

Technical Evaluation of an “Allergy Friendly Room” Treatment Protocol for Hotels

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A “PURE” treatment protocol has been proposed for rendering hotel spaces sufficiently free of indoor air pollutants, that even environmentally-sensitive room occupants can work and rest productively while maintaining good health.

In a recent independent test series at the Hampton Inn (adjacent to the University at Buffalo), the proposed protocol was implemented and monitored by multiple indoor and outdoor air quality measures of respirable particulates and gases that might trigger allergic responses or exacerbate asthma problems. Data were collected before, during, and after room treatment. Follow-up data were recorded at the 30-day and 90-day post-treatment dates.

Analytical techniques included multiple-internal reflection infrared spectroscopy, respirable particle counts, ozone measurements, and scanning electron microscopy with energy-dispersive X-ray analysis.

Results indicated that the treated hotel room became and remained at least 3 times “cleaner” than the outdoor air on each sampling occasion.

The PURE process included surfactant-assisted disinfection (deep rug) and fabric vacuuming, air conditioner cleaning/disinfection, aminosilane-based barrier film “fogging”, extensive ozonization of the room volume, final HEPA vacuuming of all surfaces, and installation of an ionization-based air purifier.

An unexpected finding was the ozone-induced *de novo* formation of fine nitrosylated aerosols within the just-cleaned air space. These quickly resolved after the ozone treatment stopped, and were not persistent at the final steps of room treatment (replacement of all the bed linens with pure, allergy-free cotton fabrics and replacement of the shower head with a dechlorination unit). Room selection by hotel visitors strongly favors this treatment protocol.

pre-analysis baseline

Treatment Day

Outside the Room

before initiation of treatment

hydroxylated compounds

organic carbonates

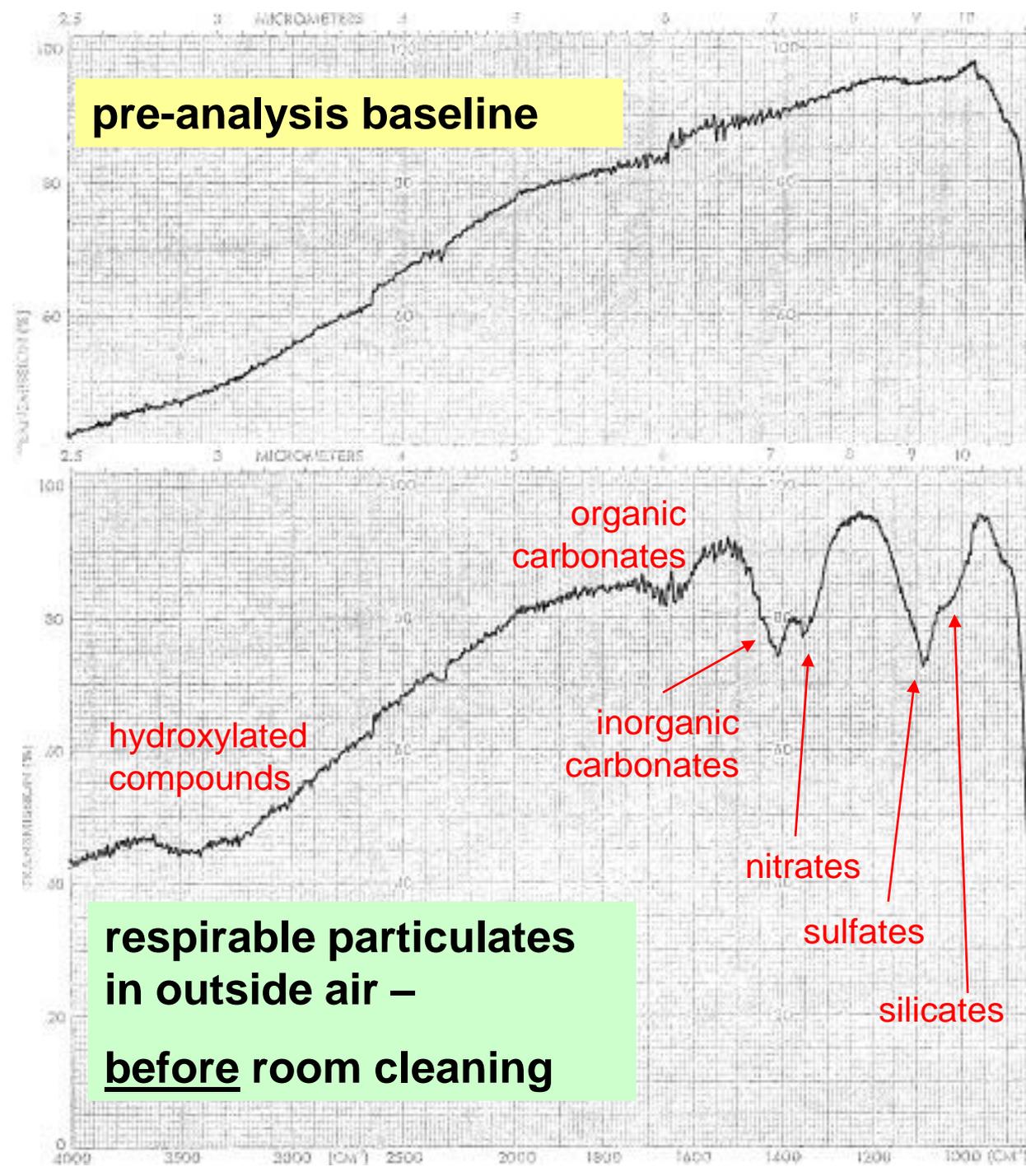
inorganic carbonates

nitrates

sulfates

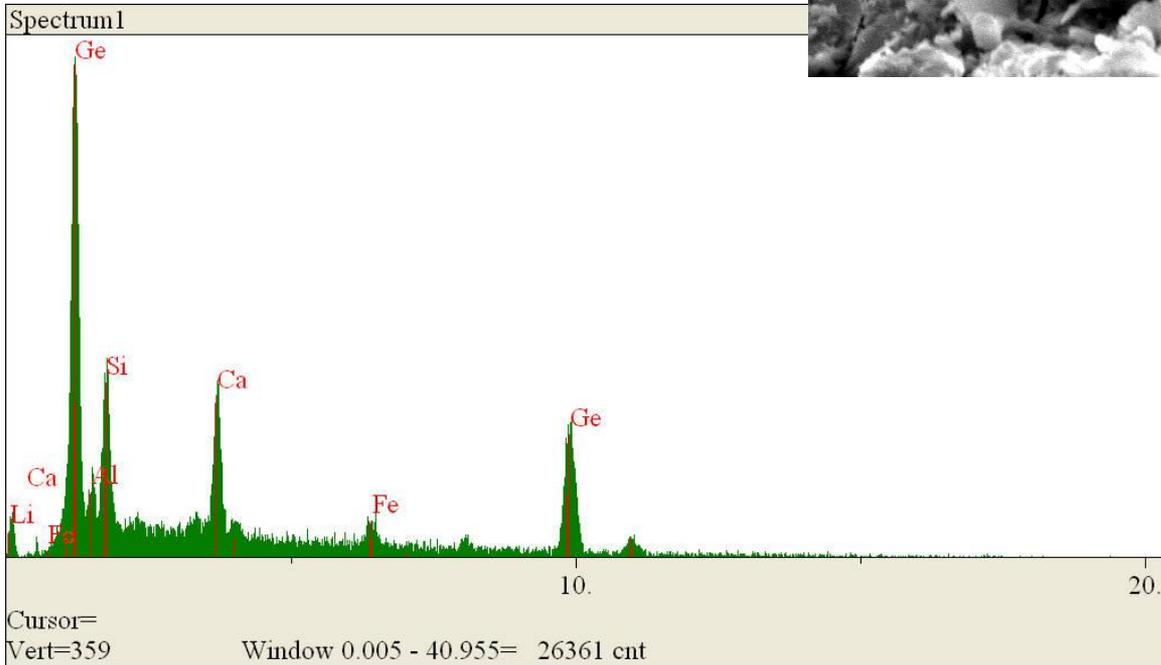
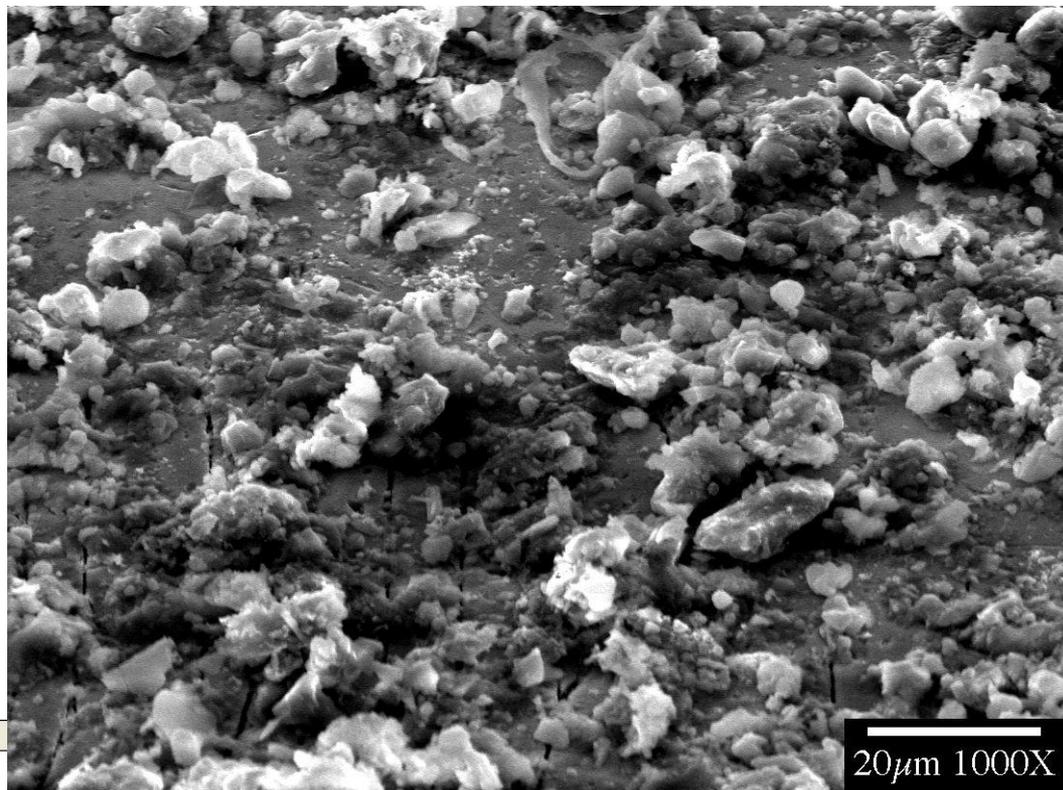
silicates

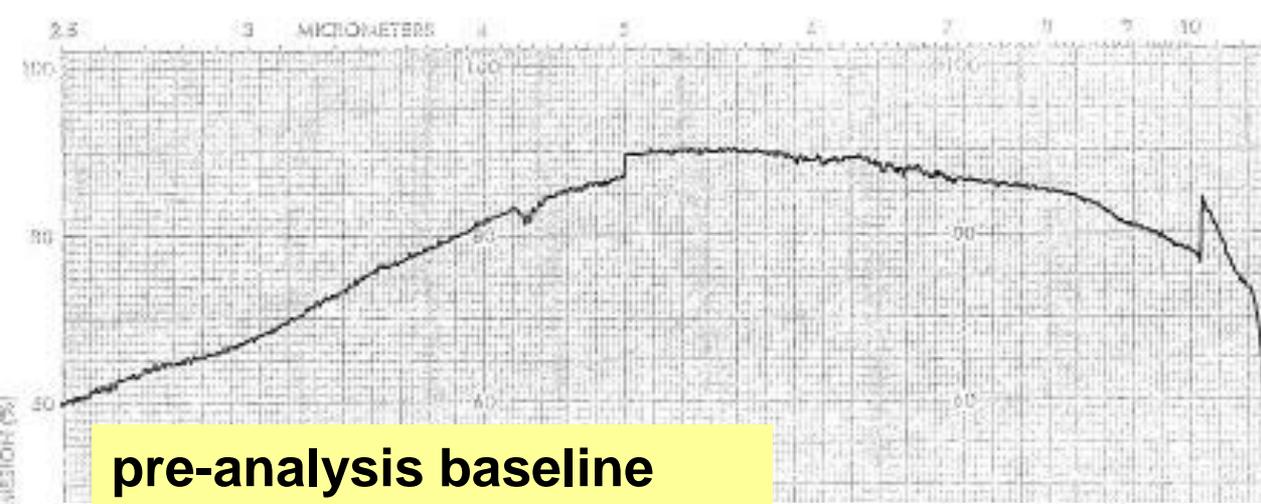
respirable particulates in outside air –
before room cleaning



Outside Air

before room
treatment



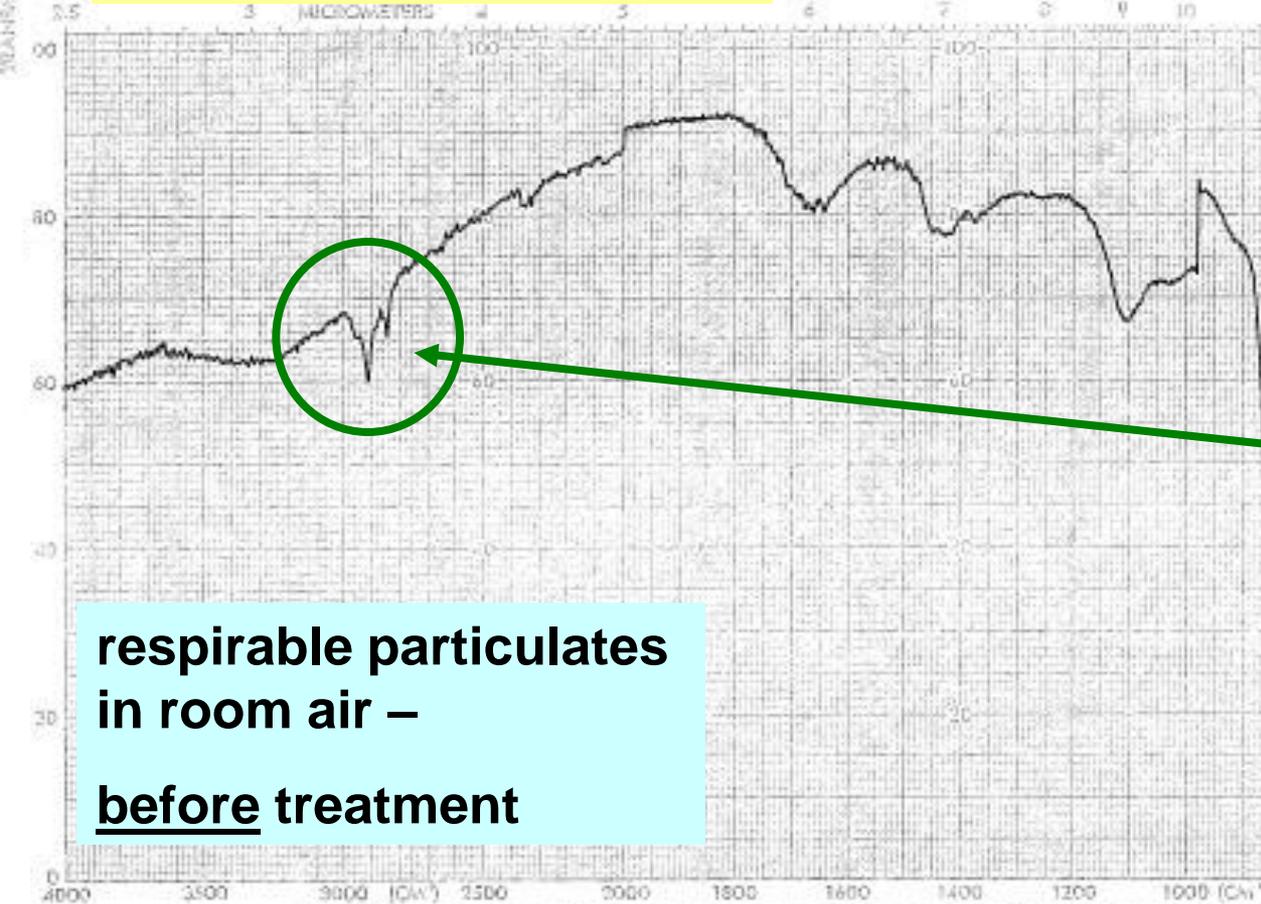


pre-analysis baseline

Treatment Day

Inside the Room

before initiation of treatment

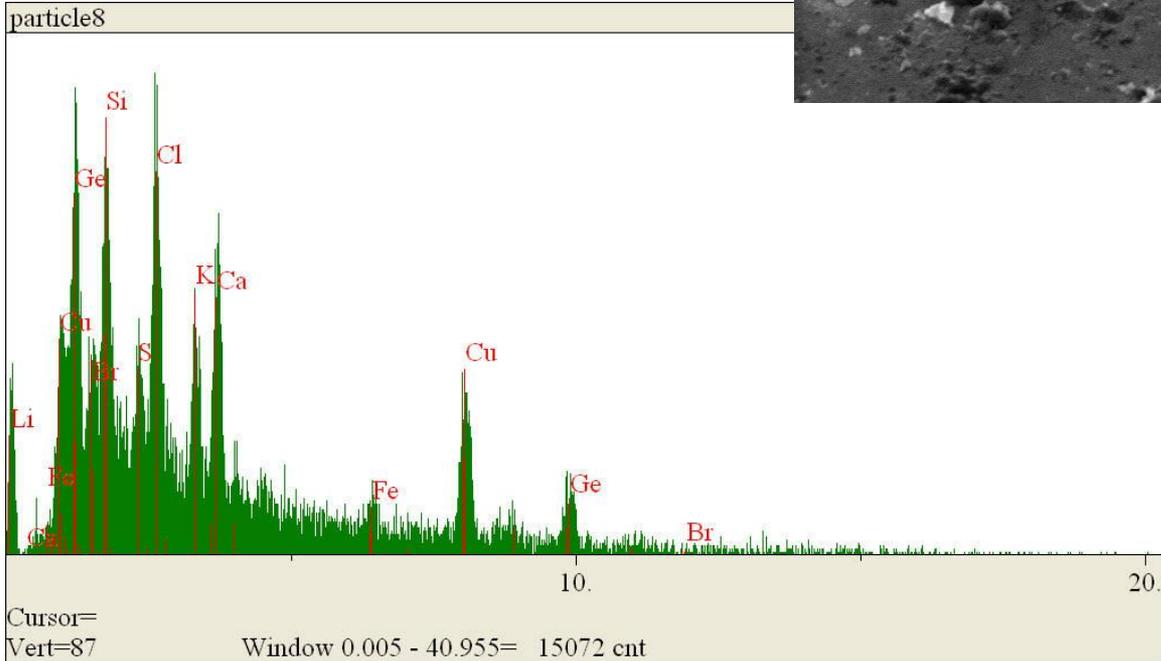
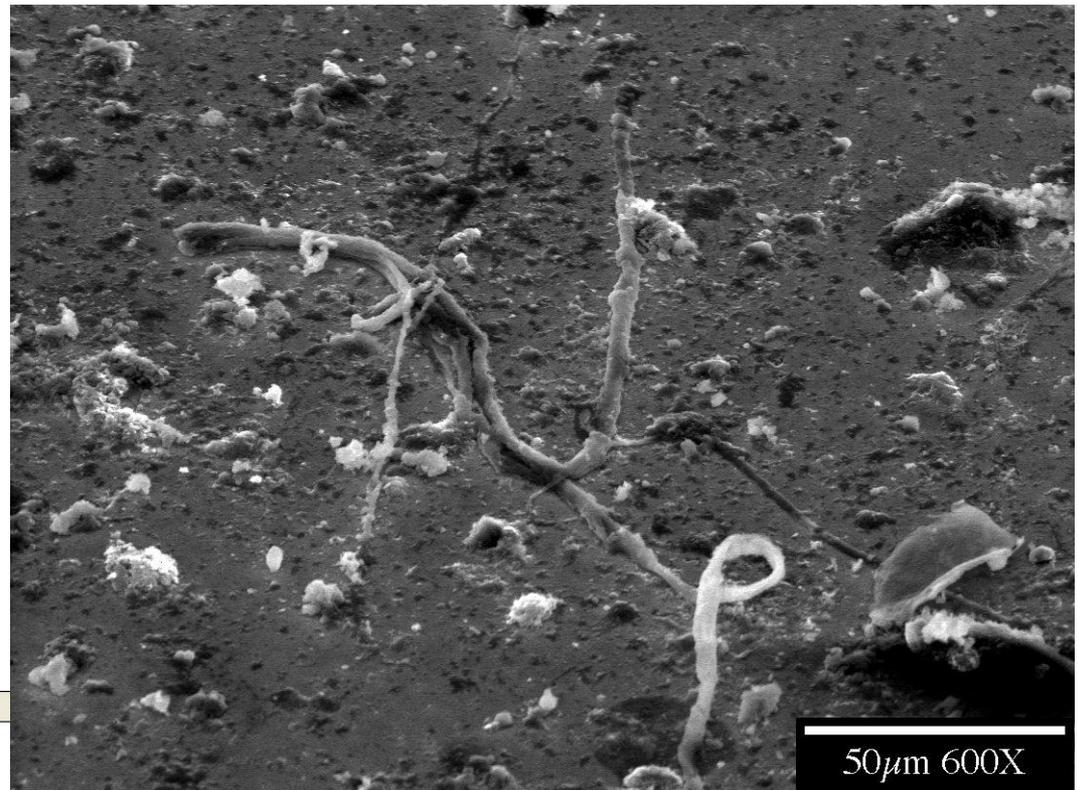


respirable particulates in room air – before treatment

note additional hydrocarbon contaminants (not present in outdoor air sample)

Inside Room

before room
treatment

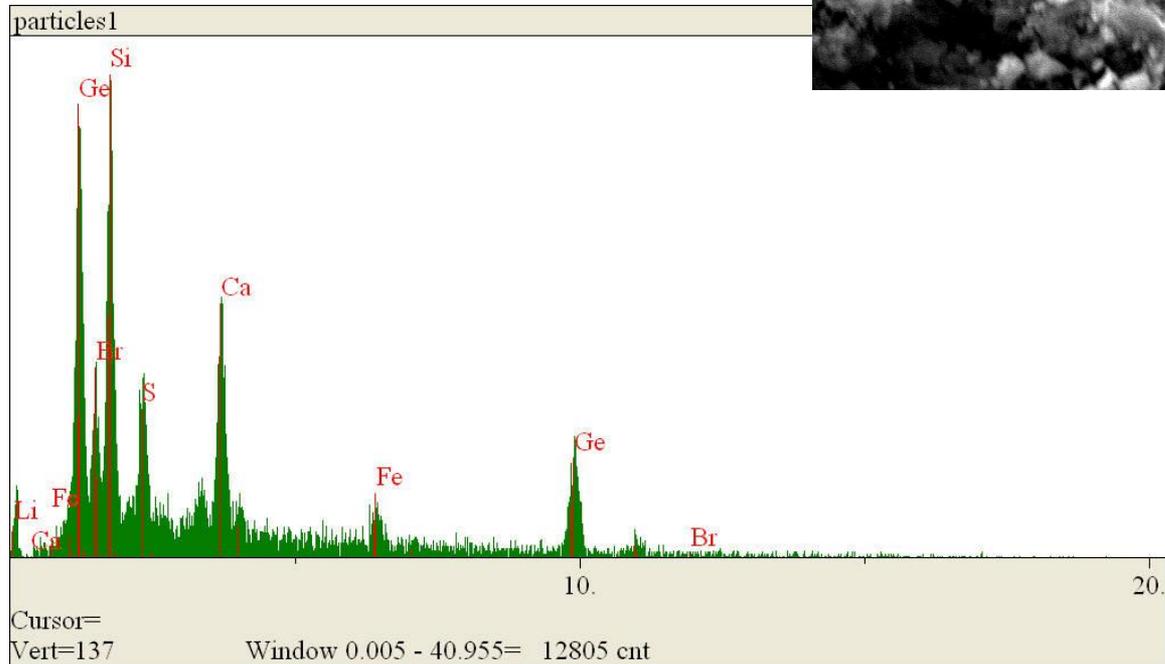
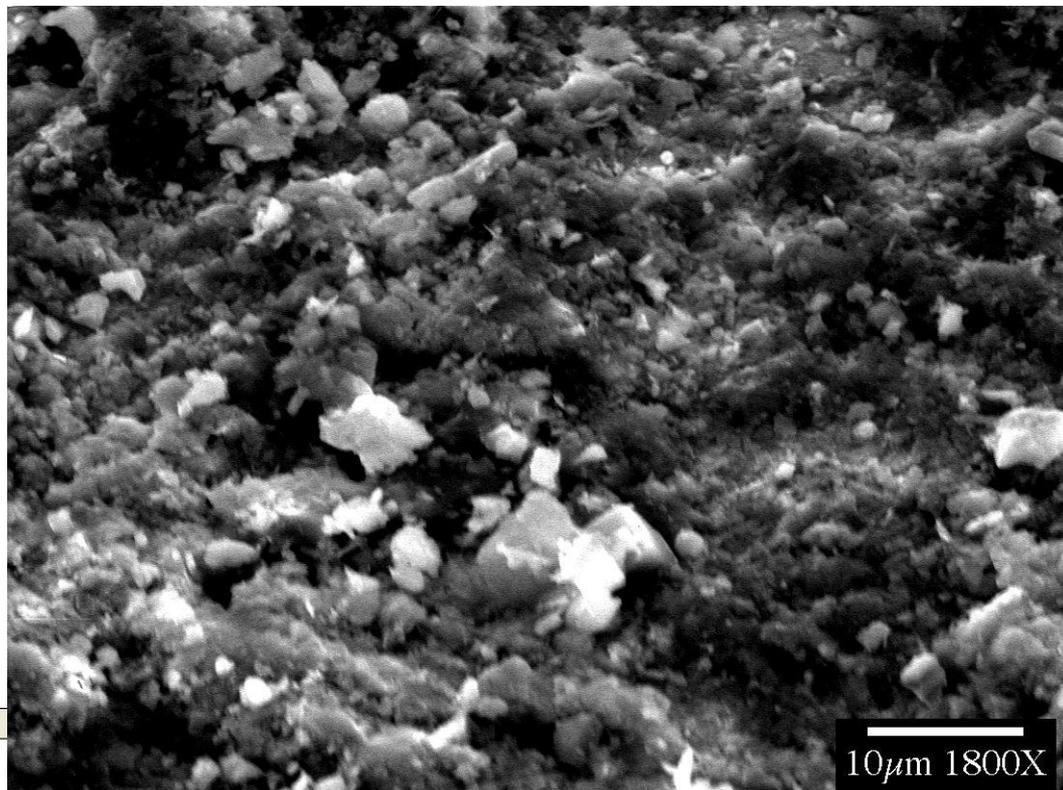


Note large “lint” fragments

Note presence of copper in
room aerosol before
treatment

Outside Air

at completion of
treatment



pre-analysis baseline

Treatment
Day

Outside the
Treated
Room

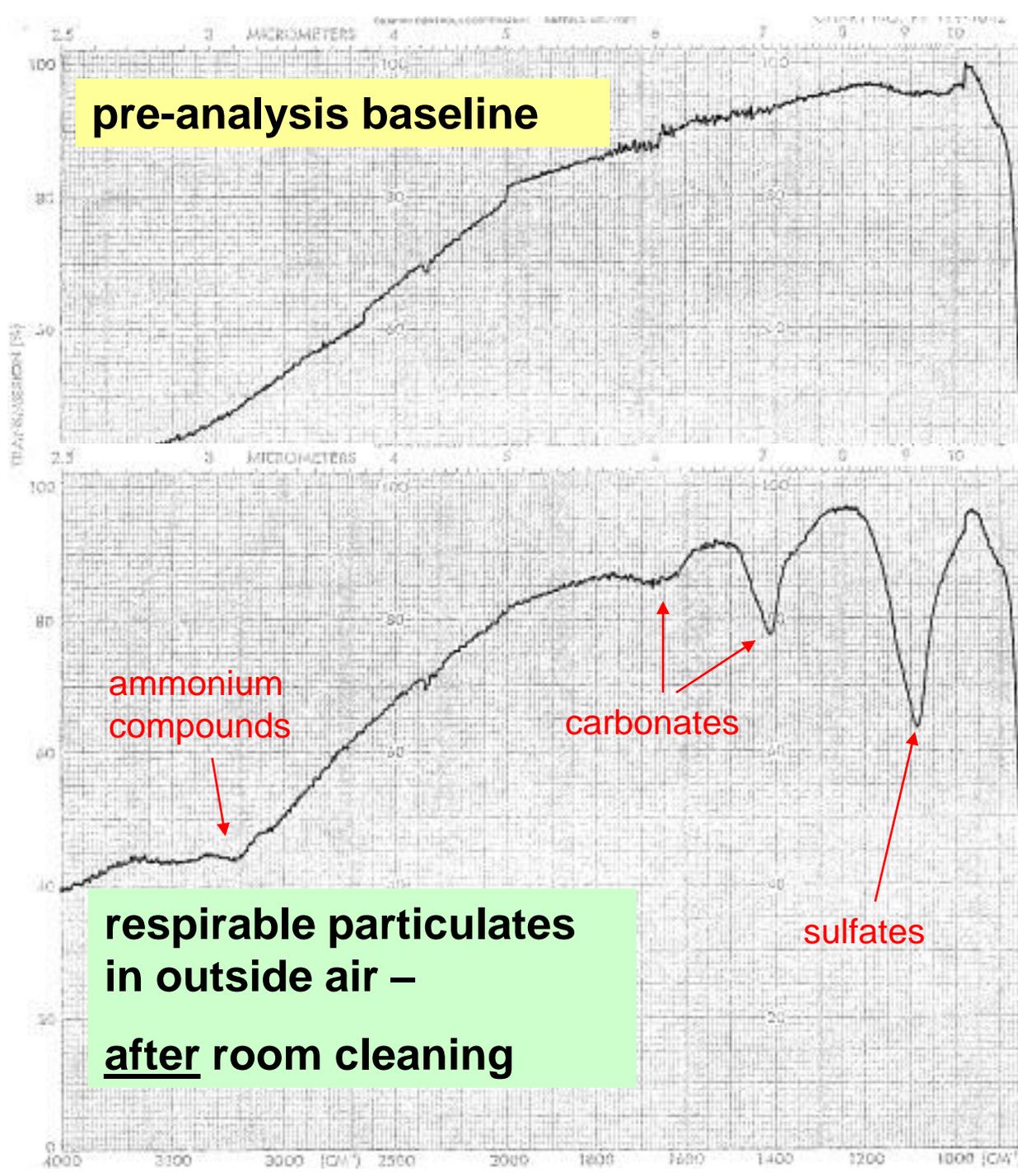
after
completion of
treatment

ammonium
compounds

carbonates

sulfates

respirable particulates
in outside air –
after room cleaning



Day 1

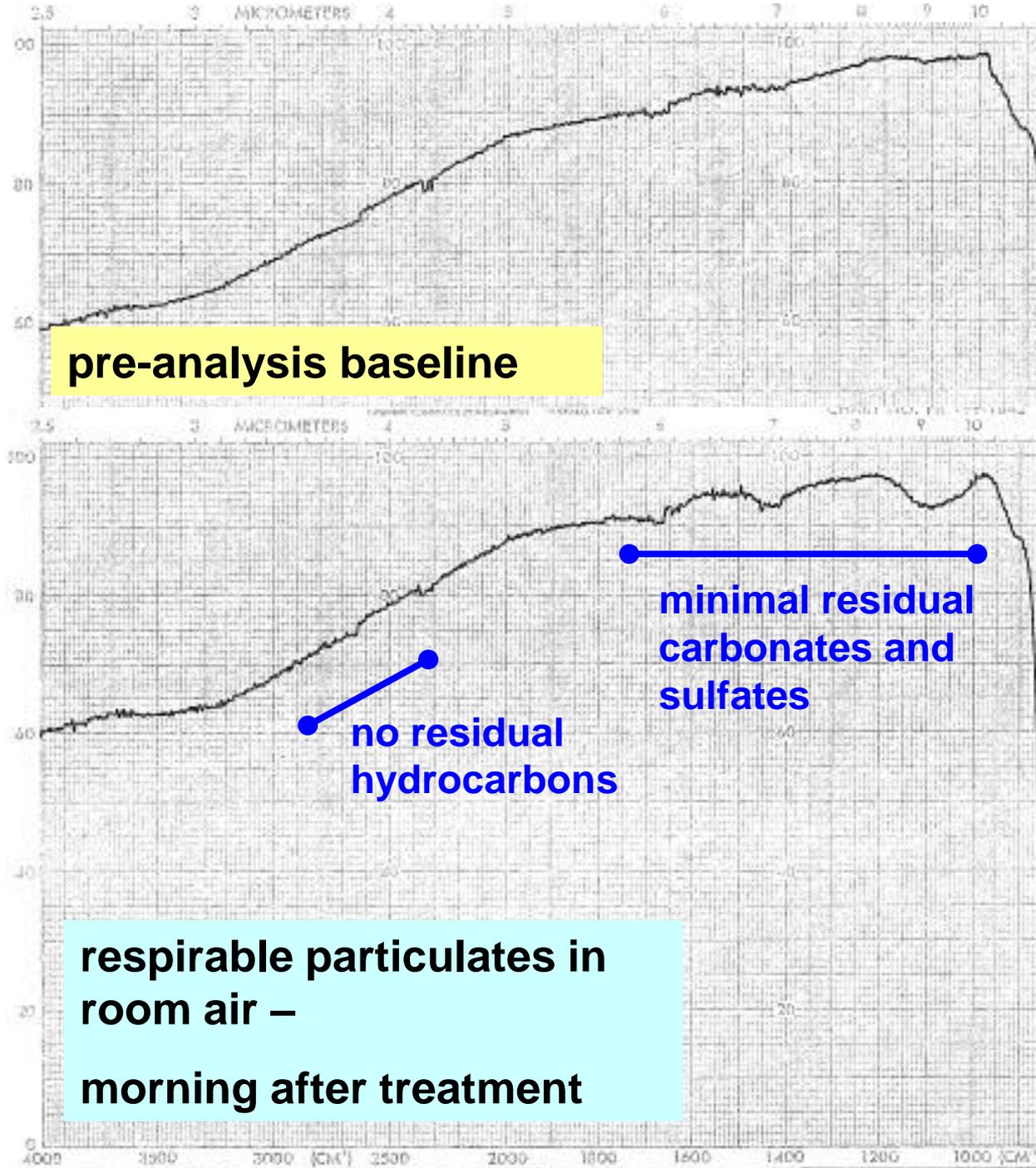
Inside the Treated Room

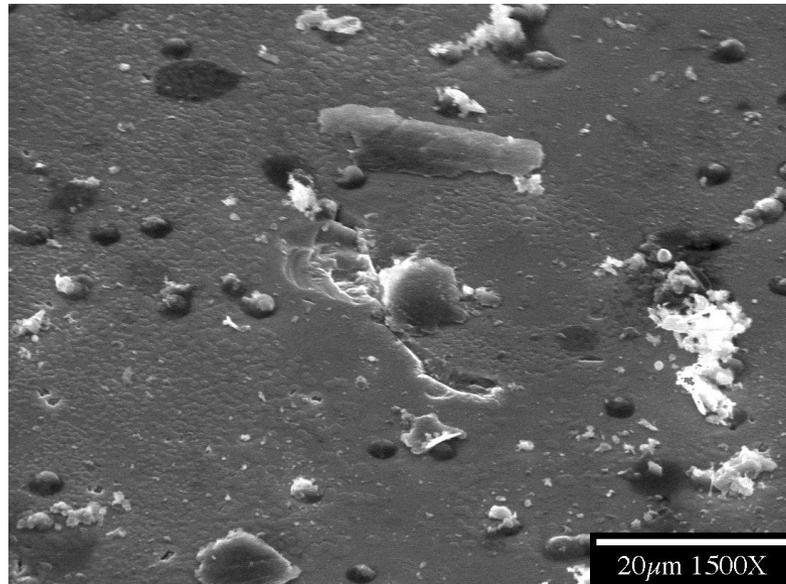
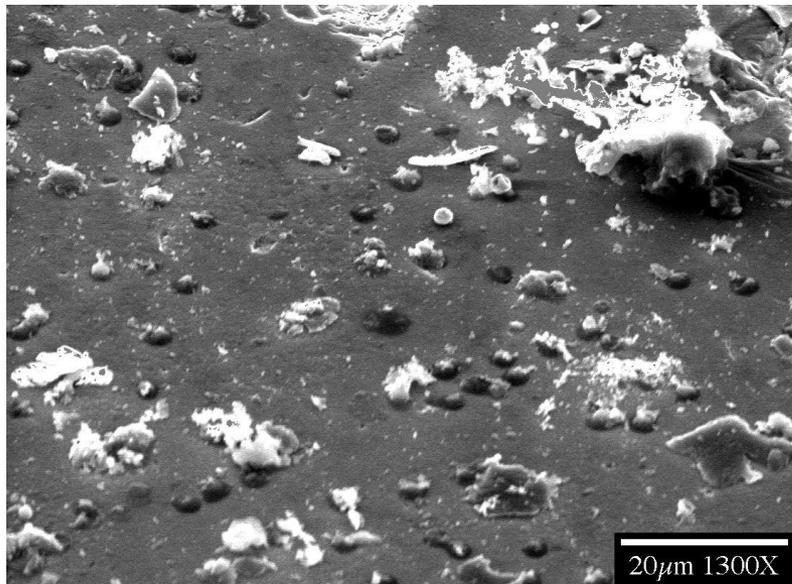
pre-analysis baseline

no residual hydrocarbons

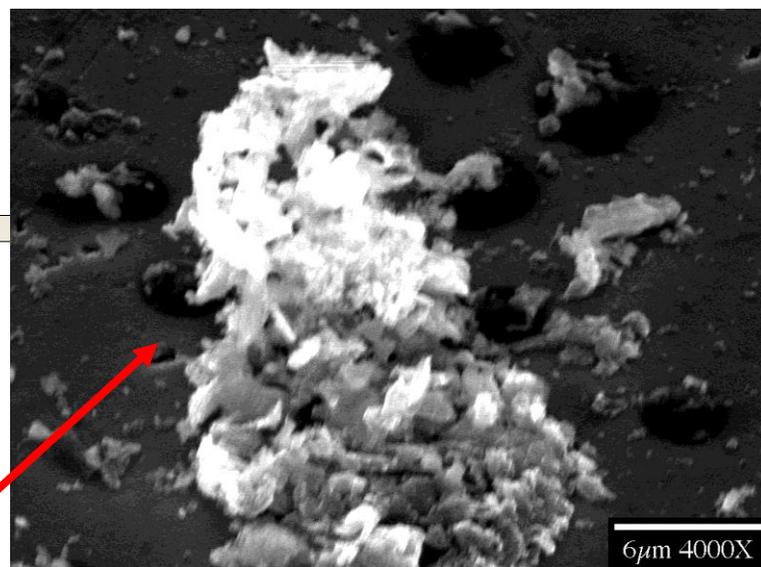
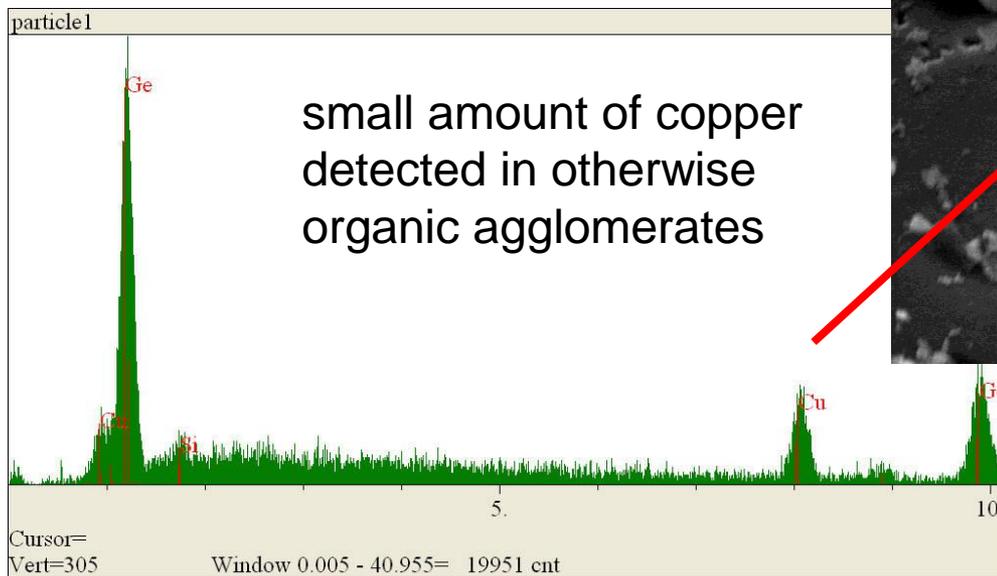
minimal residual carbonates and sulfates

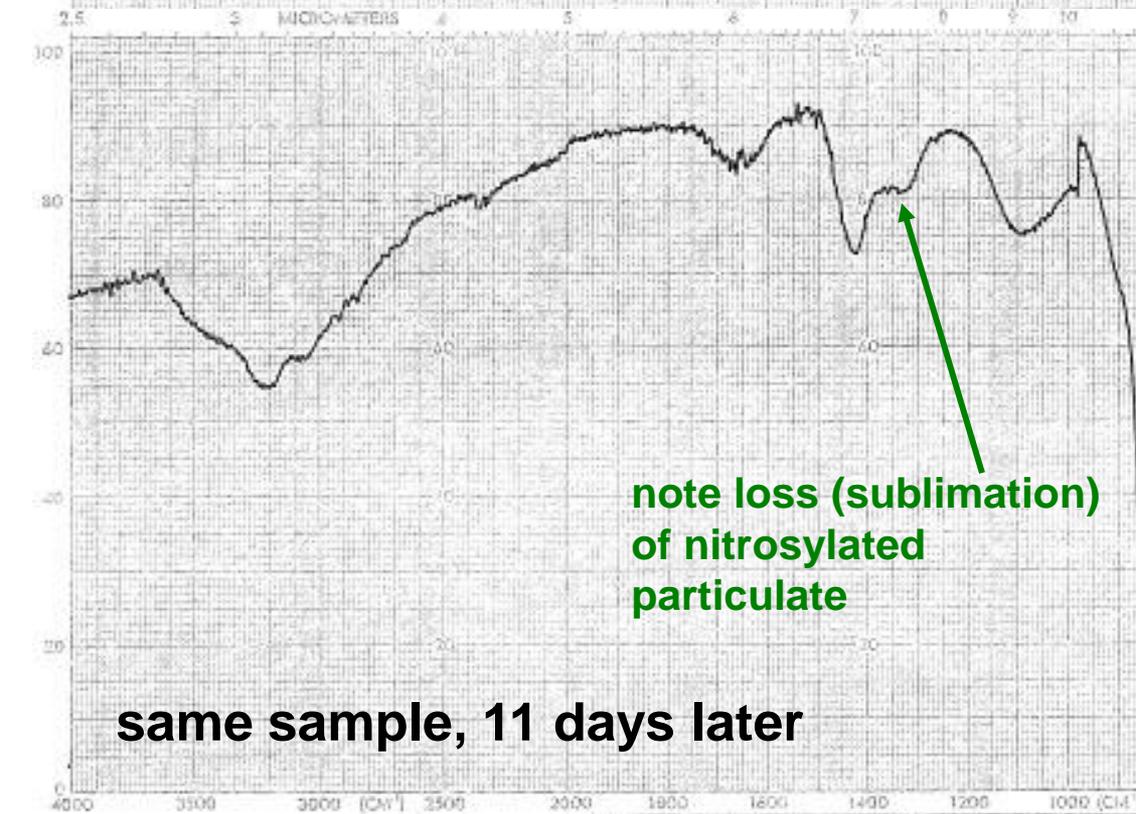
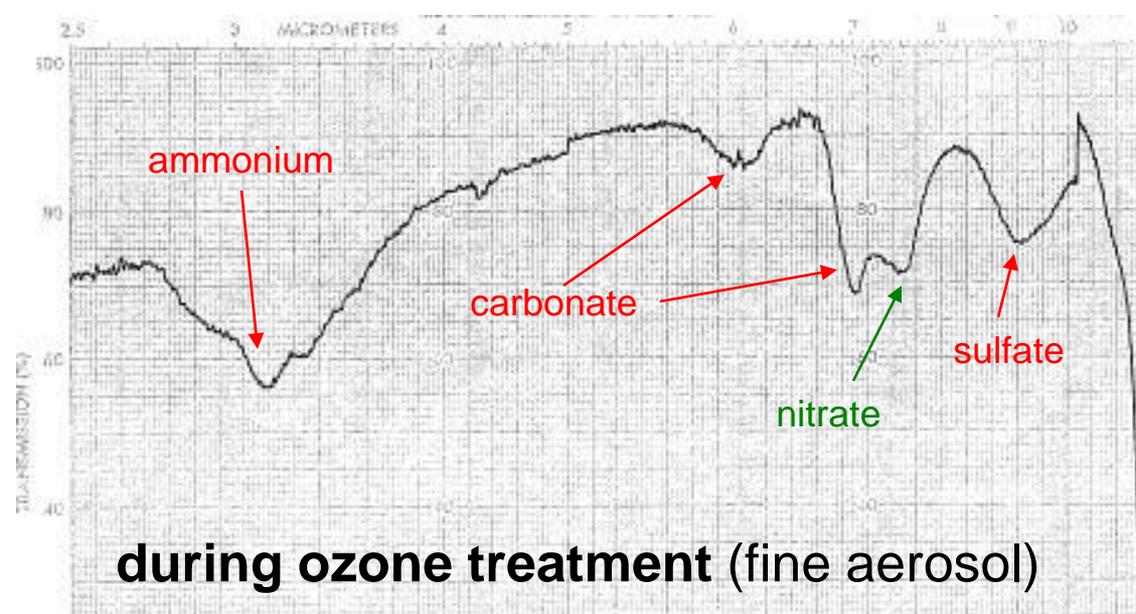
respirable particulates in room air – morning after treatment



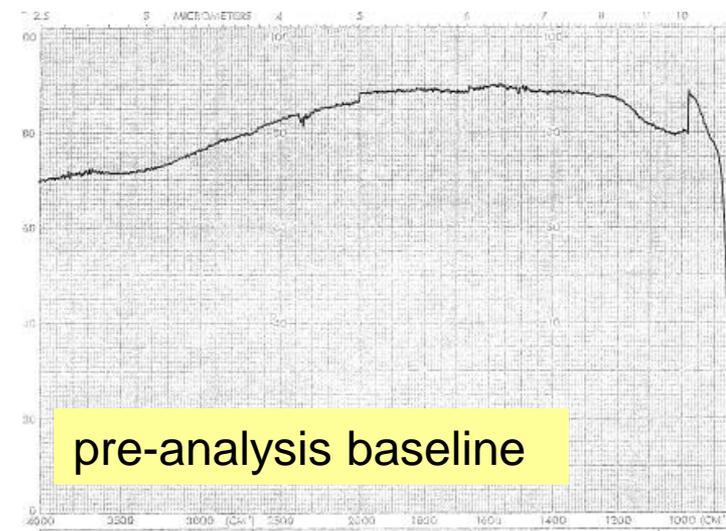


Room aerosol deposits collected during ozonization



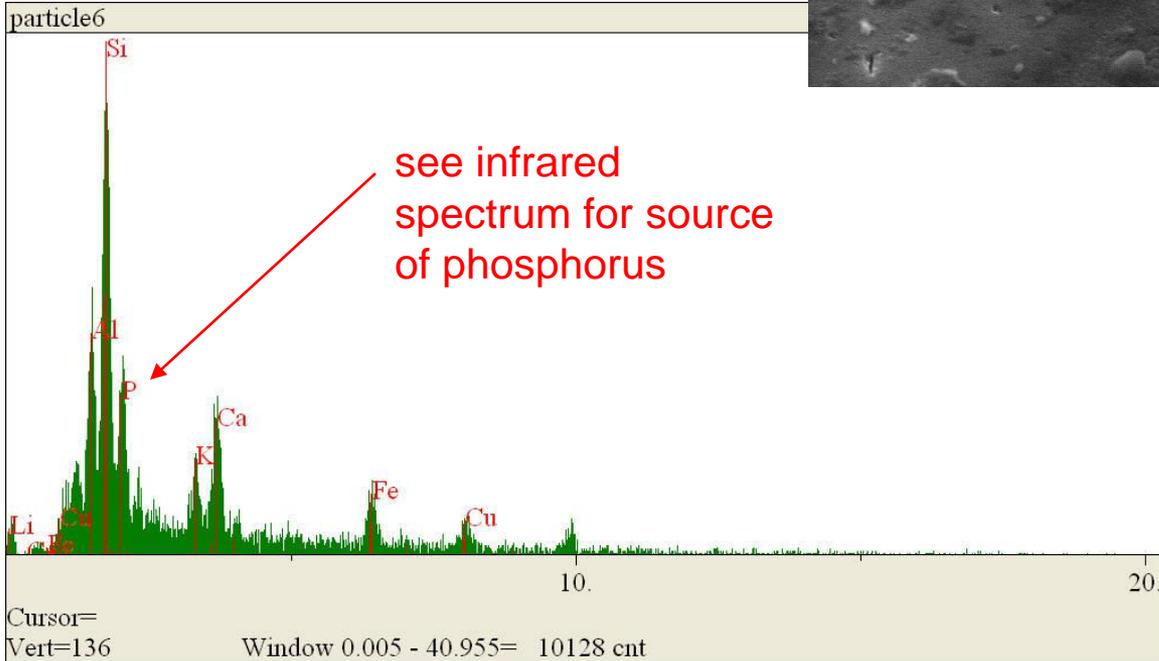
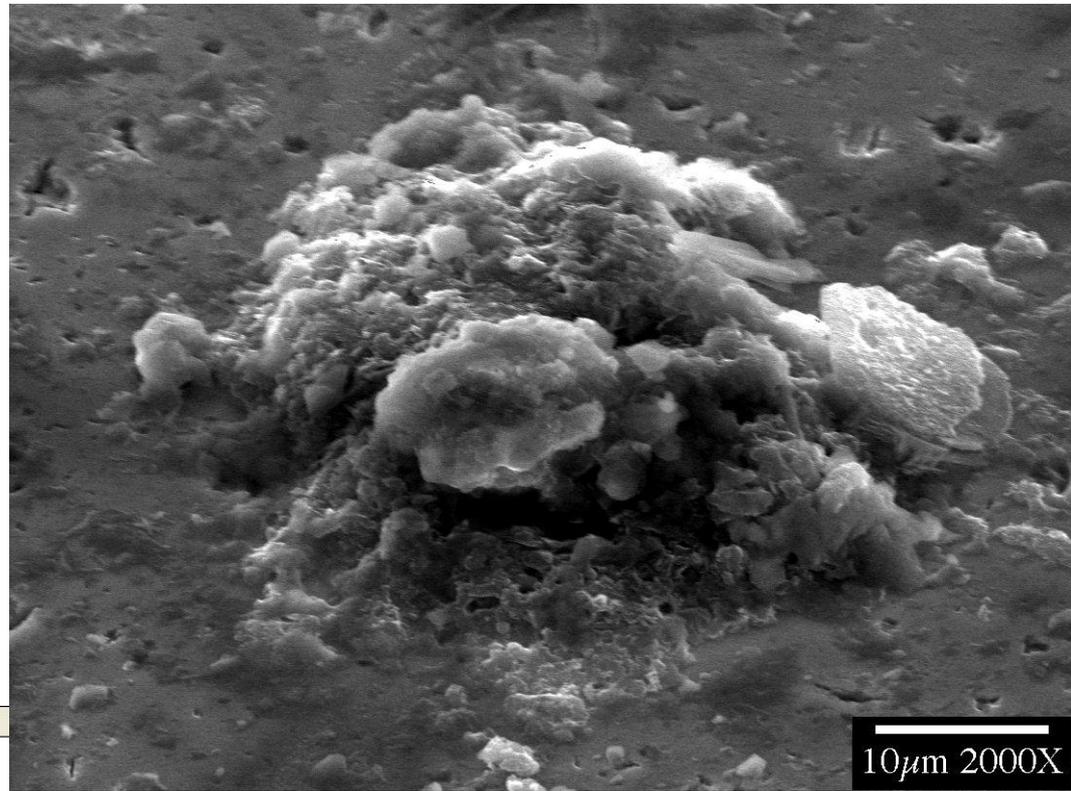


Air sample during and 11 days after ozone treatment of the room air.

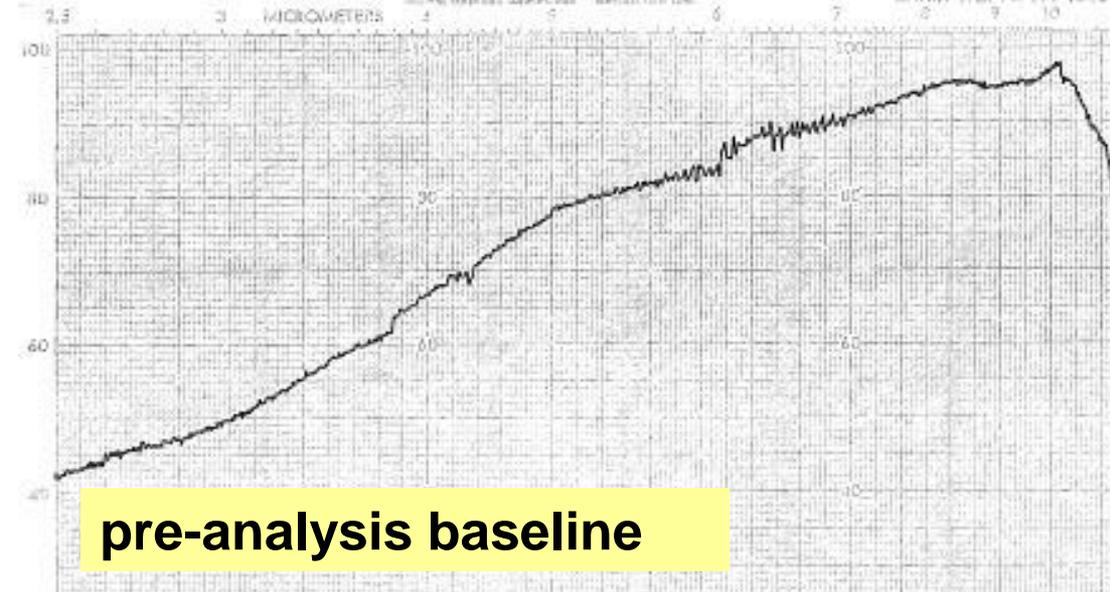


Inside the Room

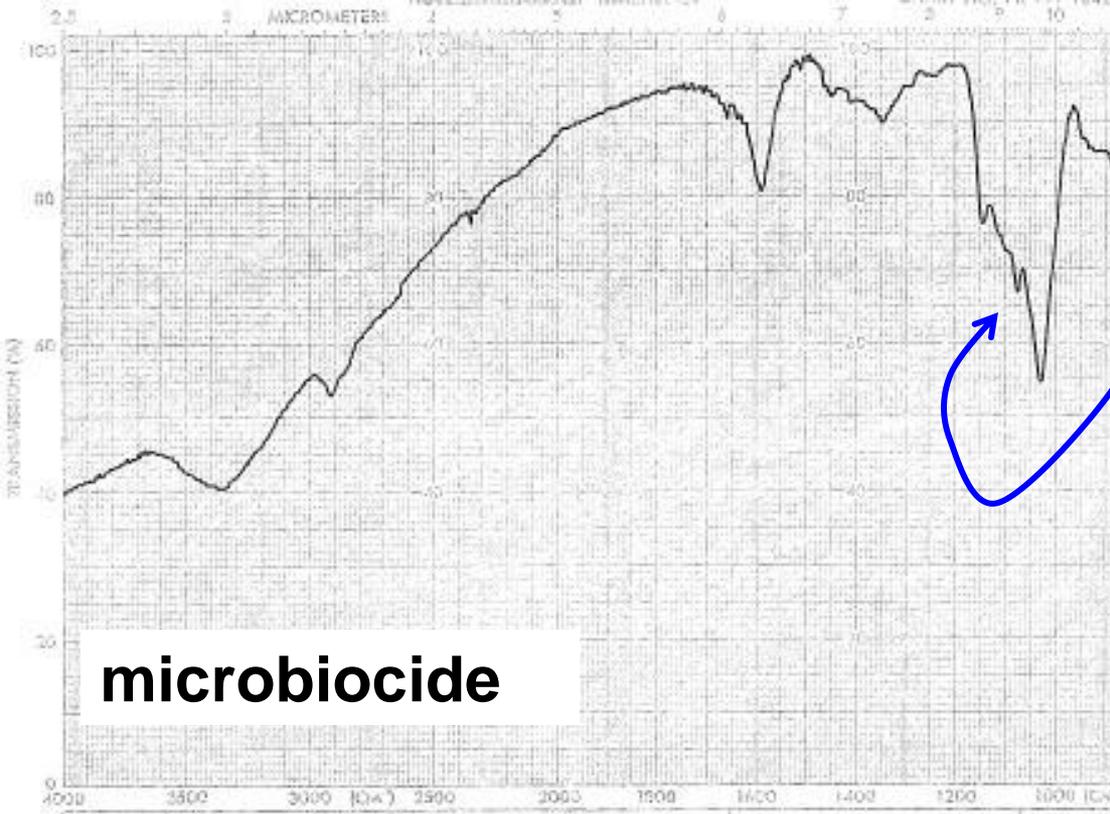
after air
conditioner
cleaning activity



aside from some
agglomerates, room air was
generally respirable-particle-
free after treatment



pre-analysis baseline



microbiocide

Infrared spectral identification of **phosphate-rich** particulate matter generated from microbiocide used to clean air conditioner in room

Day 30

**Outside the
Treated
Room**

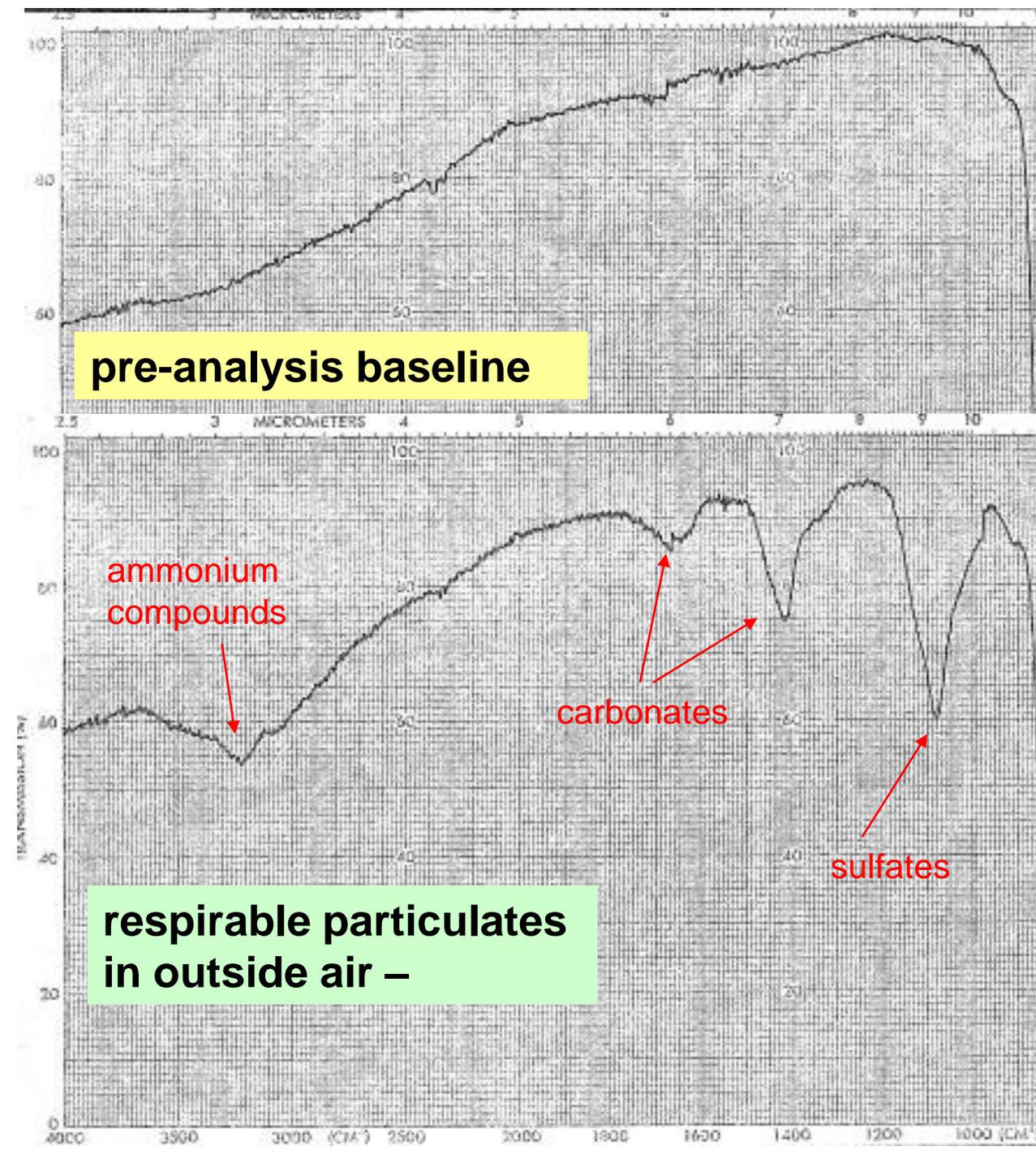
pre-analysis baseline

ammonium
compounds

carbonates

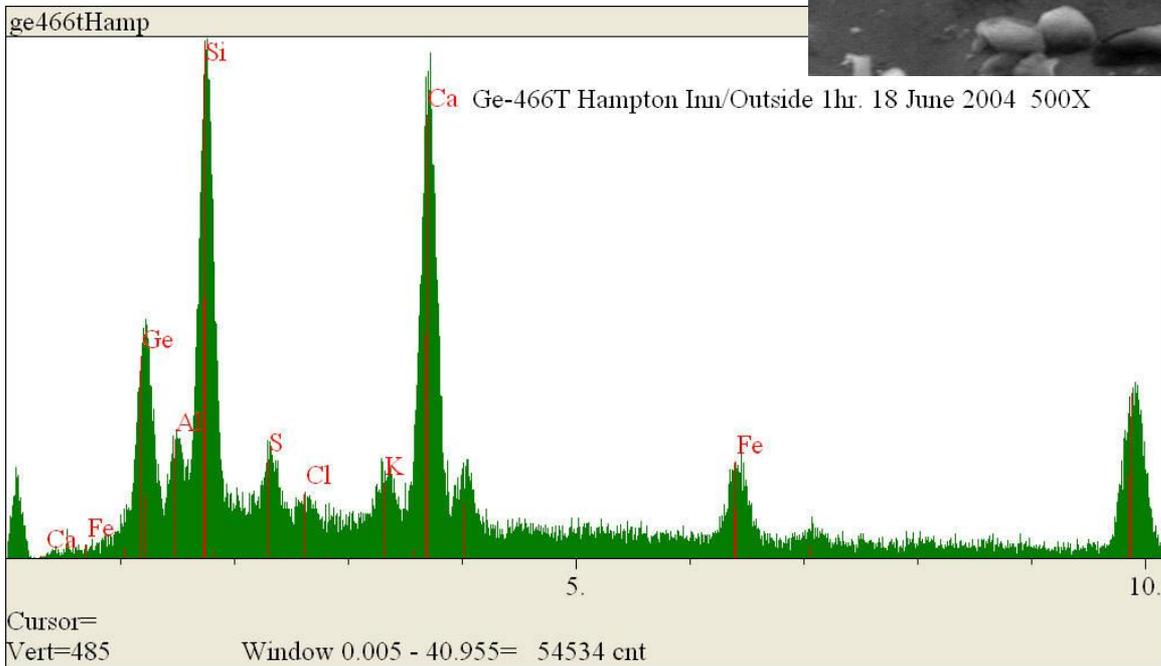
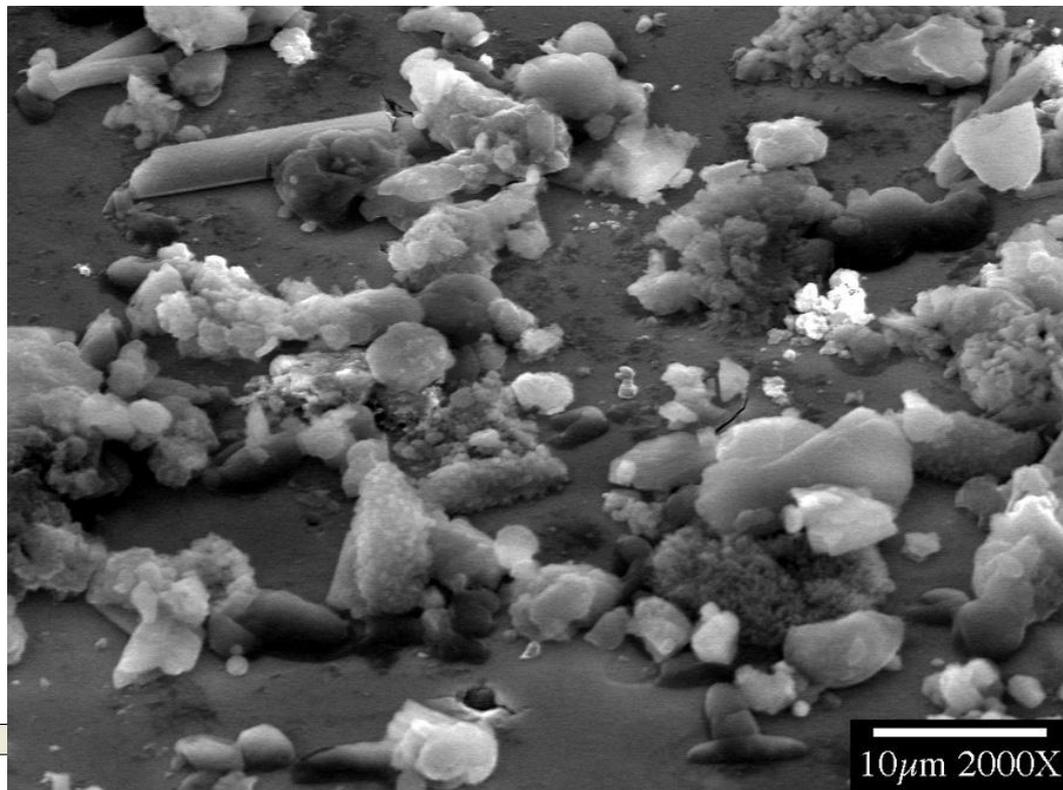
sulfates

**respirable particulates
in outside air –**



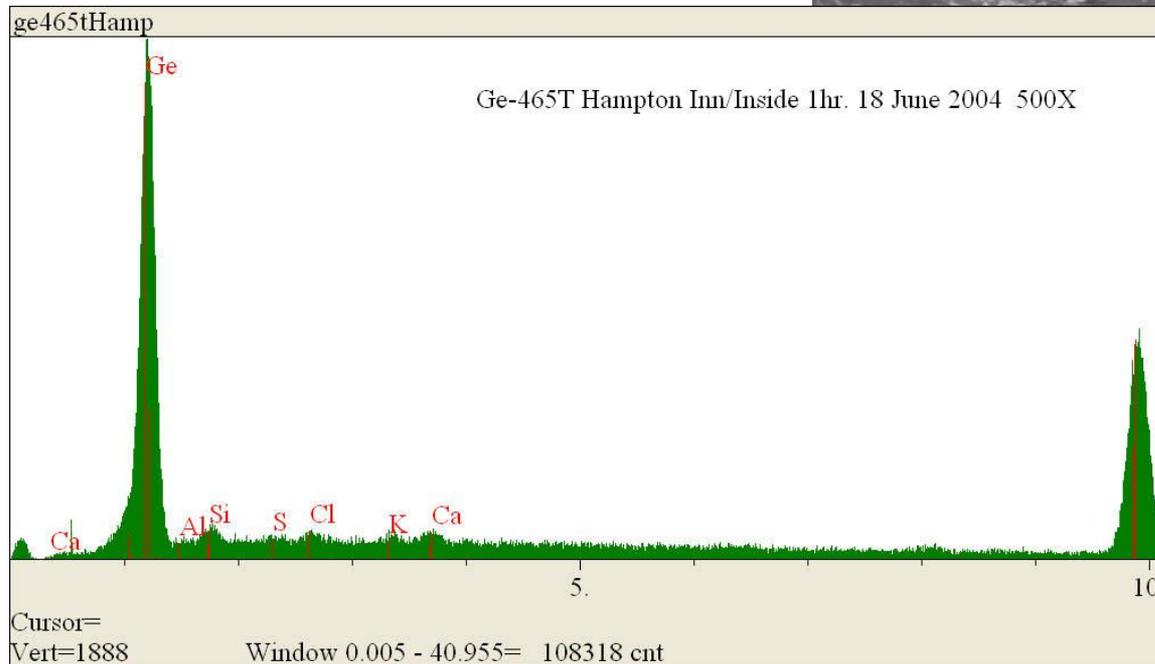
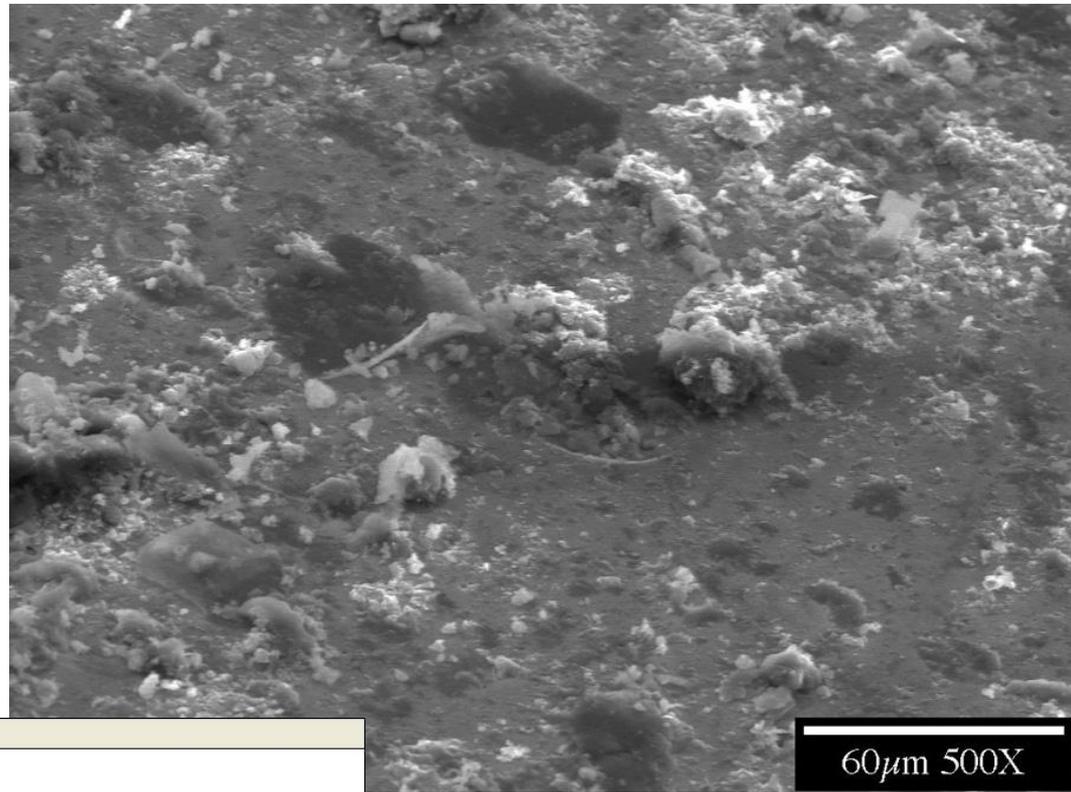
Outside Air

30 days after
treatment



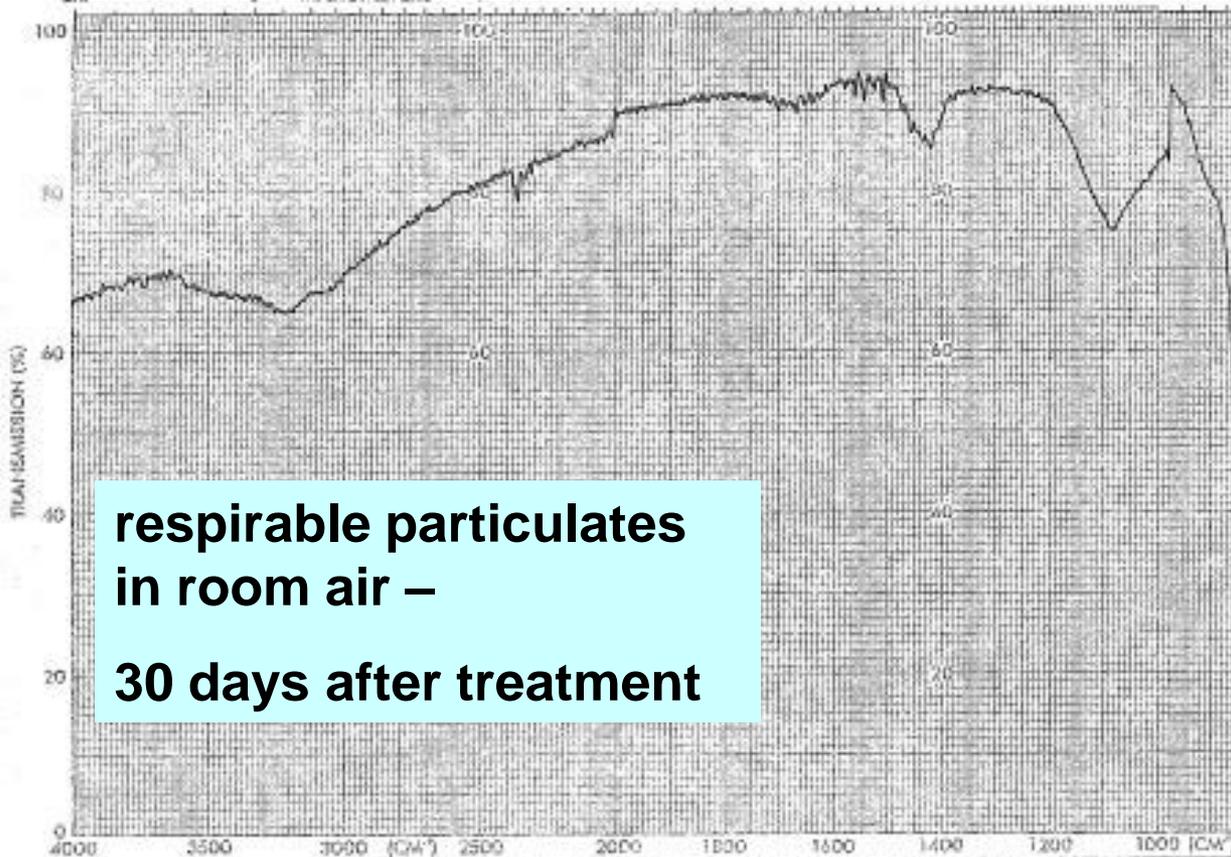
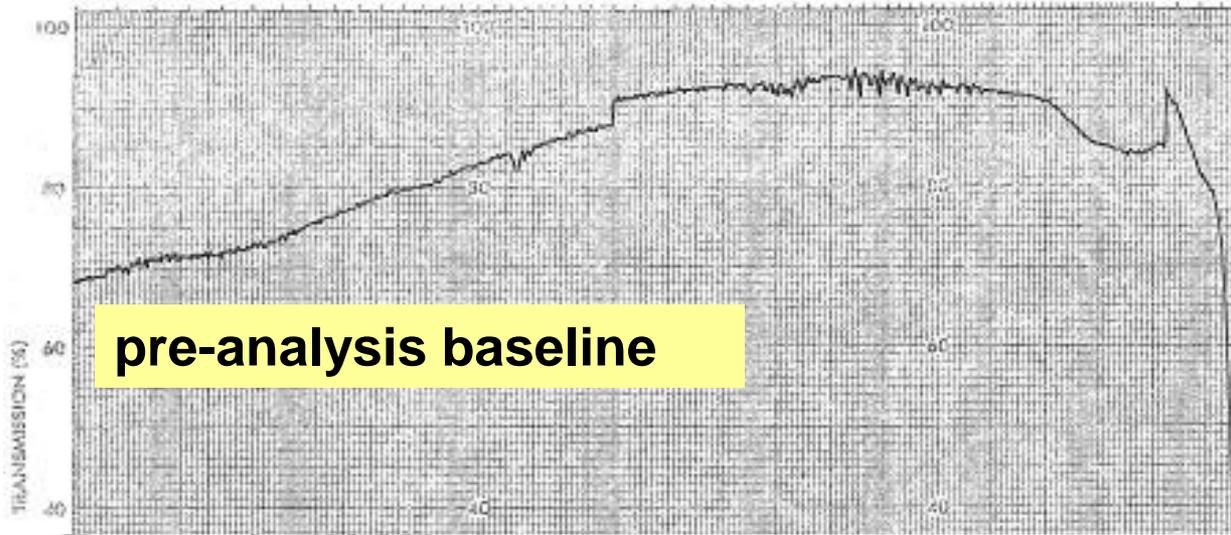
Inside the Room

30 days after
treatment



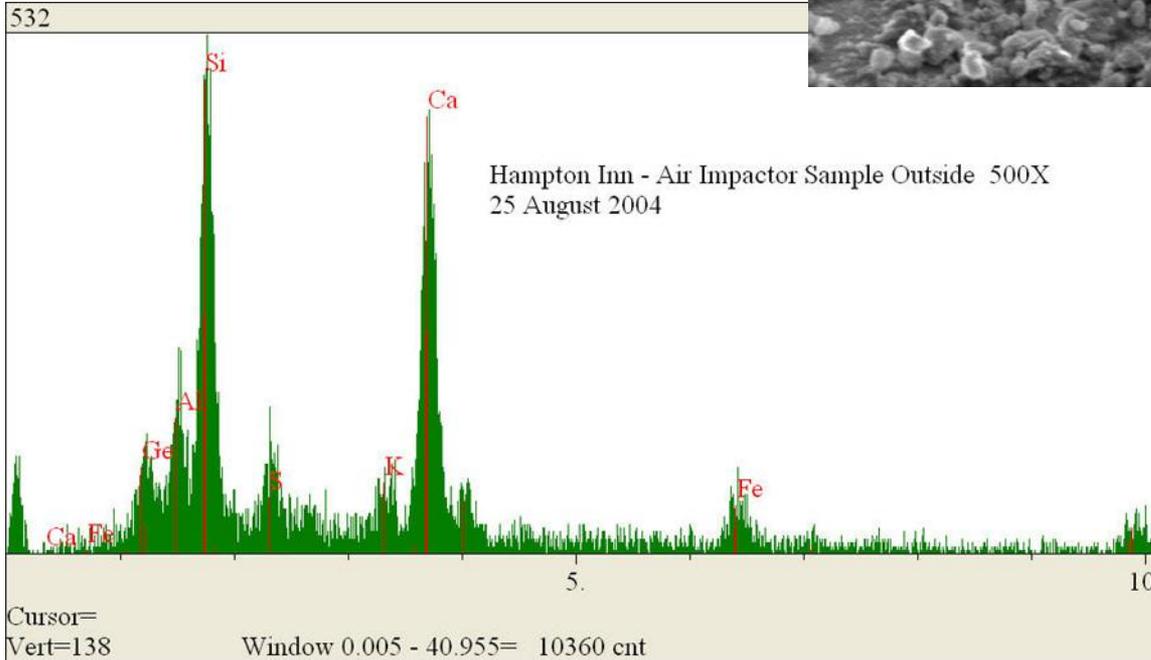
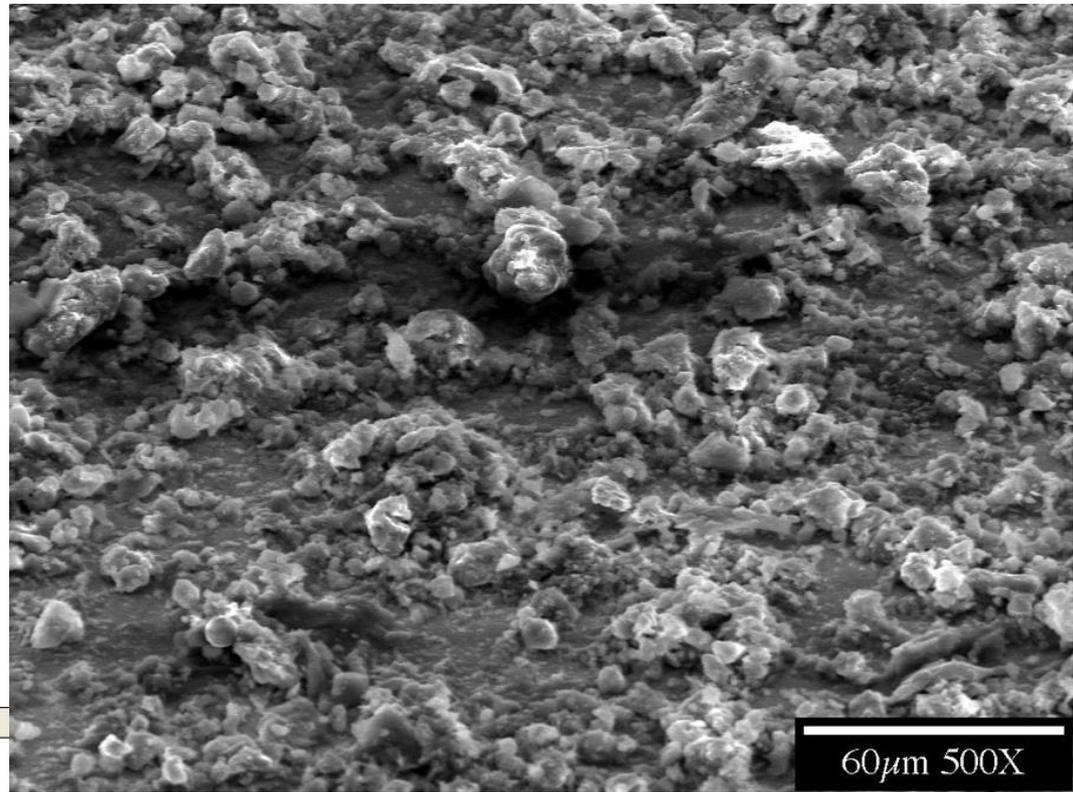
Day 30

**Inside the
Treated
Room**



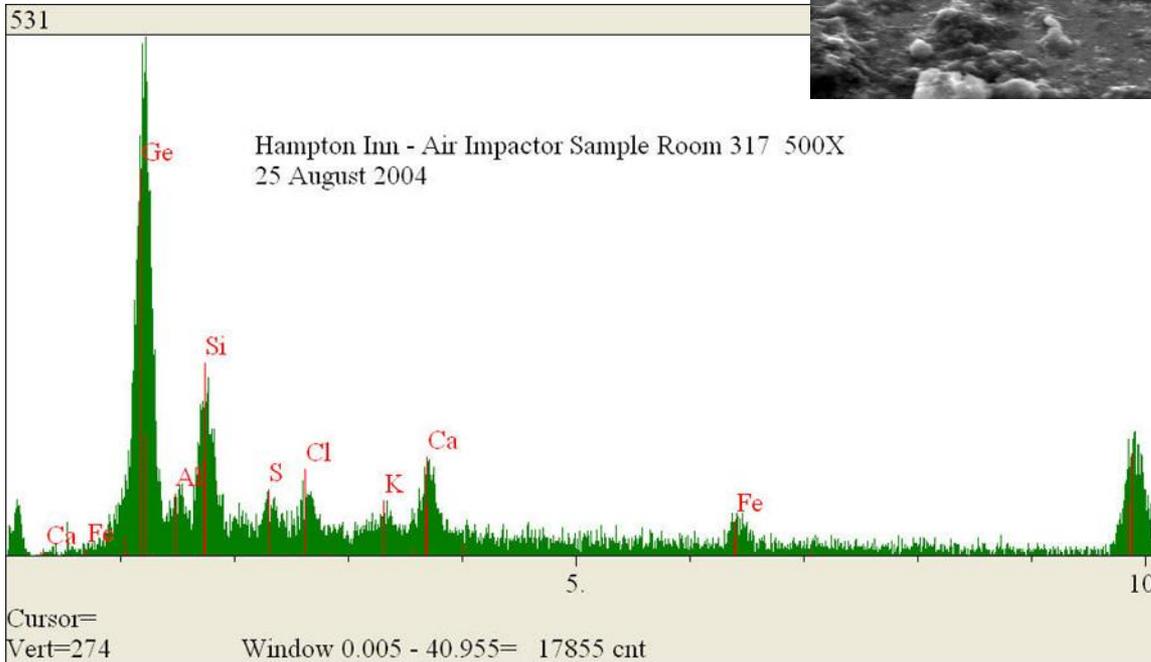
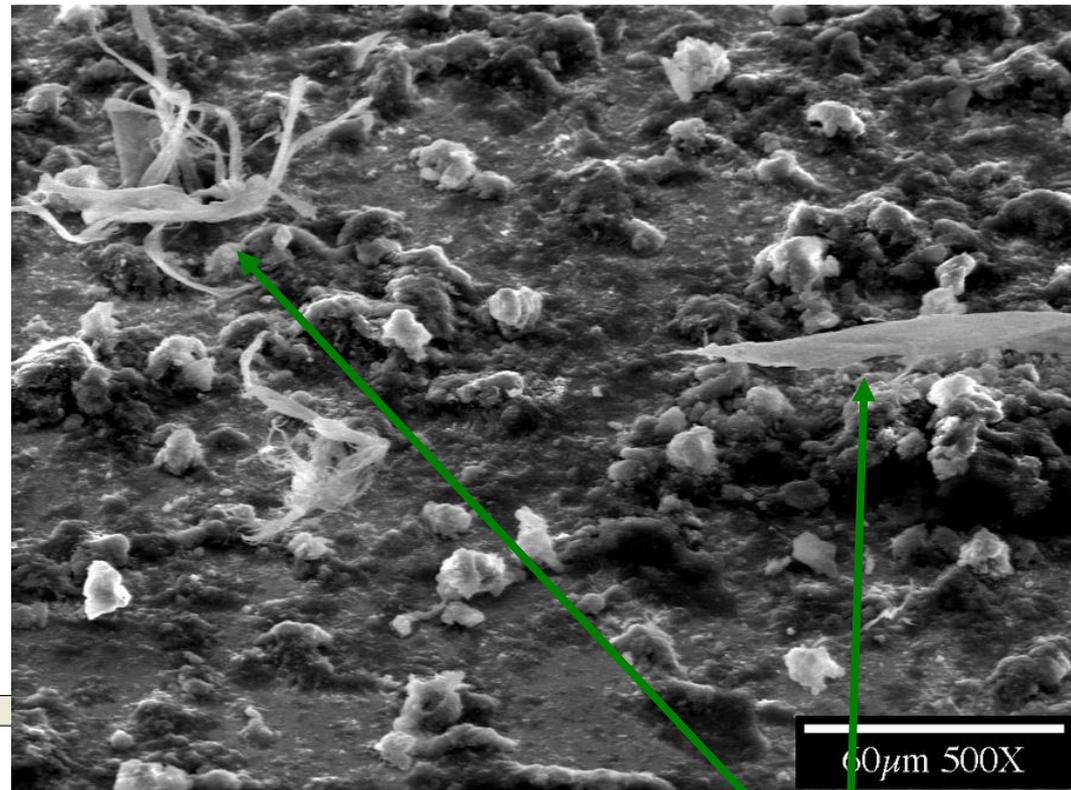
Outside Air

90 days after
treatment



Inside the Room

90 days after
treatment



Note cotton fiber fragments

Day 90

respirable particulates
in room air – 90 days
after treatment

Inside Air
compared to
Outside Air

respirable particulates
in outside air – 90 days
after treatment of room

