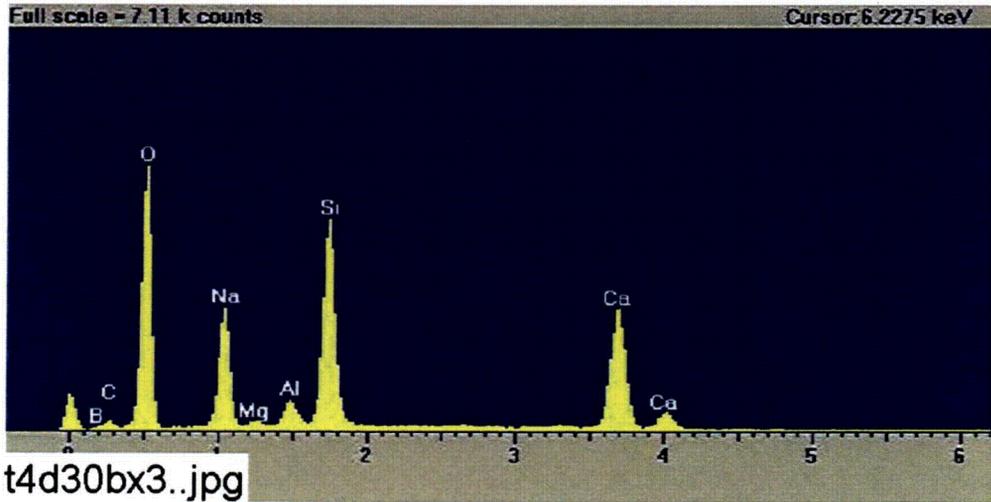
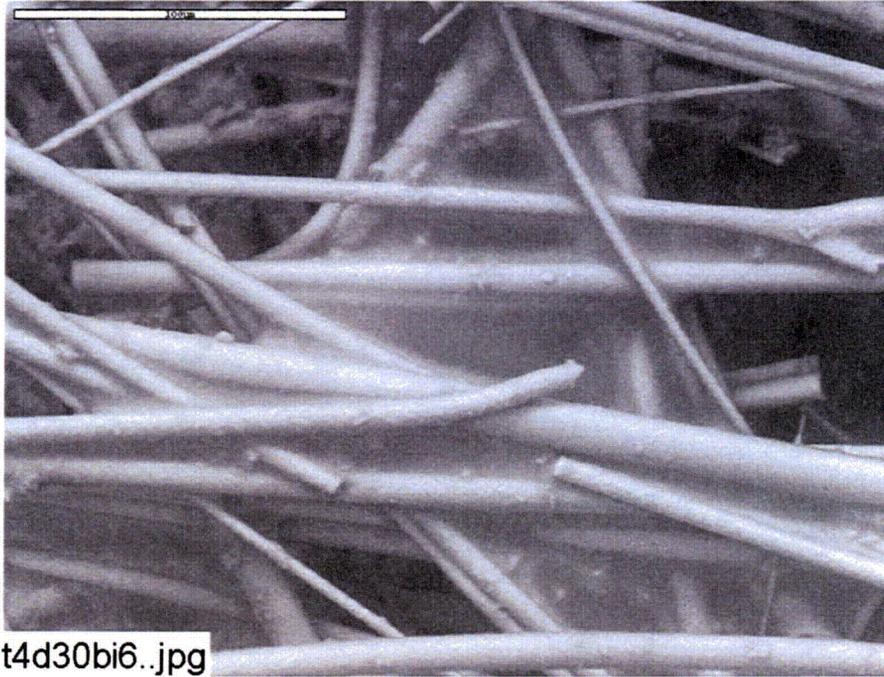


Figure C7-3. EDS counting spectrum for the particulate deposits on fiberglass shown in Figure C7-2. (T4D30bx3.jpg)

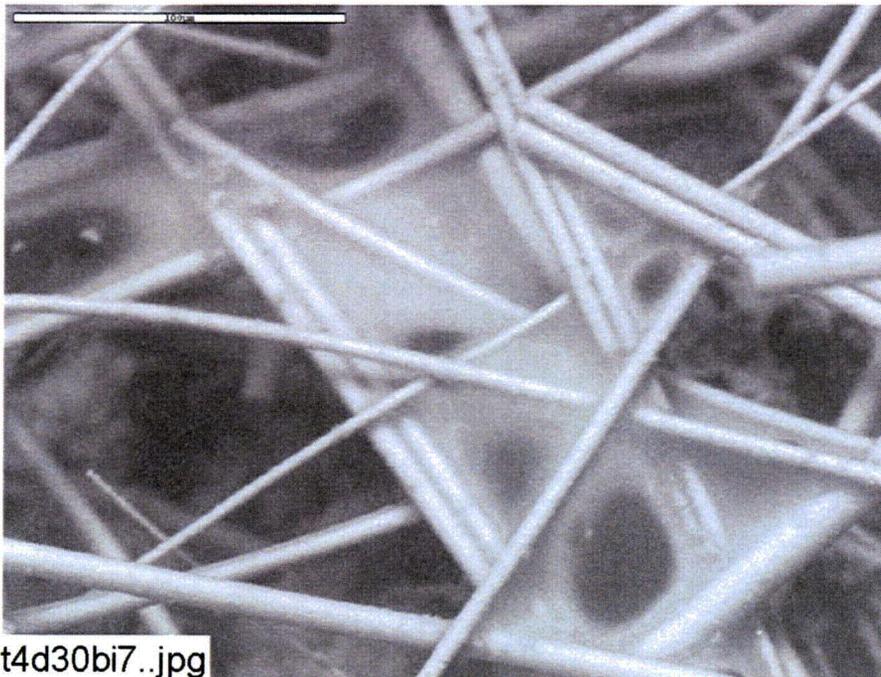


Figure C7-4. Environmental SEM image magnified 100 times for a Test #4, Day-30 interior fiberglass sample within the birdcage. (t4d30bi5.jpg)



t4d30bi6.jpg

Figure C7-5. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior fiberglass sample within the birdcage. (t4d30bi6.jpg)



t4d30bi7.jpg

Figure C7-6. Environmental SEM image magnified 500 times for a Test #4, Day-30 interior fiberglass sample within the birdcage. (t4d30bi7.jpg)

Appendix D

ESEM/EDS Data for Test #4, Day-30 Low-Flow Cal-Sil Samples

Figures

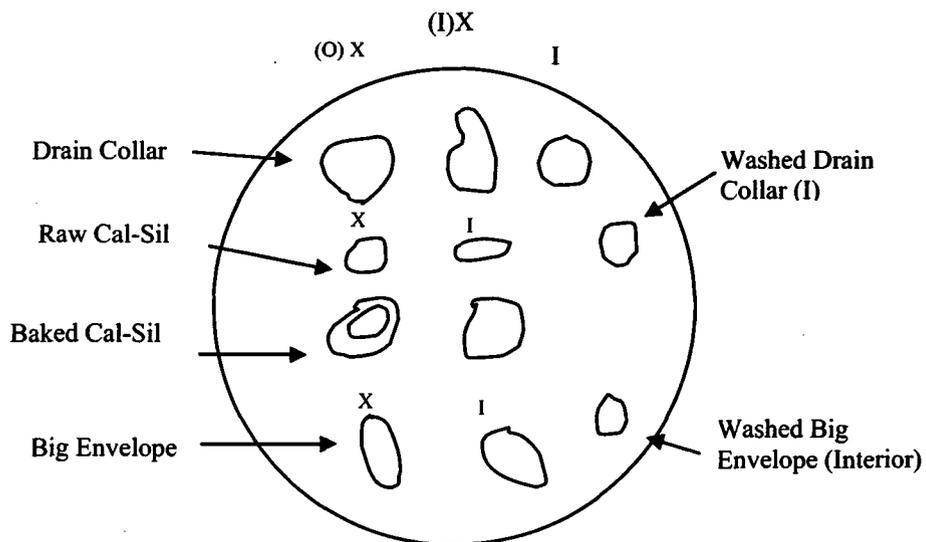
Figure D-1.	ESEM image magnified 100 times for a Test #4, Day-30 low-flow exterior raw cal-sil sample. (T4RCX01.jpg).....	D-5
Figure D-2.	ESEM image magnified 500 times for a Test #4, Day-30 low-flow exterior raw cal-sil sample. (t4rcex02.jpg).....	D-5
Figure D-3.	EDS counting spectrum for the whole image shown in Figure D-2. (t4rcex03.jpg).....	D-6
Figure D-4.	ESEM image magnified 100 times for a Test #4, Day-30 low-flow interior raw cal-sil sample. (t4rcin04.jpg)	D-6
Figure D-5.	ESEM image magnified 500 times for a Test #4, Day-30 low-flow interior raw cal-sil sample. (t4rcin05.jpg)	D-7
Figure D-6.	EDS counting spectrum for the whole image shown in Figure D-5. (t4rcin06.jpg)	D-7
Figure D-7.	ESEM image magnified 100 times for a Test #4, Day-30 low-flow exterior baked cal-sil sample. (T4BCX07.jpg).....	D-8
Figure D-8.	ESEM image magnified 500 times for a Test #4, Day-30 low-flow exterior baked cal-sil sample. (t4bcex08.jpg).....	D-8
Figure D-9.	EDS counting spectrum for the whole image shown in Figure D-7. (t4bcex09.jpg)	D-9
Figure D-10.	ESEM image magnified 100 times for a Test #4, Day-30 low-flow interior baked cal-sil sample. (T4BCIN10.jpg).....	D-9
Figure D-11.	ESEM image magnified 500 times for a Test #4, Day-30 low-flow interior baked cal-sil sample. (t4bcin11.jpg).....	D-10
Figure D-12.	EDS counting spectrum for the whole image shown in Figure D-11. (t4bcin12.jpg).....	D-10

This appendix presents the ESEM/EDS results of Test #4, Day-30 raw and baked cal-sil samples submerged in a low-flow zone. The cal-sil samples were collected on the date Test #4 was shut down (June 23, 2005). ESEM was employed to analyze the hydrated cal-sil samples without any coating under a low-vacuum condition (i.e., 80 Pa) to minimize the modification of the cal-sil samples through a drying process. The ESEM/EDS analytical results of the cal-sil samples were obtained on June 30, 2005. EDS results provide a semi-quantitative elemental analysis of the sample compositions.

Transcribed Laboratory Log

Laboratory session from June 30, 2005.

ESEM/EDS Test #4, Day-30 Low-Flow Cal-Sil



Submerged Raw Cal-Sil (Low-Flow) Exterior

Image:	T4RCEX01	100 ×	ESEM image	Figure D-1
	t4rcex02	500 ×	ESEM at higher magnification	Figure D-2
EDS:	t4rcex03		EDS on whole image t4rcex02	Figure D-3

Submerged Raw Cal-Sil (Low-Flow) Interior

Image:	t4rcin04	100 ×	ESEM image	Figure D-4
	t4rcin05	500 ×	ESEM at higher magnification	Figure D-5
EDS:	t4rcin06		EDS of whole image t4rcin05	Figure D-6

Low-Flow Exterior Submerged Baked Cal-Sil

Image:	T4BCEX07	100 ×	ESEM image	Figure D-7
	t4bcex08	500 ×	ESEM at higher magnification	Figure D-8
EDS:	t4bcex09		EDS of whole image of t4bcex08	Figure D-9

Low-Flow Interior Submerged Baked Cal-Sil

Image:	T4BCIN10	100 ×	ESEM image	Figure D-10
	t4bcin11	500 ×	ESEM at higher magnification	Figure D-11
EDS:	t4bcin12		EDS of whole image of t4bcin11	Figure D-12



Figure D-1. ESEM image magnified 100 times for a Test #4, Day-30 low-flow exterior raw cal-sil sample. (T4RCEX01.jpg)

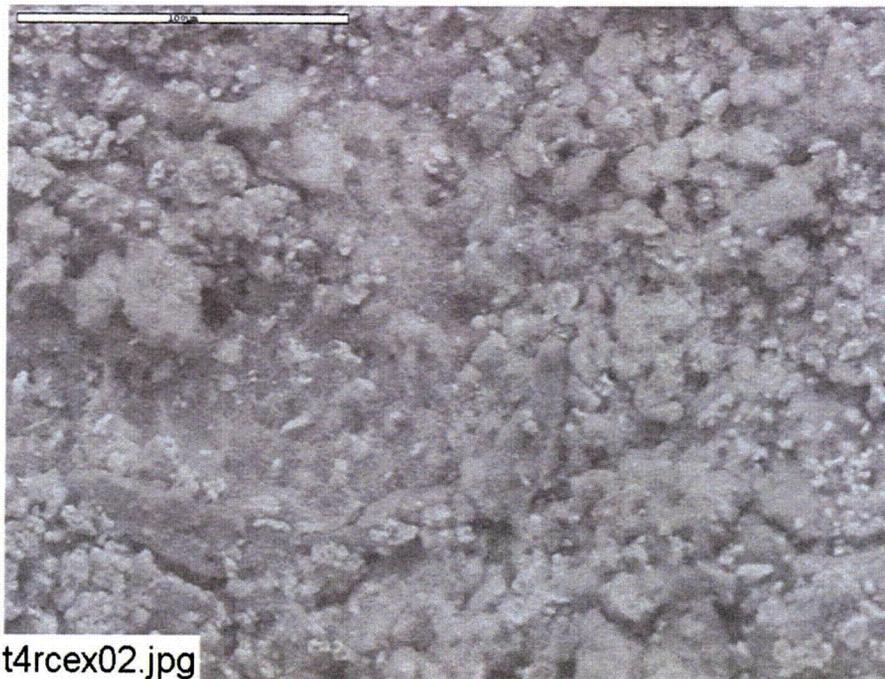


Figure D-2. ESEM image magnified 500 times for a Test #4, Day-30 low-flow exterior raw cal-sil sample. (t4rcex02.jpg)

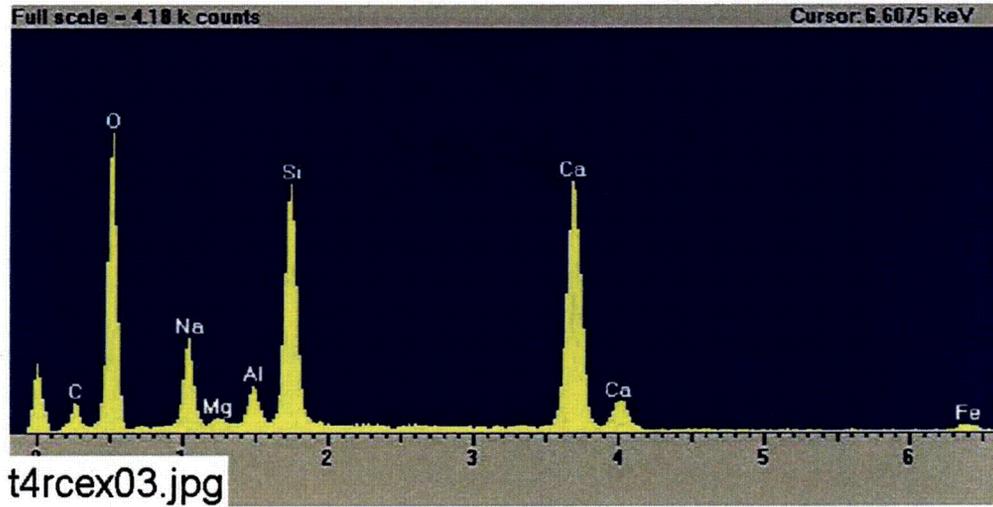


Figure D-3. EDS counting spectrum for the whole image shown in Figure D-2. (t4rcex03.jpg)

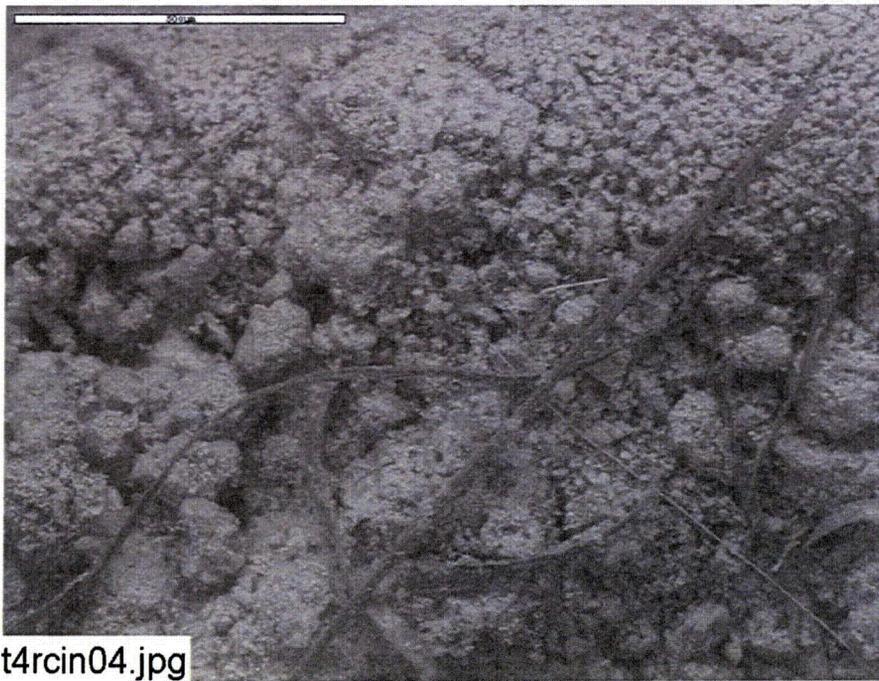


Figure D-4. ESEM image magnified 100 times for a Test #4, Day-30 low-flow interior raw cal-sil sample. (t4rcin04.jpg)

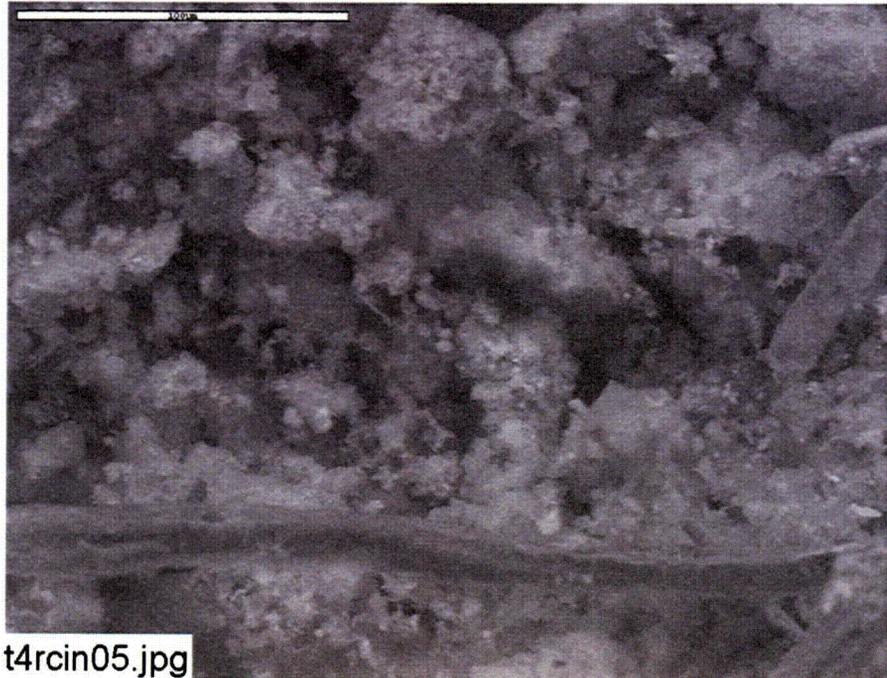


Figure D-5. ESEM image magnified 500 times for a Test #4, Day-30 low-flow interior raw cal-sil sample. (t4rcin05.jpg)

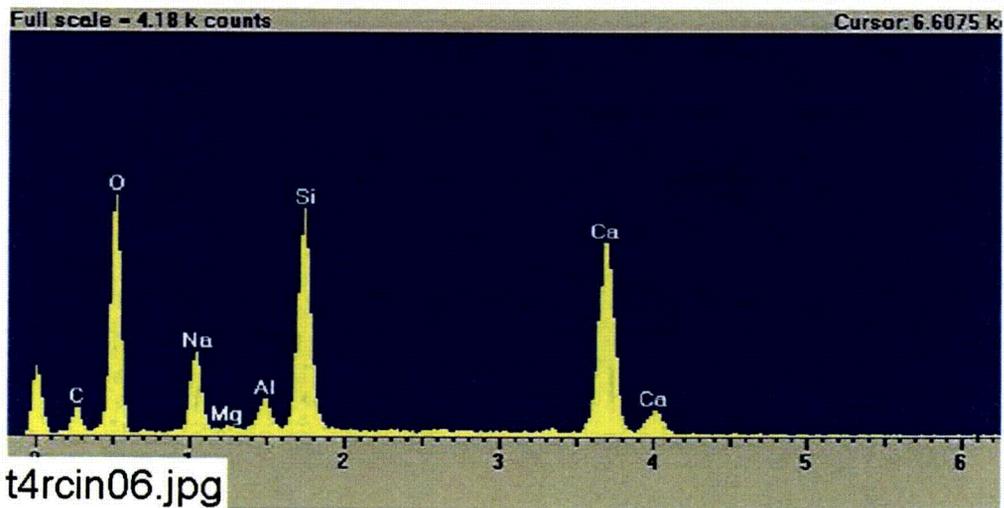


Figure D-6. EDS counting spectrum for the whole image shown in Figure D-5. (t4rcin06.jpg)

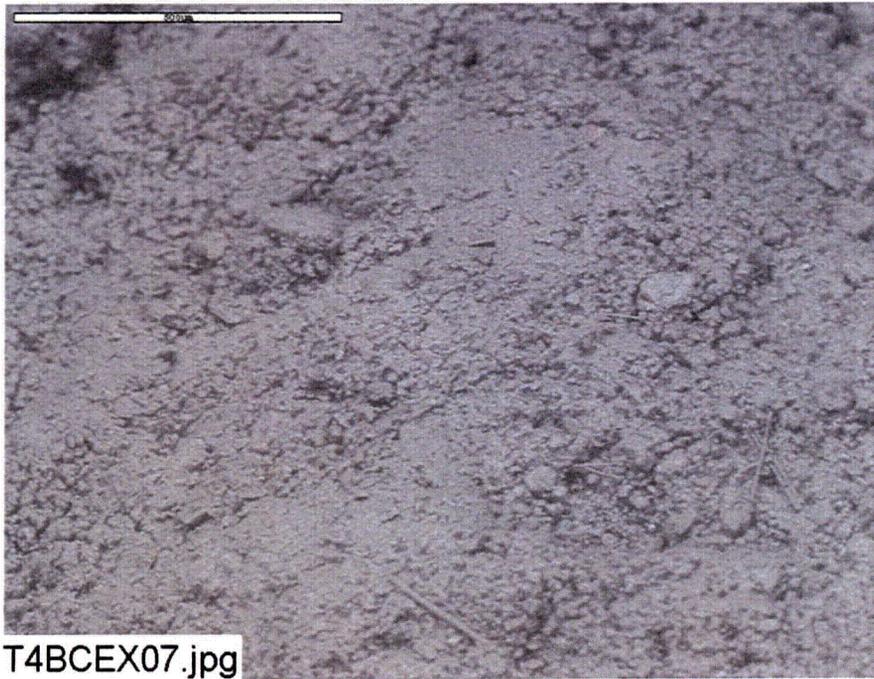


Figure D-7. ESEM image magnified 100 times for a Test #4, Day-30 low-flow exterior baked cal-sil sample. (T4BCEX07.jpg)

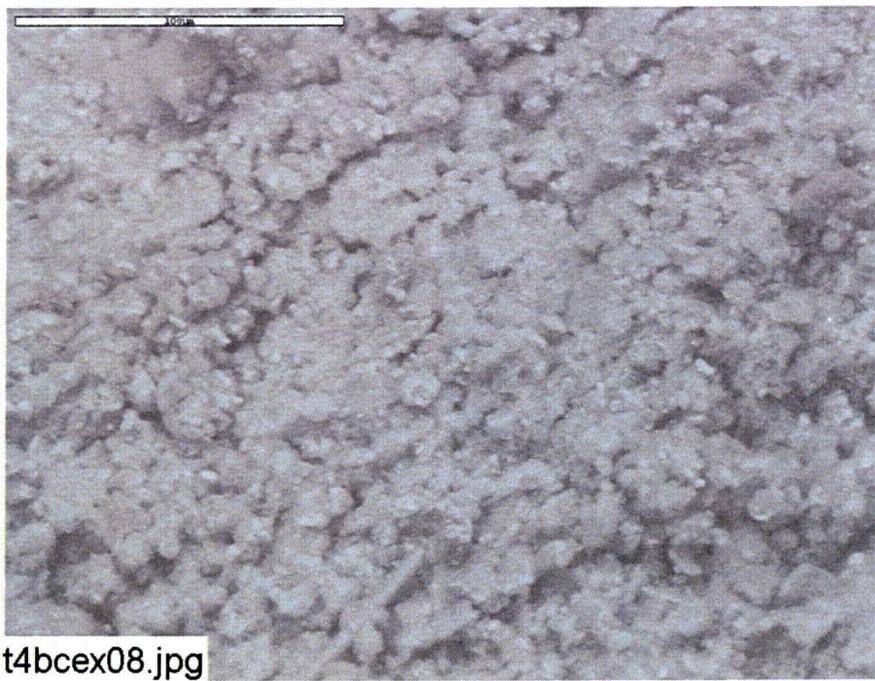


Figure D-8. ESEM image magnified 500 times for a Test #4, Day-30 low-flow exterior baked cal-sil sample. (t4bcex08.jpg)

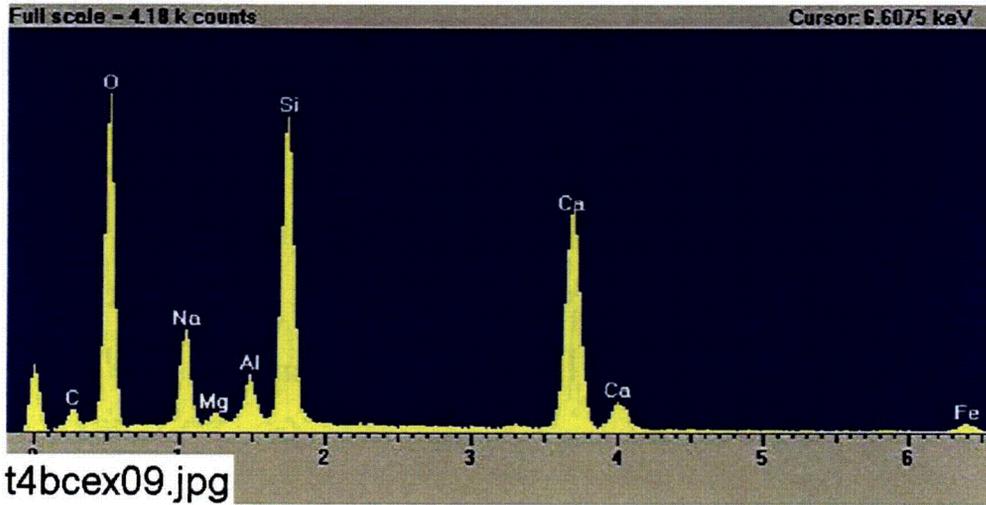


Figure D-9. EDS counting spectrum for the whole image shown in Figure D-7. (t4bcex09.jpg)

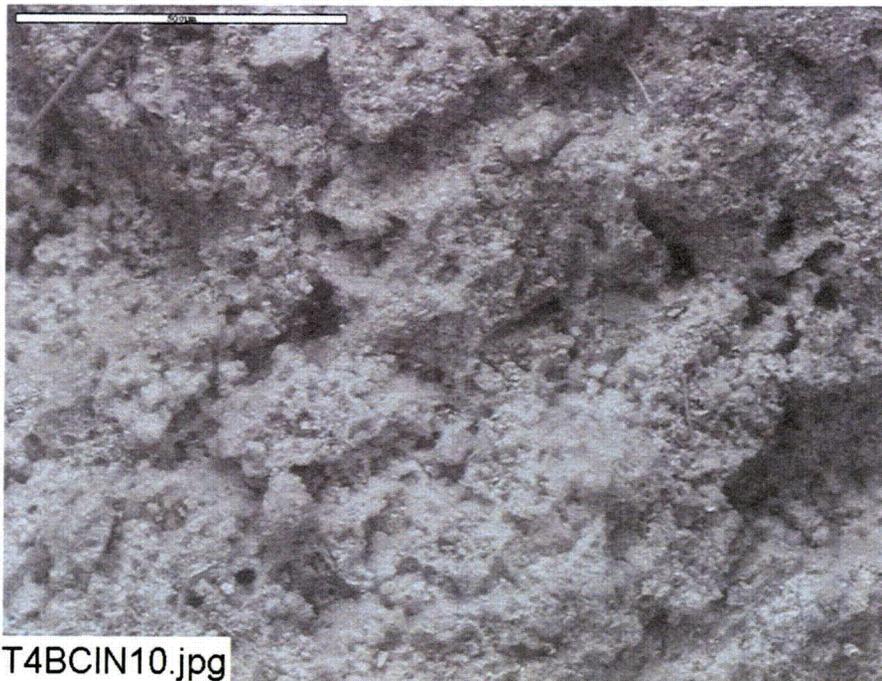


Figure D-10. ESEM image magnified 100 times for a Test #4, Day-30 low-flow interior baked cal-sil sample. (T4BCIN10.jpg)

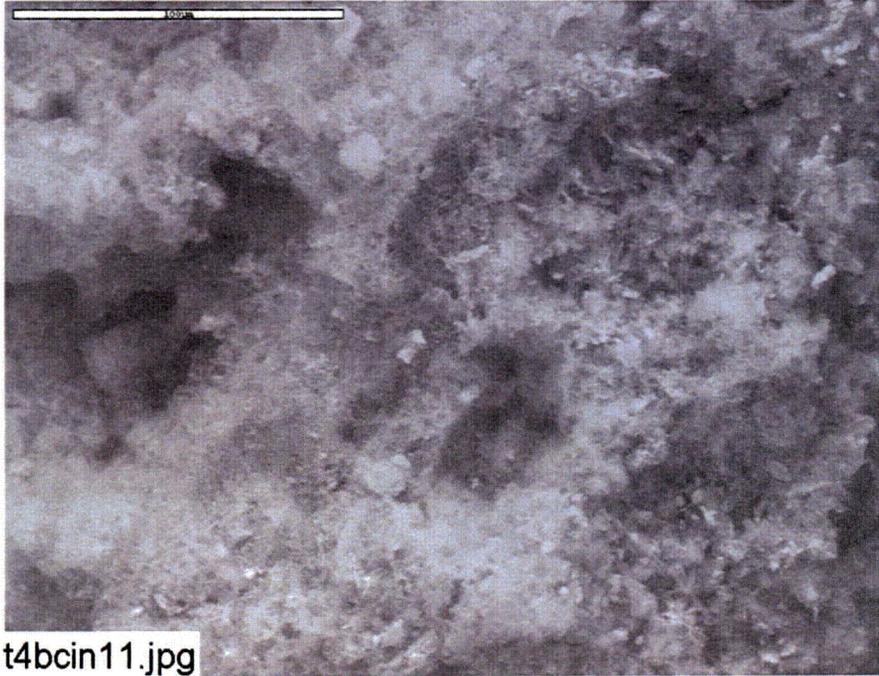


Figure D-11. ESEM image magnified 500 times for a Test #4, Day-30 low-flow interior baked cal-sil sample. (t4bcin11.jpg)

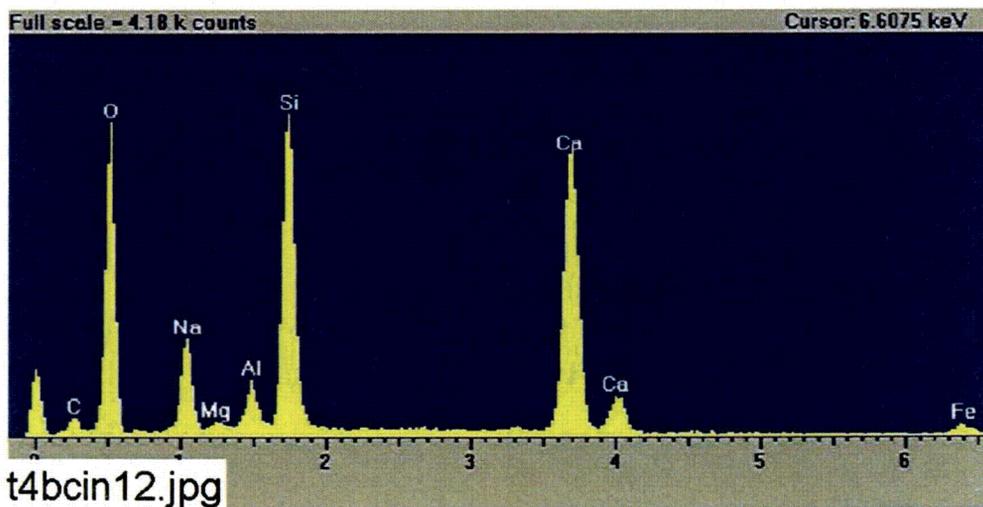


Figure D-12. EDS counting spectrum for the whole image shown in Figure D-11. (t4bcin12.jpg)

Appendix E

ESEM and SEM/EDS Data for Test #4, Day-30 Deposition Products

Figures

- Figure E-1. SEM image magnified 500 times for a Test #4, Day-30 fine powder on the submerged rack. (T4D30RackPowder029.bmp) E-4
- Figure E-2. SEM image magnified 1000 times for a Test #4, Day-30 fine powder on the submerged rack. (T4D30RackPowder030.bmp) E-4
- Figure E-3. EDS counting spectrum for the particles (whole image) shown in Figure E-2. (T4D30RackPowder18.jpg)..... E-5

Tables

- Table E-1. Chemical Compositions for T4D30RackPowder18.jpg, Figure E-3 E-6

For ICET, of interest is the corrosion/reaction effect of metal and concrete coupons, as well as the deposition of debris in the tank. To understand the corrosion processes that have occurred in the test, one direct way is the examination of the corrosion/deposition products after the test is completed. For this purpose, the corrosion/deposition products were collected on the date Test #4 was shut down (June 23, 2005). These products are fine powders on the submerged CPVC rack.

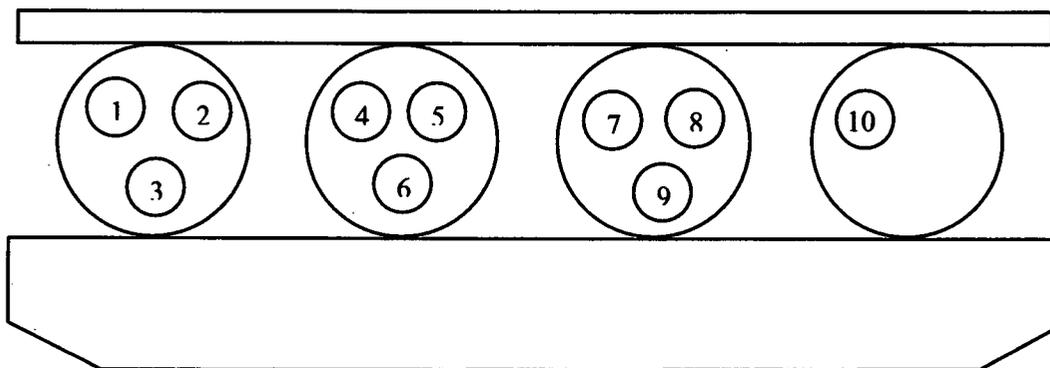
These products were collected by directly adhering onto double-sided carbon tapes for probe SEM/EDS examination. After the samples were dried in air, an Au/Pd coating was applied to enhance the surface conductivity of the samples and to prevent possible charging problems during SEM examination. Based on EDS results, a semi-quantitative elemental analysis was performed after calibration. This appendix presents the SEM/EDS data that were obtained on June 29, 2005.

Transcribed Laboratory Log

Laboratory session from June 29, 2005.

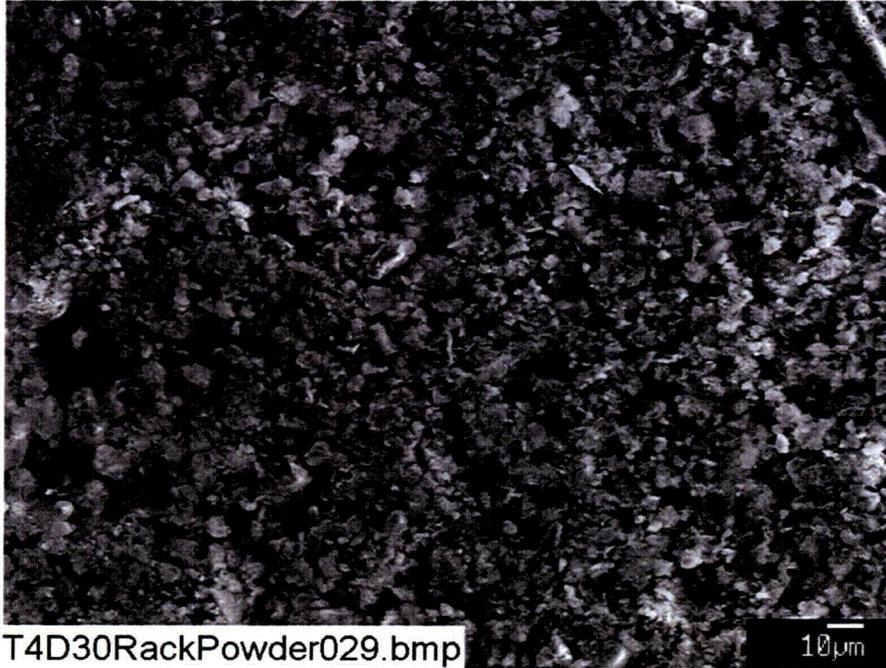
ESEM Test #4, Day-30 Deposition Products

- | | | | |
|-----------------|-------------------------|-------------------|---------------|
| 1. Suspended Al | 3. Sus. Cu | 5. Sus. Gal-Steel | 7. Sus. Steel |
| 2. Submerged Al | 4. Sub. Cu | 6. Sub. Gal Steel | 8. Sub. Steel |
| 9. Sediment | 10. Powder on Sub. Rack | | |



Powder on Submerged Rack

Image:	T4D30RackPowder029	500 ×	ESEM image	Figure E-1
	T4D30RackPowder030	1000 ×	ESEM at higher magnification	Figure E-2
EDS:	T4D30RackPowder018		EDS of whole of image 30	Figure E-3



T4D30RackPowder029.bmp

10 μ m

Figure E-1. SEM image magnified 500 times for a Test #4, Day-30 fine powder on the submerged rack. (T4D30RackPowder029.bmp)



T4D30RackPowder030.bmp

10 μ m

Figure E-2. SEM image magnified 1000 times for a Test #4, Day-30 fine powder on the submerged rack. (T4D30RackPowder030.bmp)

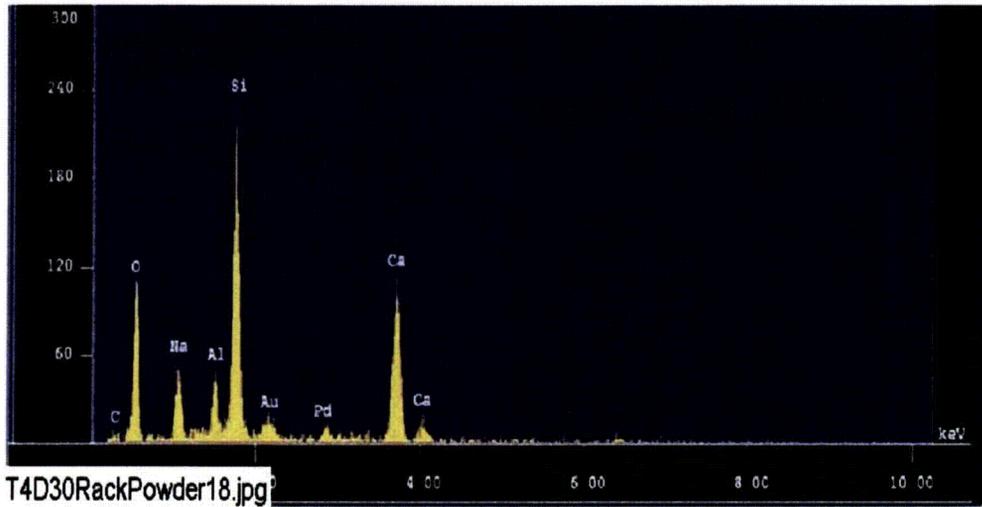


Figure E-3. EDS counting spectrum for the particles (whole image) shown in Figure E-2. (T4D30RackPowder18.jpg)

The results from the chemical composition analysis for T4D30RackPowder18.jpg are given in Table E-1.

Table E-1. Chemical Compositions for T4D30RackPowder18.jpg, Figure E-3

Jun 29 15:55 2005 /tmp/eds_pout.log Page 1

Group : NRC
 Sample : T4D30 ID# : 18
 Comment : powder on submerged rack
 Condition : Full Scale : 20KeV(10eV/ch,2Kch)
 Live Time : 60.000 sec Aperture # : 2
 Acc. Volt : 15.0 KV Probe Current : 1.068E-09 A
 Stage Point : X=86.234 Y=59.512 Z=11.000
 Acq. Date : Wed Jun 29 15:53:49 2005

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background	
O K	Normal	0.25- 0.77	30.9731	0.0014	1027 /	3
Na K	Normal	0.81- 1.27	4.6719	0.0006	445 /	8
Al K	Normal	1.26- 1.78	2.8315	0.0004	390 /	71
Si K	Normal	1.50- 2.07	10.6068	0.0007	1361 /	32
Ca K	Normal	3.40- 4.30	15.8585	0.0055	989 /	5
C K	Normal	0.09- 0.46	0.1513	0.0001	7 /	10

Chi_square = 1.6428

Element	Mass%	Atomic%	ZAF	Z	A	F
O	51.787	66.6327	1.3652	0.9856	1.3851	1.0000
Na	8.112	7.2632	1.4177	1.0401	1.3635	0.9996
Al	4.182	3.1907	1.2060	1.0015	1.2094	0.9957
Si	15.974	11.7078	1.2296	0.9896	1.2431	0.9995
Ca	19.144	9.8324	0.9857	0.9980	0.9875	1.0001
C	0.801	1.3733	4.3237	1.0335	4.1836	0.9999

Total 100.000 100.0000

Normalization factor = 1.2247