



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

DATE: March 11, 2002

SUBJECT: Status of air and dust asbestos testing after WTC collapse

- 1. Misrepresented "safe levels" and standards for asbestos**
- 2. Failure to test at low levels related to safety**
- 3. Region 2 relied on more sensitive TEM tests for settled dusts in own building, required by EPA policy, did not provide same sensitive testing for rest of NYC, and refused Region 8 offer of free sensitive testing for rest of NYC**

FROM: Cate Jenkins, Ph.D.*
jenkins.cate@epamail.gov
Waste Identification Branch (Mail Code 5304 W)
Hazardous Waste Identification Division

C Jenkins

TO: Affected Parties and Responsible Officials

This memorandum provides documentation of EPA Region 2's failure to address the aftermath of the World Trade Center (WTC) collapse with adequate environmental monitoring for asbestos. Region 2's rationales for its actions and decisions are provided in this memorandum. These are contrasted with extensive abstracts of the Code of Federal Regulations and other EPA guidance which contradict the contentions of Region 2. The testing methods upon which Region 2 relied as a basis for abating its own building for asbestos are compared to the testing methods Region 2 utilized to evaluate asbestos for the rest of New York City, and the official EPA policy requiring the use of the more sensitive testing methods.

The following table of contents also serves as a summary.

* The conclusions and opinions in this memorandum are those of the author and do not necessarily reflect those of the U.S. Environmental Protection Agency.

TABLE OF CONTENTS

page

ASBESTOS IN AIR	6
Region 2 falsely claims 70 structures/square millimeter is “AHERA standard”	6
70 s/mm ² is not the AHERA standard, as explained in the AHERA regulations themselves	8
– It is a LABORATORY BACKGROUND, the same as a DETECTION LIMIT or lab SENSITIVITY	8
– A “LABORATORY BACKGROUND” is like going to a salad bar with a container for the salad.	8
– The scale at the cashiers is good for weighing the large amount of salad, because the weight of the container is relatively small.	8
– But if you went to the cashiers with an empty container and asked that it be weighed for traces of cyanide, you would be out of luck, since the cyanide would weigh much less than the container.	8
– The container for the salad is like a “LABORATORY BACKGROUND”	8
Region 2 mistakes 70 s/mm ² as a normal air “background” level	10
The actual AHERA standard for asbestos in air is ZERO	11
– The AHERA regulations explicitly state: “there are no safe exposures to asbestos”	11
The Asbestos School Hazard Detection and Control Act states that the only standard or safe exposure level to asbestos is ZERO	11
There are no other EPA ambient air standards other than ZERO asbestos	12
EPA acceptable risk levels for comparison to the 70 s/mm ² – AHERA level	12
Explanation of “PCM equivalent” asbestos fibers	13
70 s/mm ² – AHERA is 2375 to 4750 times higher than EPA’s 10 ⁻⁶ risk level	13
70 s/mm ² – AHERA is higher than levels found at the Libby Superfund site	15

If asbestos were present at Region 2's detection limits, levels would be higher than EPA's 10 ⁻⁶ risk level	17
– A sensitive laboratory method is like looking at something with a microscope, or even an electron microscope	17
– A cruder or less sensitive method is like looking for something with a hand-held magnifying glass.	17
– A low detection limit is the same thing as high sensitivity. A much lower amount can be detected, like a microscopic grain of sand. The microscopic grain of sand is the “detection limit.”	17
– A high detection limit means low sensitivity. The detection limit would be larger, like only being able to detect a piece of gravel. The piece of gravel would be the “high detection limit.”	17
If asbestos were present at Region 2's detection limits, levels would be higher than the Libby Superfund site	18
Typical background air levels are lower than Region 2's detection limits	19
70 s/mm ² – AHERA must be used in combination with a leaf blower (aggressive testing) in an enclosed space to be relevant to predicting risks	20
– The law (through implementing regulations) requires this combination	20
– You can't have one without the others	20
Reasons why EPA and laboratories misuse the term “AHERA test”	20
EPA developed the “aggressive leaf-blower/short term air test” to save time	21
– Previously, EPA required air sampling for at least 8 hours or more	21
EPA did not test air indoors, or air where children actually breathe	22

ASBESTOS IN SETTLED SURFACE DUSTS AND SOILS	25
EPA Region 2 claims that 1% is the safe level for asbestos in dusts lying on surfaces or in soils	25
Under the EPA NESHAP, 1% asbestos is not considered a safe level	26
– 1% only applies when defining the asbestos-containing building material itself	26
– Region 2 agrees that 1% is not related to health risks	26
– Region 2 states that 1% is only the detection limit of a crude method, PLM, that lacks sensitivity to test for lower levels	26
– Region 2 fails to state that EPA policy requires a more sensitive method, TEM, for settled dusts and other solids	26
In Superfund guidance, EPA found 1% asbestos or lower is hazardous	27
Soils containing only 0.001% asbestos can lead to hazardous air levels	27
Decontamination of demolition sites must be cleaned up to background, not just 1%, under the EPA asbestos NESHAP	28
Under both the EPA NESHAP and AHERA regulations, ZERO emissions of asbestos-contaminated dusts is required, not emissions containing only 1% asbestos or less	29
EPA guidance requires the most sensitive method, transmission electron microscopy (TEM), for certain bulk materials under both the asbestos NESHAP and AHERA	31
– Region 2 only used the less sensitive method, PLM, in violation of EPA policy	31
EPA NESHAP regulations require testing by the sensitive TEM method for asbestos-derived wastes to determine if they asbestos free	32
– The asbestos-free level is “no asbestos detected by TEM” – not 1%	32
OSHA regulations recommend TEM analyses of settled, bulk dusts	34
Settled dusts in Lower Manhattan had higher asbestos than soils in Libby, MT	34
– Region 2 claims that asbestos levels are “low” in Manhattan dust	34

REGION 2 ASBESTOS ABATEMENT AT THEIR OWN 290 BROADWAY BUILDING 36

EPA Region 2 had positive results from sensitive TEM testing for its own building and on this basis decided to abate for asbestos 36

– Less sensitive PLM tests, the only one used for bulk dusts for the rest of Manhattan, were negative for the Region 2 building 36

– But for the results from the more sensitive tests, Region 2 would not have abated asbestos from its building 36

– TEM tests for bulk dust are required by EPA policy, but Region 2 did not use these tests for the rest of Manhattan 36

– EPA Region 2 was offered free access to similar more sensitive testing (SEM) by Region 8 for the rest of Manhattan but refused 36

– The same, more sensitive test method (SEM) was used after the first bombing of the WTC in 1993, but Region 2 refused it after the WTC 36

Difference in testing methods and sensitivities for: 38

– EPA Region 2 building at 290 Broadway 38

– All of Manhattan and surrounding NYC after WTC collapse 38

– After the first bombing of the World Trade Center 38

Region 2 defends the sensitive TEM settled dust tests on its own building “because the lab suggested it to GSA” 41

– The lab suggested it only because it was official EPA guidance and a NY State regulatory requirement to perform TEM tests of settled dusts and solid materials under certain conditions 41

Region 2 withheld testing results for its own building in response to FOIA request 42

CONCLUSIONS 43

ASBESTOS IN AIR

Region 2 falsely claims 70 structures/square millimeter is “AHERA standard”

The EPA website relating to the WTC disaster, pages maintained by EPA Region 2, repeatedly claim that there is an air standard under the Asbestos Hazard Emergency Response Act (AHERA), and that this standard for asbestos is “70 structures per square millimeter”:

The samples are evaluated against a variety of benchmarks, standards and guidelines established to protect public health under various conditions. ... EPA analyzed 34 samples taken in and around ground zero from October 8 to October 9. All samples showed results less than 70 structures per millimeter squared, which is the Asbestos Hazard Emergency Response Act (AHERA) standard for allowing children to re-enter school buildings after asbestos removal activities.

[U.S. Environmental Protection Agency (EPA) Daily Summary, Wednesday, October 10, 2001. Posted at <http://www.epa.gov/epahome/wtc/> or www.NYenviroLAW.org]

The following is a statement that appears in most of Region 2's daily air monitoring summaries:

In evaluating data from the World Trade Center and the surrounding areas, EPA is using a protective standard under AHERA, the Asbestos Hazard Emergency Response Act, to evaluate the risk from asbestos in the outdoor and indoor air. This is a very stringent standard that is used to determine whether children may re-enter a school building after asbestos has been removed or abated. It is based on assumptions of long-term exposure. EPA has chosen to use this standard, because it is the most stringent and protective, even though it is unlikely that the public will be exposed to asbestos from the World Trade Center site for extended periods of time.

To determine asbestos levels, air filters are collected from monitoring equipment through which air in the school building has passed and viewed through a microscope. The number of structures – material that has asbestos fibers on or in it – is then counted. The measurements must be 70 or fewer structures per square millimeter before children are allowed inside.

[EPA Response to September 11, Benchmarks, Standards and Guidelines Established to Protect Public Health, posted at <http://www.epa.gov/epahome/wtc/activities.htm>]

Regional Counsel for EPA’s Region 2 made the following assertions:

EPA has two sets of regulations that deal with asbestos ... neither set of regulations is directly applicable to the conditions in the wake of the WTC disaster ... The first set of asbestos-related regulations are part of the National Emission Standards for Hazardous Air Pollutants (NESHAPs) ... pursuant to ... the Clean Air Act ... The second set of regulations are those promulgated by EPA pursuant to the Asbestos Hazard Emergency Response Act (AHERA) ... The AHERA regulations also include a “clearance” standard for inside air in school buildings to

be used after asbestos abatement work has been completed, in order to ensure that the space is safe for re-entry by children, teachers and other employees. ...

EPA began taking ambient air samples ... Once again, the key question ... to what reference standard the test results would be compared in order to determine whether the air was "safe." ... EPA has not promulgated an outdoor ambient air quality standard for asbestos; nor has any other regulatory agency done so, for that matter. The only standard for asbestos in air that EPA has promulgated is found in the AHERA regulations referenced above. These rules include what is commonly called a clearance test ... The specified AHERA clearance test procedure includes, *inter alia*, a step in which air monitored in the affected space is compared with the specified "background" level of 70 structures per square millimeter (70 s/mm²).

[Mugdan, Walter E., Esq. (January 25, 2002) Environmental law issues raised by terrorist events in 2001. Speech before the NY Bar Association. Posted at www.NYenviroLAW.org]

In a document drafted by Region 2 legal counsel, the following statement is made:

It was developed to determine whether school buildings where asbestos was used are safe. Under this test, an air monitor pumps room air through a special filter for a specified amount of time. Then the number of asbestos "structures," or fibers, on a square millimeter of the filter are counted. If there are fewer than 70 such structures, the air is judged to be acceptable. EPA has used this same school-based standard to evaluate the safety of outside air in downtown Manhattan.

[US EPA Region 2 (November 27, 2001) Draft. Attorney work product, attorney-client communication. Made available by EPA Region 2 in response to a January 3, 2002 Freedom of Information Act request by the New York Environmental Law and Justice Project. Posted at <http://www.nyenvirolaw.org/PDF/EPA-FOIL-scannedOn-2-27-02.pdf>]

The New York City Departments of Health and Environmental Protection also claim that the 70 s/mm² level is a safe level:

PCM sample results are compared to the clearance/re-occupancy standard for indoor air following an asbestos abatement project. This standard is 0.01 fibers per cubic centimeter. Samples found to be above this standard are re-examined using TEM (Transmission Electron Microscopy). The TEM analysis identifies the type of particles collected. TEM results are compared to the clearance/re-occupancy standard for indoor air in schools after an asbestos abatement project. This standard is 70 structures of asbestos per square millimeter. The standard was established pursuant to the federal "Asbestos Hazard and Emergency Response Act", usually known as AHERA.

[Testimony of Thomas R. Firenden, M.D., M.P.H., Commissioner, New York City Department of Health and Joel A. Miele Sr., P.E., Commissioner, New York City Department of Environmental Protection before the U.S. Senate Committee on Environment and Public Works, Subcommittee on Clean Air, Wetlands, and Climate Change, February 11, 2002. Posted at www.NYenviroLAW.org]

70 s/mm² is not the AHERA standard, as explained in the AHERA regulations themselves

- It is a LABORATORY BACKGROUND, the same as a DETECTION LIMIT or lab SENSITIVITY**
- A “LABORATORY BACKGROUND” is like going to a salad bar with a container for the salad.**
- The scale at the cashiers is good for weighing the large amount of salad, because the weight of the container is relatively small.**
- But if you went to the cashiers with an empty container and asked that it be weighed for traces of cyanide, you would be out of luck, since the cyanide would weigh much less than the container.**
- The container for the salad is like a “LABORATORY BACKGROUND”**

In their naivete of analytical testing methods, Region 2 is under the mistaken belief that 70 s/mm² is the natural, typical background level of asbestos in normal air. Region 2 states this explicitly, seen in the excerpts in the preceding section.

EPA Region 2 has unfortunately completely misinterpreted the regulations at Title 40 of the Code of Federal Regulations, which describe in detail the meaning of the 70 s/mm² level for the AHERA TEM clearance test.

It is only the detection limit of a particular air test for asbestos, or the sensitivity of the method, a LABORATORY BACKGROUND. The word “background” refers to the fact that one particular filter material through which air is drawn is already contaminated with asbestos.

Analysts have the choice of using either polycarbonate filters or methyl cellulose filters. Polycarbonate filters have asbestos fibers in the filter material itself. The AHERA clearance test was designed to allow for the presence of the asbestos in the polycarbonate filters, so it set the level at 70 s/mm² to allow for this contamination. Typically, the methyl cellulose filters are used today because it is understood that using polycarbonate filters would result in finding some asbestos as part of the lab background. Using methyl cellulose filters gives a “free pass” of 70 s/mm².

Extensive excerpts are given of the AHERA regulations, which make it very clear that 70 s/mm² only refers to the detection limit or sensitivity or laboratory background of the AHERA TEM clearance test. Nowhere in the AHERA regulations is the word “standard” or “safe” used in conjunction with 70 s/m². In fact, in the next section, it can be seen that the same AHERA regulations state that there is NO safe exposure to asbestos.

§763.90 Response actions. (a) The local education agency shall select and implement in a timely manner the appropriate response actions in this section consistent with the assessment conducted in §763.88. ...

(i) Completion of response actions.

...

(3) Except as provided in paragraphs (i)(4), and (i)(5), of this section, an action to remove, encapsulate, or enclose ACBM shall be considered complete when the average concentration of asbestos of five air samples collected within the affected functional space and analyzed by the TEM method in appendix A of this subpart E, is not statistically significantly different, as determined by the Z-test calculation found in appendix A of this subpart E, from the average asbestos concentration of five air samples collected at the same time outside the affected functional space and analyzed in the same manner, and the average asbestos concentration of the three field blanks described in appendix A of this subpart E is below the filter background level, as defined in appendix A of this subpart E, of 70 structures per square millimeter (70 s/mm²).

(4) An action may also be considered complete if the volume of air drawn for each of the five samples collected within the affected functional space is equal to or greater than 1,199 L of air for a 25 mm filter or equal to or greater than 2,799 L of air for a 37 mm filter, and the average concentration of asbestos as analyzed by the TEM method in appendix A of this subpart E, for the five air samples does not exceed the filter background level, as defined in appendix A, of 70 structures per square millimeter (70 s/mm²). ...

...

40 CFR §763, Appendix A.

II. Mandatory Transmission Electron Microscopy Method A.

Definitions of Terms

...

13. Filter background level -- The concentration of structures per square millimeter of filter that is considered indistinguishable from the concentration measured on a blank (filters through which no air has been drawn). For this method the filter background level is defined as 70 structures/mm².

...

A response action is determined to be completed by TEM when the abatement area has been cleaned and the airborne asbestos concentration inside the abatement area is no higher than concentrations at locations outside the abatement area. ... After the abatement area has passed a thorough visual inspection, and before the outer containment barrier is removed, a minimum of five air samples inside the abatement area and a minimum of five air samples outside the abatement area must be collected. Hence, the response action is determined to be completed when the average airborne asbestos concentration measured inside the abatement area is not statistically different from the average airborne asbestos concentration measured outside the abatement area.

...

When volumes greater than or equal to 1,199 L for a 25 mm filter and 2,799 L for a 37 mm filter have been collected and the average number of asbestos structures on samples inside the abatement area is no greater than 70 s/mm² of filter, the response action may be considered complete without comparing the inside samples to the outside samples. EPA is permitting this initial screening test to save analysis costs in situations where the airborne asbestos concentration is

sufficiently low so that it cannot be distinguished from the filter contamination/background level (fibers deposited on the filter that are unrelated to the air being sampled).

...

The initial screening test is expressed in structures per square millimeter of filter because filter background levels come from sources other than the air being sampled and cannot be meaningfully expressed as a concentration per cubic centimeter of air. The value of 70 s/mm² is based on the experience of the panel of microscopists who consider one structure in 10 grid openings (each grid opening with an area of 0.0057 mm²) to be comparable with contamination/background levels of blank filters. The decision is based, in part, on Poisson statistics which indicate that four structures must be counted on a filter before the fiber count is statistically distinguishable from the count for one structure.

[emphasis added]

[The Code of Federal Regulations are available from most larger libraries, all law libraries, and also online at: <http://www.access.gpo.gov/nara/cfr/index.html>, or for EPA-only (faster) at <http://www.epa.gov/epahome/cfr40.htm>]

It is true that EPA Region 2's air tests in Manhattan had greater sensitivity than 70 s/mm². That is because they used methyl cellulose filters, which do not have the asbestos contamination problem.

Region 2 mistakes 70 s/mm² as a normal air “background” level

Regional Counsel for EPA's Region 2 explained his belief of the meaning of 70 s/mm². He believes that it is a normal air background, and when the AHERA clearance test is run, the results of the test are COMPARED WITH the 70 s/mm² “background” level:

These rules include what is commonly called a clearance test ... The specified AHERA clearance test procedure includes, *inter alia*, a step in which air monitored in the affected space is compared with the specified “background” level of 70 structures per square millimeter (70 s/mm²).

[Mugdan, Walter E., Esq. (January 25, 2002) Environmental law issues raised by terrorist events in 2001. Speech before the NY Bar Association. Posted at www.NYenviroLAW.org]

This is wrong. There is no comparison going on at all with the results of the test and any purported background level of 70 s/mm². Instead, the AHERA TEM clearance test requires a comparison with the actual background air, which must be done by sampling the air outside and actually testing it, according to the procedures of the AHERA test.

As seen above, the word “background” in the regulations refers to a laboratory background from unavoidable asbestos contamination of the filter through which air is drawn.

Later, the actual typical background levels of asbestos in air will be given, and the reasons why EPA has regulations that would allow the air in schools to “pass” with such abnormally high and dangerous asbestos results of 70 s/mm². (You have to use “aggressive sampling” with a one-horsepower leaf blower inside an enclosed space, which makes asbestos concentrations in air abnormally high.)

The actual AHERA standard for asbestos in air is ZERO

- The AHERA regulations explicitly state:
“there are no safe exposures to asbestos”**

The AHERA regulations actually do give a standard for asbestos in air, namely ZERO. The AHERA regulations are explicit, saying there are no safe exposures to asbestos:

40 CFR § 763. Appendix B to Subpart E to Part 763 -- Asbestos Model Accreditation Plan

...

1. WORKERS [*same language included for supervisors and all others involved in abatement*] ...

...

(b) *Potential health effects related to asbestos exposure.* The nature of asbestos-related diseases; routes of exposure; dose-response relationships and the lack of a safe exposure level; the synergistic effect between cigarette smoking and asbestos exposure; the latency periods for asbestos-related diseases; a discussion of the relationship of asbestos exposure to asbestosis, lung cancer, mesothelioma, and cancers of other organs.

[*emphasis added*]

[The Code of Federal Regulations are available from most larger libraries, all law libraries, and also online at: <http://www.access.gpo.gov/nara/cfr/index.html>, or for EPA regulations only (faster) at <http://www.epa.gov/epahome/cfr40.htm>]

The Asbestos School Hazard Detection and Control Act states that the only standard or safe exposure level to asbestos is ZERO

Asbestos School Hazard Detection and Control Act

...

§ 3601. Congressional statement of findings and purposes (a) The Congress finds that-- (1) exposure to asbestos fibers has been identified over a long period of time and by reputable medical and scientific evidence as significantly increasing the incidence of cancer and other severe or fatal diseases, such as asbestosis; (2) medical evidence has suggested that children may be particularly vulnerable to environmentally induced cancers; (3) medical science has not established any minimum level of exposure to asbestos fibers which is considered to be safe to individuals exposed to the fibers;

[June 14, 1980, P.L. 96-270, § 1, 94 Stat. 487, 20 USCS § 3601 (2001). Available at <http://www.findlaw.com/> or <http://uscode.house.gov/>]

There are no other EPA ambient air standards other than ZERO asbestos

Furthermore, there are no other EPA standards for asbestos in air, such as an ambient air quality standard, other than the “zero” level or “no exposure” level. EPA guidance states the following:

Q: What is the acceptable exposure/ambient air standard for asbestos?

A: EPA does not specify an acceptable exposure/ambient air standard.

[US EPA (1990) Common Questions on the Asbestos NESHAP. EPA Publication No. 340/1-90-021. Available online at: <http://www.epa.gov/ncepihom/nepishom/>]

Even EPA Region 2 agrees that there are no ambient air standards for asbestos. Walter Mugdan, Regional Counsel, stated:

EPA has not promulgated an outdoor ambient air quality standard for asbestos; nor has any other regulatory agency done so, for that matter.

[Mugdan, Walter E., Esq. (January 25, 2002) Environmental law issues raised by terrorist events in 2001. Speech before the NY Bar Association. Posted at www.NYenviroLAW.org]

EPA acceptable risk levels for comparison to the 70 s/mm² – AHERA level

Although there are no standards for asbestos in air, there are levels or concentrations that are cleanup goals in the event of asbestos contamination. EPA does not consider any exposure to a carcinogen to be acceptable.

In the event of contamination, it is the policy and goal of EPA to clean up the environment to protect citizens from any increased risk of cancer at the 1 in a million cancer risk level for a lifetime exposure. This is called the “10⁻⁶ risk level,” or the “ten to the minus six risk level.”

Exposing citizens after a cleanup to anything less than the 10⁻⁶ risk level is never done by EPA without due public process with opportunity for public input and review. EPA would never even propose deciding that citizens be exposed to higher risk levels than one-in-a-million without extensive environmental monitoring, considering all feasible options, considering whether or not there are relatively few citizens that would be exposed, etc. Regardless, in all cases, action by EPA is triggered by any risk greater than 1 in 10,000.

The EPA risks for asbestos at different air concentrations are given in the table below:

AIR CONCENTRATION OF ASBESTOS "PCM equivalent" fraction, fibers over 5 micrometers long		CANCER RISK LEVEL, LIFETIME	
		number of cancers	risk level
concentration fibers per milliliter	expressed as exponent		
0.000004 f/mL	4E-6 f/mL	1 in 1,000,000	10 ⁻⁶ (= E-6)
0.00004 f/mL	4E-5 f/mL	1 in 100,000	10 ⁻⁵ (= E-5)
0.0004 f/mL	4E-4 f/mL	1 in 10,000	10 ⁻⁴ (= E-4)
Source: U.S. EPA (August, 2001) Integrated Risk Management Information System (IRIS) Summary for Asbestos, posted at http://www.epa.gov/iris/subst/0371.htm			

Explanation of "PCM equivalent" asbestos fibers

The "PCM fraction" or "PCM equivalents" are those asbestos fibers at least 5 micrometers (μm) long, with a width greater than $0.25 \mu\text{m}$, and an aspect ratio greater than or equal to 3 to 1. These are the fibers that are small enough to be inhaled deeply into the lungs ("respirable size"), but also large enough to be retained by the lungs. It is believed that fibers shorter than $5 \mu\text{m}$ can be engulfed by macrophages and carried out of the lungs.

EPA policy currently uses this "PCM-equivalent" theory, which means that asbestos fibers smaller than $5 \mu\text{m}$ in length are eliminated from the risk assessment, since they are believed not to contribute to cancer. Not all scientist agree with this theory, that the smallest of the small asbestos fibers are harmless.

Because the established EPA risk level is expressed in PCM equivalents, and because other asbestos in air data is typically expressed as PCM equivalents, it is useful to convert units from "total asbestos fibers" to "PCM equivalent fibers." This makes comparisons of data easier.

70 s/mm² – AHERA is 2375 to 4750 times higher than EPA's 10⁻⁶ risk level

The table below compares the AHERA 70 structures per square millimeter (70 s/mm²) level with the EPA one-in-a-million risk level (10⁻⁶ risk level; ten to the minus six risk level).

Since the EPA one-in-a-million cancer risk level for asbestos is 0.000004 fibers per milliliter (PCM), the AHERA level is 2375 to 4750 times higher than the EPA cancer risk level. In other words, the 70 s/mm² level would lead to 2.4 to 4.8 excess cancers per one thousand. This is unacceptable.

The 70 s/mm² level is converted to “PCM equivalents” to make this comparison possible. See section above for an explanation of PCM equivalents. The theoretical level of PCM equivalents for 70 s/mm² is given in the AHERA regulations at 40 CFR § 763 App. A. The Region 2 air monitoring data also gives real-world PCM-equivalents to 70 s/mm². For Manhattan asbestos air tests, the PCM equivalents range from 0.0095 to 0.019 f/mL (PCM).

70 structures per square millimeter (s/mm²) COMPARISON WITH CANCER RISKS AHERA TEM clearance test levels, different units. All numbers are roughly equal	
THEORETICAL EQUIVALENTS TO 70 s/mm ² from 40 CFR § 763 App. A	
= 0.01 fibers per milliliter (f/mL) (PCM) = 0.01 fibers per cubic centimeter (f/cc) (PCM) = 2500 times the EPA one per million cancer risk = 2.5 excess cancers per one thousand fibers over 5 μm, “PCM-equivalent”	= 0.02 structures per milliliter (s/mL) = 0.02 structures per cubic centimeter (s/cc) [all fibers plus bundles]
EPA REGION 2 EQUIVALENTS TO 70 s/mm ² , if 50% of fibers are “PCM equivalent”	
= 0.019 fibers per milliliter (f/mL) (PCM) = 0.019 fibers per cubic centimeter (f/cc) (PCM) = 4750 times the EPA one per million cancer risk = 4.8 excess cancers per one thousand	= 0.038 structures per milliliter (s/mL) = 0.038 structures per cubic centimeter (s/cc) [all fibers plus bundles, not just PCM-equivalent fibers which are over 5 μm in length]
EPA REGION 2 EQUIVALENTS TO 70 s/mm ² , if 25% of fibers are “PCM equivalent”	
= 0.0095 fibers per milliliter (f/mL) (PCM) = 0.0095 fibers per cubic centimeter (f/cc) (PCM) = 2375 times the EPA one per million cancer risk = 2.4 excess cancers per one thousand	= 0.038 structures per milliliter (s/mL) = 0.038 structures per cubic centimeter (s/cc) [all fibers plus bundles, not just PCM-equivalent fibers which are over 5 μm in length]

The following table gives some of Region 2's air measurements for Manhattan that were significantly higher than the detection limit, along with the fraction of fibers that are “PCM equivalent.” A conservative estimate would be that 25% to 50% of the fibers are PCM equivalent. Since the Region 2 data lacked the necessary sensitivity, there is no basis for concluding that the PCM fraction was any lower.

AVAILABLE AIR ASBESTOS LEVELS SIGNIFICANTLY ABOVE DETECTION LIMITS EPA REGION 2 DATA, MANHATTAN				
concentration in fibers or structures per milliliter (f-s/mL)	concentration in structures per square millimeter (s/mm ²)	fibers less than 5 μm	fibers greater than 5 μm (PCM)	date
0.0143	24	3	0	10/1
0.0095	17.78	2	0	9/28
0.0171	32	4	0	9/23

0.0128	24	3	0	9/23
0.0095	17.78	1	1	9/25 a
0.019	35.56	2	2	
0.033	62.22	8	1	
0.0074	17.78	1	1	
0.0095	17.78	1	1	9/25
0.0190	35.56	4	0	
0.0476	89.89	7	3	
0.0143	26.67	2	1	9/29 a
0.0095	17.78	2	0	
0.038	71.11	6	2	10/2
0.045	88.88	8	4	
0.0143	26.67	2	1	
Source: EPA air monitoring laboratory sheets. Made available in response to a Freedom of Information Act request from the New York Environmental Law and Justice Project. Posted at www.NYenviroLAW.org Note that EPA only posted incomplete data on its web site, giving only asbestos concentrations expressed as structures per square millimeter, which is not helpful for scientists attempting to quantify risks.				

70 s/mm² – AHERA is higher than levels found at the Libby Superfund site

The 70 s/mm² AHERA TEM clearance level is higher than the air levels found inside homes at the Libby, Montana Superfund site, the air levels that caused Libby to become a Superfund site.

The following table gives the air levels inside residences that resulted in the designation of Libby as a Superfund site. Because most of the inside air samples had non-detectable asbestos, it was necessary to estimate the detection limit of the tests performed at Libby. This estimate was from 0.0001 to 0.0003 f/mL (PCM).

The average level of asbestos inside residences in Libby is 0.0024 f/mL (PCM).

The AHERA 70 s/mm² level is equivalent to 0.0095 to 0.019 f/mL (PCM). (See preceding section.)

The AHERA 70 s/mm² level is 4 to 8 times higher than the air inside residences at Libby.

COMPARISON OF AHERA 70 s/mm² LEVEL WITH LIBBY SUPERFUND SITE			
70 s/mm ² equivalent low range, Region 2 data	0.0095 f/mL (PCM)	4 times higher than Libby	
70 s/mm ² equivalent high range, Region 2 data	0.019 f/mL (PCM)	8 times higher than Libby	
AIR LEVELS INSIDE RESIDENCES IN LIBBY, MONTANA			
Average concentration of asbestos in air inside Libby residences**	0.0024 f/mL (PCM)	0.0023 - 0.0024 f/mL (PCM), range	
Air levels during routine activities, samples where asbestos detected.	0.009 f/mL (PCM)	0.003 - 0.036 f/mL (PCM), range	4/10 samples with detectable asbestos
Air levels during active cleaning, samples where asbestos detected.	0.008 f/mL (PCM)	0.007 - 0.010 f/mL (PCM), range	3/17 samples with detectable asbestos
Non-detect samples, both from tests done while routine and active cleaning taking place. Estimated detection limit	0.0002 f/mL (PCM)	0.0001 - 0.0003 f/mL (PCM), range	20/27 samples with NON-detectable asbestos. 27 total samples (10 + 17)
<p>** Calculated as follows: $(0.0002)(20/27) + (0.008)(3/27) + (0.009)(4/27) = 0.00237$</p> <p>Source: Table, page 10 of risk assessment, Weis, C. P., Senior Toxicologist/Science Support Coordinator, U.S. EPA (December 20, 2001) Excerpts from: Amphibole mineral fibers in source materials in residential and commercial areas of Libby pose an imminent and substantial endangerment to public health. Posted at: http://www.epa.gov/region8/superfund/libby/riskassess.html</p>			

If asbestos were present at Region 2's detection limits, levels would be higher than EPA's 10⁻⁶ risk level

- **A sensitive laboratory method is like looking at something with a microscope, or even an electron microscope**
- **A cruder or less sensitive method is like looking for something with a hand-held magnifying glass.**
- **A low detection limit is the same thing as high sensitivity. A much lower amount can be detected, like a microscopic grain of sand. The microscopic grain of sand is the "detection limit."**
- **A high detection limit means low sensitivity. The detection limit would be larger, like only being able to detect a piece of gravel. The piece of gravel would be the "high detection limit."**

The detection limits of the Region 2 air tests are too high, meaning that the tests did not have enough sensitivity to find asbestos at the levels that could harm people.

It is true that Region 2 was able to detect asbestos at levels lower than 70 s/mm², the AHERA test level. Many of Region 2's tests had no detectable asbestos at all. However, they were still not sensitive enough, and there are many ways of making the tests more sensitive.

The sensitivities, or detection limits, for the air tests Region 2 performed after the WTC collapse were only 0.0043 to 0.0096 structures per milliliter (s/mL), for all fibers and bundles. This corresponds to 0.0011 to 0.0043 f/mL (PCM). This assumes that either 25% or 50% of the fibers are PCM-equivalent, a conservative estimate, explained in an earlier section.

If asbestos were present at the detection limits or slightly below it, it would correspond to excessive cancer risks from nearly 3 per 10,000 up to 1 per 1000. See the following table.

CANCER RISKS AT REGION 2 DETECTION LIMITS		
Cancer risk level	Air concentration for "PCM-equivalent" fibers	
1 per million	0.000004 f/mL (PCM)	EPA's Integrated Risk Information System
2.75 cancers per 10,000	0.0011 f/mL (PCM)	estimated 25% PCM-equivalents for lowest detection limit for Region 2 tests
1 cancer per 1000	0.0043 f/mL (PCM)	estimated 50% PCM-equivalents for highest detection limit for Region 2 tests

The following table gives some typical detection limits for the Region 2 tests, along with the estimated amount that would be “PCM-equivalent.”

DETECTION LIMITS -- LOWEST LEVELS OF ASBESTOS IN AIR THAT REGION 2 COULD DETECT				
Estimated “PCM equivalent” fibers, those over 5 µm in length – f/mL (PCM)		structures per milliliter (s/mL)	structures per square millimeter (s/mm ²)	date
50% PCM fraction assumption	25% PCM fraction assumption	all fibers and bundles (“structures”)	all fibers and bundles (“structures”)	
0.0024	0.0012	0.0048	8.89	9/24
0.0022	0.0011	0.0043	8.0	9/25
0.0031	0.0016	0.0062	7.75	9/29
0.0027	0.0013	0.0053	8.0	9/29
0.0043	0.0024	0.0096	8.0	9/29
0.0025	0.0012	0.0049	8.89	9/29
EPA air monitoring laboratory sheets. Made available in response to a Freedom of Information Act request from the New York Environmental Law and Justice Project. Posted at www.NYenviroLAW.org Note that EPA only posted incomplete data on its own web site, giving only asbestos concentrations expressed as structures per square millimeter.				

If asbestos were present at Region 2's detection limits, levels would be higher than the Libby Superfund site

The detection limits of the Region 2 air tests are also higher than or comparable to the air found inside homes at the Libby Superfund site. An earlier section showed that if asbestos were present at the AHERA levels, it would be higher than in homes in Libby.

On other words, even if Region 2 found no asbestos, even testing inside residences with normal activities going on, it would not be able to say that the air was safer than at Libby. See the table below.

COMPARISON OF REGION 2 DETECTION LIMITS WITH LIBBY SUPERFUND SITE			
Higher Reg. 2 detection limits	0.0043 f/mL (PCM)	almost 2 times higher than Libby	
Lower Reg. 2 detection limits	0.0011 f/mL (PCM)	about one-half that in Libby	
AIR LEVELS INSIDE RESIDENCES IN LIBBY, MONTANA			
Average concentration, Libby residences	0.0024 f/mL (PCM)	0.0023 - 0.0024 f/mL (PCM), range	
See table in earlier section for a calculation of the average residential air concentration of asbestos found in Libby.			
In home asbestos levels are from Table, page 10 of risk assessment, Weis, C. P., Senior Toxicologist/Science Support Coordinator, U.S. EPA (December 20, 2001) Excerpts from: Amphibole mineral fibers in source materials in residential and commercial areas of Libby pose an imminent and substantial endangerment to public health. Posted at: http://www.epa.gov/region8/superfund/libby/riskassess.html			

Typical background air levels are lower than Region 2's detection limits

The typical concentrations of asbestos in air are much, much lower than Region 2's testing sensitivity (detection limits). The following table gives typical indoor and outdoor air concentrations from the Agency for Toxic Substances and Disease Control (ATSDR) of the Centers for Disease Control.

Region 2's detection limits are 550 to 2150 times higher than typical background air levels for asbestos. Thus, we have no idea at this time whether the air in New York City has returned to normal.

ATSDR TYPICAL AIR LEVELS COMPARED TO REGION 2 DETECTION LIMITS	
Region 2 detection limits are 550 to 2150 times higher than typical air levels	
0.0011 to 0.0043 f/mL (PCM)	range of detection limits for Region 2 tests
0.000002 f/mL (PCM)	typical outside air, urban and rural (background)
0.000003 f/mL (PCM)	typical inside air (background)
Source: Table 5-2, ATSDR (2000) Toxicological Profile for Asbestos, Centers for Disease Control, ATSDR. Available by calling 1-888-42-ATSDR. Currently, only the final draft version is posted at www.atsdr.cdc.gov/toxprofiles/tp61.html]	

Note that the concentrations are “PCM equivalents.” This means that only the fraction of asbestos that is over 5 micrometers long is included. If the total level of asbestos were given, it would be higher.

Urban air usually contains higher levels of asbestos just because of general pollution from brake linings and other sources. However, the ATSDR did not develop any specific overall estimate for urban air in particular. A few individual studies cited by the ATSDR generally showed that urban air contains 10 times more asbestos than rural air. The table above gives an average value for both urban and rural air.

These typical air concentrations represent the consensus of the ATSDR peer review process from evaluating many studies on background air concentrations by different researchers. Different scientist may have favorite studies that they like to cite for background levels of asbestos in air. However, the ATSDR conclusions about typical background levels must be referred to unless there is statistically significant data from a particular site before and after a contamination event. We do not have statistically significant air monitoring data at these low concentrations for many different locations in New York City prior to the collapse of the WTC.

70 s/mm² – AHERA must be used in combination with a leaf blower (aggressive testing) in an enclosed space to be relevant to predicting risks

- **The law (through implementing regulations) requires this combination**
- **You can't have one without the others**

The 70 s/square millimeter level must always be coupled with the use of a one-horsepower or greater leaf blower in an enclosed space, following a certified professional abatement, and other requirements. **YOU CAN'T HAVE ONE WITHOUT THE OTHER REQUIREMENTS.**

The regulations are explicit about aggressive testing:

40 CFR Part 763 Subpart E - Asbestos-Containing Materials in Schools

...

(1) At the conclusion of any action to remove, encapsulate, or enclose ACBM [asbestos containing building materials] ... A person designated by the local education agency shall collect air samples using aggressive sampling as described in appendix A ...

...

Appendix A ... The following appendix contains three units. The first unit is the mandatory transmission electron microscopy (TEM) method which all laboratories must follow ...

d. After the area has passed a thorough visual inspection, use aggressive sampling conditions to dislodge any remaining dust.

...

iii. Prior to air monitoring, floors, ceiling and walls shall be swept with the exhaust of a minimum one (1) horsepower leaf blower.

...

iv. Stationary fans are placed in locations which will not interfere with air monitoring equipment. Fan air is directed toward the ceiling. One fan shall be used for each 10,000 ft³ of worksite.

[emphasis added]

[The Code of Federal Regulations are available from most larger libraries, all law libraries, and also online at: <http://www.access.gpo.gov/nara/cfr/index.html>, or for EPA-regulations only (faster) at <http://www.epa.gov/epahome/cfr40.htm>]

Reasons why EPA and laboratories misuse the term “AHERA test”

EPA, laboratories, and contractors usually misuse the term “AHERA test.” There are several reasons for this.

First, the laboratory who receives the sample does not have any idea whether or not

the air sample was taken using the full AHERA protocols. The lab just looks at the form that the client filled out, and must assume that the air sampling followed the AHERA sampling protocols involving aggressive leaf blower testing followed by a fan, with the right amount of air being pumped through the filter, an enclosed space, after abatement, etc. The lab does its part only, following the AHERA counting protocols for classifying the different lengths and sizes of asbestos fibers and other requirements. The lab then generates a sheet saying “AHERA method” or some such equivalent statement.

When EPA or others look at the lab sheet, their belief that the whole testing procedure was actually according to the full AHERA protocols is reinforced.

There is another reason that EPA and others are confused about what constitutes a genuine AHERA asbestos test. This is because the 1985 version of the Purple Book is still being distributed by EPA. The Purple Book only states that the aggressive testing method is “recommended.” (US EPA (1985) Guidance for Controlling Asbestos-Containing Materials in Buildings, Office of Pesticides and Toxic Substances, Publication No. EPA 560/5-85-024.)

However, the aggressive method became mandatory in 1987, and was formally added to the AHERA regulations in the Code of Federal Regulations. (52 *Federal Register* 41826, October 30, 1987; 40 CFR §763 App. A.)

But the Purple Book has never been updated to reflect the change to the mandatory aggressive testing. Most asbestos abatement professionals and EPA staff only consult the Purple Book. They believe that aggressive testing is only recommended. This is unfortunate.

EPA developed the “aggressive leaf-blower/short term air test” to save time

– Previously, EPA required air sampling for at least 8 hours or more

The reason that EPA developed the AHERA TEM clearance test was to save time and costs. Previously, it required sampling the air for at least 8 hours, under “work day” conditions of human activity if possible, so that enough air would pass through the filter to collect enough asbestos fibers to detect:

Sampling for asbestos consists of collecting fibers by drawing air through a filter at a known rate. Usually sampling equipment is placed at a fixed location for a certain period of time. But this approach may fail to detect the presence of fibers. For example, if sampling is conducted for a short time during a quiet period (i.e., when air movement is limited), many fibers will settle out of the air onto the floor and other surfaces and may not be captured on the filter. Under these conditions, air measurements could show little or no asbestos.

Previously, EPA recommended sampling for at least eight hours to cover various

air circulation conditions and thus increase the likelihood of capturing asbestos fibers if they are present. A quicker and more effective way to accomplish this, however, is to circulate the air artificially so that the fibers remain airborne during sampling.

This “aggressive sampling” is recommended for the post-abatement air test. [Actually, the regulations at 40 CFR 763 Appendix A require it.] Recommended methods for conducting aggressive sampling are presented in Appendix M. They use forced-air equipment such as a leaf blower to dislodge free fibers then slow-speed fans to keep the fibers suspended during sampling.
[emphasis added]

[US EPA (1985) Guidance for Controlling Asbestos-Containing Materials in Buildings, Office of Pesticides and Toxic Substances, Publication No. EPA 560/5-85-024, Section 6.4.2.1. The “PURPLE BOOK” Available at no charge from: National Service Center for Environmental Publications (NSCEP), PO Box 42419 Cincinnati, OH 45242, 1-800-490-9198 or (513) 489-8190, Fax: (513) 489-8695, <http://www.epa.gov/ncepihom/>]

EPA found that using a leaf blower increased asbestos concentrations in air by thousands of times. It was a “worse case” scenario.

One study showed that using a leaf blower increased airborne asbestos concentrations over 100 times that caused by even vigorous broom cleaning. (Millette, J., *et al.* Applications of the ASTM Asbestos in Dust Method D5755. In: Advances in Environmental Measurement Methods for Asbestos, ASTM Special Technical Publication 1342.) And vigorous broom cleaning has been demonstrated to increase asbestos levels hundreds or thousands of times over that of passive conditions which do not disturb dusts.

EPA did not test air indoors, or air where children actually breathe

EPA only tested air outdoors after the WTC disaster, and did nothing to test indoors. The New York City Department of Health, who claimed to have responsibility for the indoor environment, did not test air indoors, but left it up to the building owners and occupants.

EPA Headquarters has acknowledged now that its outdoor testing was irrelevant to showing asbestos levels indoors. On February 12, EPA Administrator Christine Whitman wrote to Senator Hilary Clinton, stating:

Of course, the environmental issues of concern to those who live, work, and visit Lower Manhattan are not limited to outdoor air quality issues. People are also justly concerned about indoor environmental quality. The enormous amount of particulates released by the collapse of the World Trade Center towers permeated many of the surrounding buildings, including apartments, offices, and other indoor spaces throughout the area surrounding Ground Zero.

As you may recall, in the days immediately following September 11th, the City of New York assumed responsibility for indoor environmental quality. ... Despite the City's best efforts to address indoor environmental issues, it is apparent that many concerns and challenges remain. I am committed to providing additional assistance to the City and its residents and stand ready to do so. In addition, as you suggested yesterday, I will be working with our local, state, and federal partners to establish a Task Force on Indoor Air in Lower Manhattan, so that we can move as quickly as possible to address the remaining concerns we all share.

Even if testing is done at the low levels associated with asbestos health effects (0.000004 f/mL (PCM)), there must be human activities or simulated human activities in the same room at the same time of the testing. When testing airborne asbestos levels inside homes in Libby, Montana, the Superfund site, EPA had both stationary air monitors and monitors worn by residents going about their normal daily activities. The monitors worn by the people picked up higher concentrations of asbestos than the stationary monitors in the same rooms sampling air at the same times. See the risk assessment for the Libby site for a description, posted at: <http://www.epa.gov/region8/superfund/libby/riskassess.html> .

Another study showed that asbestos concentrations in air can be undetectable or below 0.005 s/mL when there are no activities in the room to stir up dusts, but as high as 0.09 to 54 s/mL when activities such as vacuuming, broom sweeping, gym activities, etc. are going on in the room to disturb the dusts. (Millette, J. R., and Hays, S. M. (1994), Chapter 8, Resuspension of Settled Dust, in: *Settled Asbestos Dust Sampling and Analysis*, page 63, Table 2, Lewis Publishers, ISBN 0-87371-948-4.)

To date, Region 2's tests of outdoor air are irrelevant to determining the concentration of asbestos in indoor air, because outdoor air becomes diluted with other air. Indoors, however, asbestos dust in a confined space will result in much higher asbestos concentrations.

Furthermore, the recent tests on indoor air performed by the Agency for Toxic Substances and Disease Registry (ATSDR), part of the Centers for Disease Control, at the request of the New York City Department of Health (NYC DOH) are also inadequate, in all probability. The NYC DOH, while not releasing the actual results, claims that the ATSDR tests showed no elevated air levels. We can assume that the NYC DOH is contending that the 70 s/mm² level, or 0.01 f/mL (PCM) is what is safe, because testimony of Thomas Frieden, Commissioner of the NYC DOH on February 11, 2002 made these assertions.

An earlier section above shows that this 70 s/mm² level is higher than even found at the Libby, Montana Superfund site.

The following table gives the legal/legitimate and illegal/illegitimate ways to determine whether asbestos levels in air in homes, offices, or schools meets EPA standards:

LEGAL/LEGITIMATE AIRBORNE ASBESTOS TESTING METHODS		ILLEGAL/ILLEGITIMATE AIRBORNE ASBESTOS TESTING METHODS	
0.000004 f/mL (PCM) laboratory sensitivity (detection limit), the EPA 10 ⁻⁶ risk level	0.01 f/mL (PCM) = 0.02 s/mL (all fibers) = 70 structures per square millimeter	0.000004 f/mL (PCM) laboratory sensitivity (detection limit), the EPA 10 ⁻⁶ risk level	0.01 f/mL (PCM) = 0.02 s/mL (all fibers) = 70 structures per square millimeter
Conditions of actual or simulated human activities, such as a child jumping on a contaminated couch or rolling around on contaminated carpet	Testing for this level ONLY AFTER the following conditions, as required by 40 CFR 763: 1. Completion of professional certified asbestos abatement 2. Suspension of dusts by using one-horsepower leaf blower followed by fans during actual testing.	Passive conditions, <i>i.e.</i> , no activities to disturb dusts to cause them to be airborne.	This level under either passive testing conditions (no human activity) or even normal human activities

ASBESTOS IN SETTLED SURFACE DUSTS AND SOILS

EPA Region 2 claims that 1% is the safe level for asbestos in dusts lying on surfaces or in soils

EPA Region 2 has repeatedly claimed only dusts from the WTC collapse containing 1% or more asbestos should be treated as hazardous, strongly implying that 1% is the safe level:

In Dust. If a substance contains 1% or more asbestos, it is considered to be an "asbestos-containing material." There are federal regulations in place to ensure the proper handling and disposal of asbestos-containing material. If a substance contains less than 1% asbestos, these regulations do not apply.

EPA is using the 1% definition in evaluating dust samples from in and around ground zero. The vast majority of the samples taken to date have levels of asbestos below 1%. In fact, in an urban environment like New York City, we can expect the presence of a low level of asbestos under normal circumstances (these low everyday levels are called "background levels").

[EPA website on September 11 Response posted at <http://www.epa.gov/epahome/wtc/activities.htm>]

Regional Counsel for EPA's Region 2 made the following assertions:

EPA has two sets of regulations that deal with asbestos ... neither set of regulations is directly applicable to the conditions in the wake of the WTC disaster ... The first set of asbestos-related regulations are part of the National Emission Standards for Hazardous Air Pollutants (NESHAPs) ... pursuant to ... the Clean Air Act ... The second set of regulations are those promulgated by EPA pursuant to the Asbestos Hazard Emergency Response Act (AHERA) ...

Both sets of regulations include a definition and standard for "asbestos-containing material." ...

One of the first decisions that EPA had to make when sampling for asbestos in the dust from the WTC collapse was what reference value to use when reporting the data – in other words, at what concentration of asbestos in the bulk dust samples would the Agency characterize the dust as containing asbestos in quantities of significance? EPA elected to use the definition of ACM [asbestos containing material] from the NESHAPs regulations – *i.e.*, the 1% asbestos content standard.

[Mugdan, Walter E., Esq. (January 25, 2002) Environmental law issues raised by terrorist events in 2001. Speech before the NY Bar Association. Posted at www.NYenviroLAW.org]

Under the EPA NESHAP, 1% asbestos is not considered a safe level

- 1% only applies when defining the asbestos-containing building material itself**
- Region 2 Counsel agrees that 1% is not related to health risks**
- Region 2 Counsel states that 1% is only the detection limit of a crude method, PLM, that lacks sensitivity to test for lower levels**
- Region 2 Counsel, however, fails to state that EPA policy requires a more sensitive method, TEM, for settled dusts and other solids**

In guidance under the Clean Air Act asbestos NESHAP, the EPA clearly states that the 1% level is only to be used to determine whether a building material itself contains asbestos, and that 1% is not a safe level, or a “standard.” Under the NESHAP, any dusts or contamination resulting from the use of building materials containing asbestos, which are called emissions, are regulated at much, much lower concentrations of asbestos in the dusts themselves.

In April 1973, the US Environmental Protection Agency (EPA) issued the National Emission Standards for Hazardous Air Pollutants (NESHAP) for asbestos (38 FR 8820). The NESHAP regulation governs the removal, demolition and disposal of asbestos containing bulk waste. An asbestos-containing product, as stated by the regulation was defined for the first time to be a product with greater than 1% asbestos, by weight. The intent of the 1% limit was:

... to ban the use of materials which contain significant quantities of asbestos, but to allow the use of materials which would (1) contain trace amounts of asbestos which occur in numerous natural substances, and (2) include very small quantities of asbestos (less than 1 percent) added to enhance the material's effectiveness. (38 FR 8821).

It must be clearly understood that the EPA NESHAP definition of 1% by weight was not established to be a health-based standard.

[emphasis added]

[US EPA (April 18, 1989) Interim Asbestos NESHAP Enforcement Guidance - “Friable asbestos” 1% by Area of Volume vs. 1% by Weight. Office of Enforcement and Compliance Monitoring EPA Publication No. EPA 560/5-88-001. Available online at: <http://es.epa.gov/oeca/ore/aed/comp/ecom/e6.html>]

Region 2 Counsel agrees that the 1% level is not a safety standard, contradicting the other Region 2 claims. He states that this level only relates to the detection limit of the method that Region 2 chose to use in Lower Manhattan, the crude PLM method.

Note that the 1% standard is not necessarily health- or risk-based, but rather keyed to the detection limits of the specified analytical method.

[Mugdan, Walter E. (January 25, 2002) Environmental law issues raised by terrorist events. Speech before the NY Bar Association, NYC. Walter Mugdan is Regional Counsel for EPA Region 2.

However, what Region 2 Counsel fails to admit is the fact that more sensitive test methods, namely TEM, is required by official EPA policy when the less sensitive test, PLM, fails to show the presence of asbestos. See later sections on the EPA guidance requiring TEM testing of settled dusts and other solid materials.

In Superfund guidance, EPA found 1% asbestos or lower is hazardous

In guidance for Superfund cleanup actions, EPA has also stated that less than 1% asbestos in soils could present hazards:

Questions and Answers about Asbestos and EPA's Libby Investigation

Q : I recently read that EPA found less than 1% (or trace levels) asbestos at Fireman's Park and other locations that were sampled. Is that a safe level?

A : This is a very difficult question, and at this time we are not sure. Levels at 1% or less may be safe. Even higher levels could be considered safe at remote locations where no one comes in contact with the material. The key to determining whether there is a risk is exposure. If there is no exposure pathway i.e., a way for the asbestos to get into your body, such as contact with the material, or people driving over the material so that they breathe in the fibers, there is no risk. Levels of 1% or less could present a risk where there is enough activity to stir up soil and cause asbestos fibers to become airborne.

www.epa.gov/region8/superfund/libby/qsafe.html]

Soils containing only 0.001% asbestos can lead to hazardous air levels

One study found that soils containing only 0.001% asbestos can lead to air concentrations of 0.01 fibers per milliliter (f/mL) (PCM). As seen from the preceding section on asbestos in air, this level of 0.01 f/mL is many times over either the EPA one-in-a-million cancer risk level of 0.000004 f/mL (PCM), or the typical background levels of asbestos in outdoor air of 0.000002 f/mL (PCM); or indoor air of 0.000003 f/mL (PCM).

Suitable Action Levels ... Airborne dust clouds were generated from mixtures of soils with different asbestos varieties in bulk concentrations ranging from 1 to 0.001 % asbestos. ... The experiments showed very clearly that even the lowest bulk amphibole asbestos content tested (0.001%) was still capable of producing measurable airborne asbestos concentrations (greater than 0.01 fibers ml⁻¹).

[Addison, J. (1995) Vermiculite: A review of the mineralogy and health effects of vermiculite exploitation. Reg. Tox. and Pharm. 21: 397 - 405]

Decontamination of demolition sites must be cleaned up to background, not just 1%, under the EPA asbestos NESHAP

Under EPA's NESHAP, the surrounding soils around a demolition site must be cleaned up to background levels of asbestos.

Region 2 has attempted to draw guidance from these NESHAPs regulations, citing them in its justification for claiming that 1% is the cleanup level, drawing an analogy to the regulations for the asbestos containing building materials themselves.

The correct analogy, however, would be to compare what is required for soils surrounding a demolition site, where the WTC is considered the demolition site. As seen below, the surrounding soils are required to be cleaned up to background levels, not 1%.

Decontamination of Demolition Site

If the surrounding soil has been contaminated by the demolition activities at the site, the site must be cleaned up to background levels of asbestos contamination. Alternatively, the site may be operated in accordance with section 61.154 (Standard for active waste disposal sites) and closed in accordance with section 61.151 (Standard for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations). However, according to 40 CFR 61.05, the establishment of an active waste site requires prior approval from EPA or the delegated State program. To clean up the site to background levels, it will probably be necessary to remove all the asbestos contaminated soil. The contaminated soil should be treated and disposed of as asbestos-containing waste material.

Decontamination of Area Surrounding Demolition Site

If a site assessment detects contamination of soil surrounding a demolition site, the site must be cleaned up to background levels of asbestos contamination. Alternatively, the site may be operated in accordance with section 61.154 (Standard for active waste disposal sites) and closed in accordance with section 61.151 (Standard for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations). However, according to 40 CFR 61.05, the establishment of an active waste site requires prior approval from EPA or the delegated State program. To clean up the site to background levels, it will probably be necessary to remove all the asbestos contaminated soil. The contaminated soil should be treated and disposed of as asbestos-containing waste material.

[emphasis added]

[US EPA (1994) Asbestos/NESHAP Demolition Decision Tree. EPA Manufacturing, Energy, and Transportation Division, Office of Compliance. Available from the EPA OPPTS Ombudsman's office]

Region 2 would need to establish background levels for soils and dusts by measuring enough samples from other parts of the city and surrounding suburbs using sensitive testing. As shown later, the required laboratory method would be TEM analyses for bulk soils and dusts, according to EPA policy under both AHERA and the NESHAP.

The Agency for Toxic Substances and Disease Registry found no studies measuring typical soil background levels of asbestos. From a limited additional literature search, I also found no studies. Thus, I am not able to provide data for typical soil levels or background levels for asbestos. (ATSDR (2000) Toxicological Profile for Asbestos, Centers for Disease Control, ATSDR. Available by calling 1-888-42-ATSDR. At this time, only the final draft version is posted on the internet at www.atsdr.cdc.gov/toxprofiles/tp61.html)

Under both the EPA NESHAP and AHERA regulations, ZERO emissions of asbestos-contaminated dusts is required, not emissions containing only 1% asbestos or less

Under both the asbestos NESHAP and AHERA regulations, ZERO emissions of asbestos-containing dusts are required, not “emissions of dusts containing less than 1% asbestos.”

In the collapse of the WTC, the airborne dusts are also analogous to the dust emissions from the transport or disposal of asbestos wastes under AHERA or the NESHAP. From the above section, they are probably more analogous to contaminated soils around a demolition site. They are not, however, as Region 2 is trying to argue, analogous to the original building materials themselves where the 1% rule applies..

The requirement for zero emissions, not emissions of dusts containing less than 1% asbestos, is made clear in the following guidance and regulations:

[NESHAP] Q: Is there a numeric emission limit for the release of asbestos fibers during renovations or demolitions in the asbestos NESHAP regulation?

A: No, the Asbestos NESHAP relating to demolitions or renovations is a work practice standard. This means that it does not place specific numerical emission limitations for asbestos fibers on asbestos demolitions and removals. Instead, it requires specific actions be taken to control emissions. However, the Asbestos NESHAP does specify zero visible emissions to the outside air from activity relating to the transport and disposal of asbestos waste.
[emphasis added]

[US EPA. Common Questions on the Asbestos NESHAP. Posted at <http://www.epa.gov/opptintr/asbestos/neshap.pdf>]

[NESHAP] 40 CFR §61.144 Standard for manufacturing. ...

(b) *Standard*. Each owner or operator of any of the manufacturing operations to which this section applies shall either:

(1) Discharge no visible emissions to the outside air from these operations or from any building or structure in which they are conducted or from any other fugitive sources; or

(2) Use the methods specified by §61.152 to clean emissions from these operations containing particulate asbestos material before they escape to, or are

vented to, the outside air.

(3) Monitor each potential source of asbestos emissions from any part of the manufacturing facility, including air cleaning devices, process equipment, and buildings housing material processing and handling equipment ...

[AHERA] 40 CFR § 763 - Appendix D to Subpart E -- Transport and Disposal of Asbestos Waste

For the purposes of this appendix, transport is defined as all activities from receipt of the containerized asbestos waste at the generation site until it has been unloaded at the disposal site. Current EPA regulations state that there must be no visible emissions to the outside air during waste transport. However, recognizing the potential hazards and subsequent liabilities associated with exposure, the following additional precautions are recommended.

[*emphasis added*]

[The Code of Federal Regulations are available from most larger libraries, all law libraries, and also online at: <http://www.access.gpo.gov/nara/cfr/index.html>, or for EPA-only (faster) at <http://www.epa.gov/epahome/cfr40.htm>]

The regulations themselves define the building materials as those containing 1% or more asbestos, and the dusts emanating from these materials are defined as emissions or debris. The 1% regulations do not apply to the emissions.

[AHERA] 40 CFR §763.83 Definitions. For purposes of this subpart: *Act* means the Toxic Substances Control Act (TSCA), 15 U.S.C. 2601, *et seq.* ...

Asbestos-containing material (ACM) when referring to school buildings means any material or product which contains more than 1 percent asbestos.

Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a school building. Asbestos debris means pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM. ...

Fiber release episode means any uncontrolled or unintentional disturbance of ACBM resulting in visible emission.

4. "Major fiber release episode" means any uncontrolled or unintentional disturbance of ACBM, resulting in a visible emission, which involves the falling or dislodging of more than 3 square or linear feet of friable ACBM.

5. "Minor fiber release episode" means any uncontrolled or unintentional disturbance of ACBM, resulting in a visible emission, which involves the falling or dislodging of 3 square or linear feet or less of friable ACBM.

[NESHAP] 40 CFR §61.141 Definitions. ...

Category I nonfriable asbestos-containing material (ACM) means asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products containing more than 1 percent asbestos ...

Category II nonfriable ACM means any material, excluding Category I nonfriable ACM, containing more than 1 percent asbestos ...

Fugitive source means any source of emissions not controlled by an air pollution control device. ...

Visible emissions means any emissions, which are visually detectable without the aid of instruments, coming from RACM [regulated asbestos containing material] or asbestos-containing waste material, or from any asbestos milling,

manufacturing, or fabricating operation. This does not include condensed, uncombined water vapor.

[*emphasis added*]

[The Code of Federal Regulations are available from most larger libraries, all law libraries, and also online at: <http://www.access.gpo.gov/nara/cfr/index.html>, or for EPA-only (faster) at <http://www.epa.gov/epahome/cfr40.htm>]

EPA guidance requires the most sensitive method, transmission electron microscopy (TEM), for certain bulk materials under both the asbestos NESHAP and AHERA

– Region 2 only used the less sensitive method, PLM, in violation of EPA policy

EPA advises against the use of polarized light microscopy (PLM) for those situations where the asbestos fibers are thin and cannot be detected by PLM. EPA has issued guidance for the use of a more sensitive test method for bulk materials (building materials, dusts and soils lying on surfaces) using transmission electron microscopy (TEM).

The asbestos fibers from the WTC are primarily of the chrysotile category, where many of the fibers are thin and cannot be detected using PLM. TEM is the more sensitive method that can detect them in settled dusts, soils, and other solid materials, as well as in air.

In 1994, EPA issued guidance to offer added precaution and protection for workers and building occupants under both the asbestos in schools rule (AHERA) and the Clean Air Act asbestos NESHAPS for the improved method for the analysis of bulk samples. EPA recommended that if any materials were found not to contain asbestos by the old method (PLM, polarized light microscopy) should be retested using transmission electron microscopy (TEM).

Abstracts of the EPA advisory from the *Federal Register* follow:

This notice announces the availability of an improved asbestos bulk sample analysis test method for use with bulk samples collected for identification of asbestos-containing materials under the Asbestos Hazard Emergency Response Act (AHERA) regulations and the asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP).

...

The test method provides clarifications and improvements to the 1982 EPA "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (as found in 40 CFR part 763 Appendix A to Subpart F). Specifically, use of the improved method can provide more precise analytical results especially at low asbestos concentrations, enhanced analysis of floor tiles which may contain thin asbestos fibers below the limits of resolution of the polarized light microscope (PLM), and clearer instruction on the analysis of bulk materials, particularly where

multiple layers are present.

The 1982 method is limited in that it does not provide guidance for analyzing materials that contain thin (<0.25 micrometers) asbestos fibers. As a consequence, floor tiles which were analyzed according to the 1982 method and for which negative results were reported may actually contain undetected asbestos. At this time EPA does not have data to support identification of other materials which may have thin fibers.

The improved method addresses the thin fiber limitation of the 1982 method by providing directions for using transmission electron microscopy (TEM). The test method includes improved procedures for reducing matrices so that fibers may be made available for microscopic analysis.

In light of the availability of the improved method, EPA recommends that local education agencies (LEAs) use the improved method in place of the 1982 procedures as found in 40 CFR part 763 Appendix A to Subpart F. EPA has made the determination that the improved method is more capable of producing accurate results than the 1982 protocol and thus serves as a preferred substitute method. Further, EPA recommends that LEAs which have PLM laboratory results indicating floor tiles to be non-asbestos-containing (asbestos present in less than or equal to 1 percent) reconsider whether these materials may have thin asbestos fibers.

...

Before undertaking activities which might trigger asbestos NESHAP requirements, it is recommended that LEAs consider resampling multi-layered materials which have been found to be nonasbestos-containing for AHERA purposes or assume them to be asbestos-containing prior to disturbance according to the guidelines set forth in this current notice, in the January 5, 1994 NESHAP *Federal Register* notice, and in the improved analytical method to avoid potential violation of the asbestos NESHAP.

[emphasis added]

[FR notice is posted at

<http://yosemite.epa.gov/R10/OWCM.NSF/d14dabb756dc1fb388256500062f164/878a5d97c3853a2e882566dd0056fee7?OpenDocument> .

This guidance was published in the *Federal Register* for AHERA on August 1, 1994 (59 FR 38970), and for the asbestos NESHAP on January 5, 1994 (59 FR 542). 1994 FR is posted at http://www.access.gpo.gov/su_docs/multidb.html . See also the Asbestos Sampling Bulletin, 1994 EPA Order Number: EPA745K94058, US EPA Environmental Assistance Division, TSCA Assistance Information Service Hotline, 1200 Pennsylvania Ave NW (7408), Washington, DC 20460, Phone Number: 202-554-1404, Fax Number: 202-554-5603]

EPA NESHAP regulations require testing by the sensitive TEM method for asbestos-derived wastes to determine if they asbestos free

- The asbestos-free level is “no asbestos detected by TEM” – not 1%**

The NESHAP regulations themselves require the use of transmission electron microscopy (TEM) to determine whether wastes can be considered “asbestos free.” The standard for being asbestos free is not 1%, but instead no detectable asbestos by the most sensitive test method, TEM. The use of polarized light microscopy (PLM) is not sufficient according to the regulations, because this method cannot reliably

determine asbestos at concentrations less than 1%, and because this method cannot detect the thinner, smaller asbestos fibers, such as chrysotile.

[NESHAP] 40 CFR § 61

§61.155 Standard for operations that convert asbestos-containing waste material into nonasbestos (asbestos-free) material.

Each owner or operator of an operation that converts RACM and asbestos-containing waste material into nonasbestos (asbestos free) material shall: (a) Obtain the prior written approval of the Administrator to construct the facility.... In addition to the information requirements of §61.07(b)(3), a (i) Description of waste feed handling and temporary storage. (ii) Description of process operating conditions. (iii) Description of the handling and temporary storage of the end product. (iv) Description of the protocol to be followed when analyzing output materials by transmission electron microscopy.

...

(b) Conduct a start-up performance test. Test results shall include:

(1) A detailed description of the types and quantities of nonasbestos material, RACM, and asbestos-containing waste material processed, e.g., asbestos cement products, friable asbestos insulation, plaster, wood, plastic, wire, etc. Test feed is to include the full range of materials that will be encountered in actual operation of the process.

(2) Results of analyses, using polarized light microscopy, that document the asbestos content of the wastes processed.

(3) Results of analyses, using transmission electron microscopy [TEM], that document that the output materials are free of asbestos. Samples for analysis are to be collected as 8-hour composite samples (one 200-gram (7-ounce) sample per hour), beginning with the initial introduction of RACM or asbestos-containing waste material and continuing until the end of the performance test.

...

(c) During the initial 90 days of operation ... (2) Monitor input materials to ensure that they are consistent with the test feed materials described during start-up performance tests in paragraph (b)(1) of this section. (3) Collect and analyze samples, taken as 10-day composite samples (one 200-gram (7-ounce) sample collected every 8 hours of operation) of all output material for the presence of asbestos. Composite samples may be for fewer than 10 days. Transmission electron microscopy (TEM) shall be used to analyze the output material for the presence of asbestos. During the initial 90-day period, all output materials must be stored on-site until analysis shows the material to be asbestos-free or disposed of as asbestos-containing waste material according to §61.150....

(h) Nonasbestos (asbestos-free) output material is not subject to any of the provisions of this subpart. Output materials in which asbestos is detected, or output materials produced when the operating parameters deviated from those established during the startup performance testing, unless shown by TEM analysis to be asbestos-free, shall be considered to be asbestos-containing waste and shall be handled and disposed of according to §§61.150 and 61.154 or reprocessed while all of the established operating parameters are being met.

[emphasis added]

[The Code of Federal Regulations are available from most larger libraries, all law libraries, and also online at: <http://www.access.gpo.gov/nara/cfr/index.html>, or for EPA-only (faster) at <http://www.epa.gov/epahome/cfr40.htm>]

OSHA regulations recommend TEM analyses of settled, bulk dusts

The Occupational Safety and Health Administration (OSHA) also recommends the use of sensitive TEM analyses for settled, bulk dusts and other solid asbestos materials. The following are the relevant OSHA regulations:

[OSHA] 29 CFR 1926.1101 Appendix A -Polarized Light Microscopy of Asbestos - Non-Mandatory

...

Light microscopy has been used for well over 100 years for the determination of mineral species. This analysis is carried out using specialized polarizing microscopes [PLM] as well as bright field microscopes. ...

When electron microscopy was applied to asbestos analysis, hundreds of fibers were discovered present too small to be visible in any light microscope [such as PLM]. There are two different types of electron microscope used for asbestos analysis: Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM). Scanning Electron Microscopy is useful in identifying minerals. The SEM can provide two of the three pieces of information required to identify fibers by electron microscopy: morphology and chemistry. The third is structure as determined by Selected Area Electron Diffraction -- SAED which is performed in the TEM. Although the resolution of the SEM is sufficient for very fine fibers to be seen, accuracy of chemical analysis that can be performed on the fibers varies with fiber diameter in fibers of less than 0.2 um diameter. The TEM is a powerful tool to identify fibers too small to be resolved by light microscopy and should be used in conjunction with this method when necessary. The TEM can provide all three pieces of information required for fiber identification. Most fibers thicker than 1 um can adequately be defined in the light microscope.

The light microscope remains as the best instrument for the determination of mineral type. This is because the minerals under investigation were first described analytically with the light microscope. It is inexpensive and gives positive identification for most samples analyzed. Further, when optical techniques [PLM] are inadequate, there is ample indication that alternative techniques [TEM and SEM] should be used for complete identification of the sample.

[emphasis added]

[Code of Federal Regulations posted at either OSHA site at http://www.osha.gov/OshStd_toc/OSHA_Std_toc.html or <http://www.access.gpo.gov/nara/cfr/cfr-table-search.html>]

Settled dusts in Lower Manhattan had higher asbestos than soils in Libby, MT

– Region 2 claims that asbestos levels are “low” in Manhattan dust

The settled dusts in Lower Manhattan tested in the early days after the WTC collapse had higher concentrations of asbestos than outdoor soils in the town of Libby, Montana, the Superfund site.

Around 35% of the samples of bulk dust taken in Lower Manhattan in the first few days after the collapse exceeded the 1% level.

[Mugdan, Walter E. (January 25, 2002) Environmental law issues raised by terrorist events. Speech before the NY Bar Association, NYC. Walter Mugdan is Regional Counsel for EPA Region 2. Posted at www.NYenviroLAW.org]

There was a higher percentage of samples that had over 1% asbestos from the WTC than soils in Libby, Montana, the town that is a Superfund site. The concentrations of asbestos, when the asbestos was found, are the same in Libby as in Lower Manhattan. In Libby, soils from yards from residences, etc., are being removed because of the asbestos hazard they pose.

The following table compares the WTC dust levels to soils in Libby.

COMPARISON OF WTC DUST CONTAMINATION WITH ASBESTOS IN YARD SOILS AT LIBBY SUPERFUND SITE		
Outdoor dusts or soils	Percent samples with 1% or higher asbestos	Levels of asbestos that were over 1%
Lower Manhattan, first few days	35 %	1 - 4.5 %
Libby, Montana, soils from yards	2.6 %	1 - 5 %

Table 1, page 6 of risk assessment, Weis, C. P., Senior Toxicologist/Science Support Coordinator, U.S. EPA (December 20, 2001) Excerpts from: Amphibole mineral fibers in source materials in residential and commercial areas of Libby pose an imminent and substantial endangerment to public health. Posted at: <http://www.epa.gov/region8/superfund/libby/riskassess.html>

Mugdan, Walter E. (January 25, 2002) Environmental law issues raised by terrorist events. Speech before the NY Bar Association, NYC. Walter Mugdan is Regional Counsel for EPA Region 2. Posted at www.NYenviroLAW.org

Region 2 Counsel has claimed that the asbestos concentration in WTC dusts was low and not a health hazard. This directly contradicts the findings of the extensive risk assessment for Libby where the same concentrations, occurring less frequently, were the basis for placing Libby on the Superfund list:

By contrast, when WTC dust was found to contain concentrations in excess of 1%, it was nevertheless still quite low – typically between 1% and 4%.

[Mugdan, Walter E. (January 25, 2002) Environmental law issues raised by terrorist events. Speech before the NY Bar Association, NYC. Walter Mugdan is Regional Counsel for EPA Region 2. Posted at www.NYenviroLAW.org]

Dusts from the collapse of the WTC present more risk than soils in Libby because they are a finely divided surface dust with no vegetation to hold them in place. Although the dusts from the WTC have now been removed to some extent, we do not know how effective the removal is to date, or whether dusts have been effectively removed from roofs, which have a larger surface area than the streets in Lower Manhattan.

REGION 2 ASBESTOS ABATEMENT AT THEIR OWN 290 BROADWAY BUILDING

EPA Region 2 had positive results from sensitive TEM testing for its own building and on this basis decided to abate for asbestos

- Less sensitive PLM tests, the only one used for bulk dusts for the rest of Manhattan, were negative for the Region 2 building**
- But for the results from the more sensitive tests, Region 2 would not have abated asbestos from its building**
- TEM tests for bulk dust are required by EPA policy, but Region 2 did not use these tests for the rest of Manhattan**
- EPA Region 2 was offered free access to similar more sensitive testing (SEM) by Region 8 for the rest of Manhattan but refused**
- The same, more sensitive test method (SEM) was used after the first bombing of the WTC in 1993, but Region 2 refused it after the WTC**

EPA had positive results for settled asbestos in its own building at 290 Broadway from a very sensitive test, transmission electron microscopy (TEM). This test is able to detect asbestos in much lower concentrations and is able to detect much smaller asbestos fibers than the older method, PLM.

But for the fact that Region 2 had the results of this more sensitive method, TEM on settled dusts, it would have taken no action to clean its building. This is because the results of the other tests, the air tests and the PLM tests of the settled dusts, were negative.

On the basis of the results of the sensitive test, EPA cleaned the lobby of its building with HEPA vacuum trucks, and also cleaned the lobbies of other buildings in the area. The General Services Administration also cleaned the EPA building, using wet-wiping methods using standard janitorial services. The filters on the air handling equipment were also changed, even though tests showed no detectable asbestos in these filters. EPA employees were “displaced” for a week (employees evacuated from their offices) during these unusual cleaning operations.

The air both outside the entrance to the building, as well as inside the lobby, were monitored for asbestos before and after the cleaning procedures. Although Region 2

is not calling these cleaning procedures “professional abatement,” they appear not to differ from what other Manhattan residents have paid to have performed on their apartments.

In marked contrast, Region 2 only performed PLM tests for bulk dusts on the ground for the rest of Manhattan and other parts of New York City and the surrounding boroughs. This is despite the fact that EPA has issued guidance under both the asbestos in schools rule (ASHERA) and the Clean Air Act asbestos NESHAPS for the use of TEM for bulk materials, such as settled dusts or other solids. It is EPA policy that if any materials were found not to contain asbestos by the old method (PLM, polarized light microscopy) should be retested using transmission electron microscopy (TEM). This guidance was published in the *Federal Register* and was summarized in a preceding section.

This improved TEM method was developed to address situations where small, thin fibers are present, which are frequently not detected by the magnification and resolution limits of PLM. Since the primary form of asbestos from the WTC is chrysotile, and since chrysotile has thin fibers that cannot always be detected by the older, cruder PLM method, the improved TEM method should have been used for the rest of Manhattan.

Scanning electron microscopy (SEM) is similar to TEM in its ability to detect the thin fibers of chrysotile asbestos. Chrysotile asbestos is the primary form of asbestos found from the WTC collapse.

EPA Region 8 offered Region 2 free SEM analytical capabilities for the evaluation of bulk asbestos dusts after the WTC collapse. In a September 12 conference call, Region 8 offered the use of 30 to 40 SEM's, along with analysts. Region 8 had a contract with EMSL Laboratories for the SEM's, since they were using them to evaluate soils at the Libby, Montana Superfund site. Region 8 was willing to divert its resources to Region 2 to assist after the disaster. Twelve of the SEM's were close by and could have been in Manhattan the next day. However, Region 2 refused the offer.

The figure shows graphically the difference in the testing methods used at the EPA Region 2 building, for the rest of Manhattan after the WTC collapse, what was offered to Region 8 but refused, and what was used after the bombing of the WTC in 1993.

DIFFERENCE IN TESTING METHODS AND SENSITIVITIES FOR:

- EPA Region 2 building at 290 Broadway
- All of Manhattan and surrounding NYC after WTC collapse
- After the first bombing of the World Trade Center

<p>TEM low sensitivity air tests using transmission electron microscope (TEM) lab instruments</p>	<p>Air</p>	<p>NEGATIVE at Region 2 building, 290 Broadway, inside and outside lobby, except 1 sample out of the 47 had 25 s/mm², below what Region 2 calls "safe." The detection limits (sensitivities) of the air tests ranged from 16.7 - 25 s/mm²</p>	<p style="text-align: center;">M A N H A T T A N</p> <p style="text-align: center;">2 9 0 B r o a d w a y</p> <p style="text-align: center;">E P A</p>
<p>PLM low sensitivity polarizing light microscopes which can see only larger asbestos fibers and can only reliably give concentrations for 1% or higher</p>	<p>Dusts on Surfaces and bulk dusts</p>	<p>NEGATIVE at Region 2 building, 290 Broadway</p>	
<p>TEM high sensitivity transmission electron microscopes which can see the smaller asbestos fibers and can also see them in much lower concentrations in dusts, probably lower than 0.001%. See 59 FR 38970 for AHERA and 59 FR 542 for NESHAP requirement to use TEM on solid bulk materials.</p>	<p>Dusts on surfaces and bulk dusts</p>	<p>POSITIVE at Region 2 building, 290 Broadway. EPA guidance requires TEM on dusts and other bulk materials for thin fibers under both AHERA and the NESHAP</p>	

<p>SEM high sensitivity scanning electron microscopes which can see the smaller asbestos fibers and can also see them in much lower concentrations in dusts, probably lower than 0.001%</p>	<p>Dusts on surfaces and bulk dusts</p>	<p>Offered to EPA Region 2 by Region 8 for free for Manhattan after WTC collapse. Also used after first bombing of WTC in 1993</p>
--	--	---

The following are excerpts from the report summarizing the asbestos testing and actions taken at the Region 2 building. The testing was performed under contract to the General Services Administration, who had overall responsibility for the maintenance of the building.

On 13 September 2001, air sampling was performed in the building by Phase Contrast Microscopy (PCM), and by Transmission Electron Microscopy (TEM). All of the PCM results were less than 0.01 fibers per cubic centimeter (f/cc), and all of the TEM sample results were No Asbestos Structures Detected (NSD). On 14 September 2001 Stratus Corporation was directed to collect two TEM air samples, and "wipe" samples inside and outside the building lobby, as well as to collect some bulk samples from W A C filters. These samples were collected to determine if asbestos fibers are now present within the dust around the area. After consulting with the laboratory, it was decided that the following types of samples would be collected:

1. Vacuum Samples - These are samples where a normal asbestos air sampling cassette is attached to a pump, and used like a small vacuum cleaner. ... The material collected can then be analyzed for asbestos by Qualitative Polarized Light Microscopy [PLM], and Qualitative Transmission Electron Microscopy [TEM].
2. Tape Samples - This is a sample where the collector uses a piece of clear tape, like scotch tape, to collect the sample. Where surfaces are visibly dirty, the piece of tape is applied to the surface, and then removed. ... The material collected can then be analyzed for asbestos by Qualitative Polarized Light Microscopy [PLM], and Qualitative Transmission Electron Microscopy [TEM].
3. Filter Samples - These samples are generated by cutting a piece of filter material out of the HVAC unit in the building and placing it in a plastic bag for delivery to the laboratory. The material collected can then be analyzed for asbestos by Qualitative Polarized Light Microscopy [PLM], and Qualitative Transmission Electron Microscopy [TEM].

On 14 September 2001, two dust samples were collected outside the building entrance, and three samples were collected inside the lobby. The initial TEM qualitative analysis did find chrysotile asbestos to be present in the dust at all locations inside, and outside the building.

On 14 September 2001, two tape samples were collected outside the building entrance, and three samples were collected inside the lobby. No asbestos was detected in any of these three samples by PLM qualitative analysis, or by TEM qualitative analysis.

On 14 September 2001, three samples were collected from the HVAC filters. One sample was collected from AC-1, one sample was collected from AC-32, and one sample was collected from AC-31. No asbestos was detected in any of these three samples by PLM qualitative analysis, or by TEM qualitative analysis.

One of the two TEM air samples collected on 14 September 2001, simultaneous to the "wipe" sampling both yielded results of No Asbestos Structures Detected (NSD). The other sample did detect asbestos, as was collected inside the lobby, by the West wall.

...

After the discovery of asbestos in the lobby of the building, the EPA informed the building management, that the EPA would be cleaning the lobby areas of all the buildings in the area. Additionally, building cleaning personnel also began performing cleaning inside the building lobbies.

On 16 September Stratus was requested to begin a regime of continuous TEM air sampling at the Duane Street entrance, the only operational entrance to the building. Initially, two samples were collected outside the Duane Street entrance, and two samples were collected inside the Duane Street entrance. ... On 19 September 2001 an additional two sets of samples were collected, and samples were taken at the air intake location to some HVAC systems at this time.

From 16 September through 19 September 2001, a total of 47 TEM air samples were collected at this site. Except for three samples, all results were No Structures Detected. Two of the other samples were overloaded, and the lab performed a qualitative scan on the sample. This means that particulate matter on the samples prevented the lab from accurately performing an analysis on the sample, so they had to declare it overloaded. The qualitative scan was then performed to see if any asbestos fibers could be found. On both overloaded samples, no asbestos structures were observed.

One sample collected outside the entrance during the morning of 17 September did find asbestos in the sample. The value for this sample was 0.003 structures per cubic centimeter [equivalent to] 25 structures per square millimeter. This reading is considered a low reading, and would be an acceptable reading for post abatement sampling after an asbestos abatement project.

[Stratus Corporation (October 5, 2001) Asbestos Emergency Monitoring Report at 290 Broadway after the World Trade Center Disaster, Final Report. Made available by EPA Region 2 in response to a January 3, 2002 Freedom of Information Act request by the New York Environmental Law and Justice Project. Posted at <http://www.nyenvirolaw.org/PDF/EPA-FOIL-scannedOn-2-27-02.pdf>]

A very different version of these events was contained in a February 22, 2002 letter to Congressman Nadler from EPA Administrator Whitman:

EPA did not set a more stringent standard of cleanup for these federal buildings, and the lobby cleanup was consistent with the New York City Department of Health advisory. After noting significant amounts of dust tracked into 290 Broadway and 26 Federal Plaza by workers responding at the World Trade Center, the General Services Administration asked EPA to clean the lobbies. The work was done by EPA contractors using HEPA vacuums already operating in the same area. As outlined in the enclosure, EPA collected seven air samples at 26 Federal Plaza and six air samples at 290 Broadway, and found results below levels of concern.

[first attachment to letter follows, full text]

USEPA Air Analytical Results from 9/13/01 Sampling Event

26 Federal Plaza: Seven air samples were collected at the 26 Federal Plaza (13th, 26th, 38th, 39th floor and in the lobby). The asbestos concentrations ranged from non-detect to 0.0072 fibers/cc (south lobby). Data results are less than the OSHA Permissible Exposure Limit of 0.1 fibers/cc.

290 Broadway: Six air samples were collected at the 290 Broadway (8th, 22th, LL-1, LL-2 and Lobby). The asbestos concentrations ranged from non-detect to 0.0133 fibers/cc (LL-1).

One Chase Plaza: One outdoor air sample was collected at One Chase Plaza; the asbestos concentration was 0.0098 fibers/cc.

Methodology.

Air samples were analyzed by TEM EPA 40CFR763 AHERA.

Dust samples were analyzed by PLM – EPA-600 R-93/116.

[Available by FOIA request to EPA Headquarters in Washington, DC, FOIA Office, 1200 Pennsylvania Ave, Washington, DC 20460. May be posted at www.NYenviroLAW.org]

The above is an erroneous interpretation of events, contradicted by the information and report and data sheets supplied by Region 2 to the New York Environmental Law and Justice Project. Because Ms. Whitman had no first-hand knowledge of the events, it is probable that Region 2 again supplied her with misinformation. The errors in Ms. Whitman's statements are as follows:

- The attachment to Ms. Whitman's letter, summarizing sampling on September 13, only mentions the 6 air samples which took place at 290 Broadway on September 13. However, between September 16 and September 19, another 47 air samples were taken at 290 Broadway, before and after the unusual cleaning procedures.
- The attachment to Ms. Whitman's letter misrepresents the type of test method used for the settled dust. It states that only PLM tests were performed. Although they were, the settled dusts were also tested by the sensitive TEM method. Region 2 conveniently omitted this important fact.
- The letter does not mention the fact that the report supplied in response to the FOIA request shows that it was Region 2 who decided to take action, cleaning not only its own lobby, but the lobbies of other buildings in the area. Thus, Region 2's excuse of "workers responding at the World Trade Center tracking in dusts" is totally invalid. Why would they have cleaned the lobbies of other buildings in the area if this were true?
- The letter does not mention the other special cleaning actions taken at 290 Broadway in addition to the HEPA vacuuming of the lobby. This included the displacement of all the employees from the building for about a week, the changing of the air handling filters, and the wet wiping cleaning process, albeit by standard janitorial personnel.

Region 2 defends the sensitive TEM settled dust tests on its own building by saying the lab suggested it to GSA

- **The lab suggested it only because it was official EPA guidance and a NY State regulatory requirement to perform TEM tests of settled dusts and solid materials under this type of situation**

Region 2 is reportedly defending the inclusion of the sensitive TEM tests for settled dusts

at its 290 Broadway building by claiming that the laboratory suggested these tests to the General Services Administration.

But that was only right and proper on the part of the laboratory. The laboratory knew that the primary form of asbestos which emanated from the WTC collapse was chrysotile, commonly used in flooring tiles, and commonly having fiber widths (diameters) too small to be detected by PLM.

In fact, SciLabs was highly responsible in this regard. At the bottom of every table giving the results of the analyses for the bulk dust analyses on the 290 Broadway building, SciLabs included the following statement, reminding its clients of the obligations under EPA guidance and NY State regulations to perform TEM for both floor covering and similar materials, and that TEM was the appropriate method:

Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (see also EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94).

[SciLab (September, 2001) Communications transmitting testing results for 290 Broadway building to S&B Environmental, the contractor who took the samples on behalf of GSA. These lab analyses tables from Scientific Laboratories, Inc. are included as part of the Region 2 FOIA response to the NY Environmental Law and Justice Project posted at <http://www.nyenvirolaw.org/PDF/EPA-FOIL-scannedOn-2-27-02.pdf>]

Thus, even at the time, EPA was reminded by the laboratory of their obligation under official EPA guidance, published in the *Federal Register*, and New York State regulations, that TEM analyses were required to determine whether or not a material was non-asbestos-containing.

Region 2 withheld testing results for its own building in response to FOIA request

It is interesting and telling that Region 2 withheld all of the testing data on its own building when it provided documents to the New York Environmental Law and Justice Project (www.NYenviroLAW.org) in response to a 9/21/01 Freedom of Information Act request. The request included all documents meeting the following description:

... all monitoring data, studies and reports of air, dust, bulk (including but not limited to hazardous materials and water samples) taken from September 11, 2001 to present in response to the World Trade Center disaster (including but not limited to lower Manhattan and Staten Island land fills). [original FOIA request posted at www.NYenviroLAW.org]

CONCLUSIONS

EPA Region 2 has selectively modified and violated federal EPA regulations and published guidance and directives. Air has not been tested with adequate sensitivity, and air has not been tested in the places where it matters, inside homes and at the breathing zones of a small child under conditions of normal activities. Settled dusts and debris have not been tested with the more sensitive tests required by EPA policy, TEM. Air and settled dusts have been claimed to be “safe” and “within standards” when no such standards at the claimed levels exist.

Both the AHERA level of 70 s/mm² and the detection limits for Region 2's air testing of asbestos are HIGHER than the levels of asbestos found inside homes in Libby, Montana, which resulted in that town becoming a Superfund site. No testing to date has been with adequate sensitivity to show that the air either outside or inside is safe in Manhattan or the rest of New York City.

The tests for settled dusts also have not been sensitive enough, because Region 2 has refused to test using sensitive TEM methods, violating EPA guidance and policy. The 1% criteria for safety Region 2 would have us believe is contradicted by the very EPA NESHAP regulations and guidance which Region 2 claims it is following. Furthermore, the level of asbestos in settled dusts in Lower Manhattan were higher than the levels in yard soils at the Libby Superfund site.

To compound these faults, Region 2 utilized the results of more sensitive TEM testing for settled dusts for its own building, as a basis for an unusual cleanup. The simultaneous less sensitive method for its building, PLM of settled dusts, was negative. But this crude PLM test was the only one used by Region 2 for the rest of Manhattan, even when official EPA guidance required the use of TEM. Later, Region 2 obscured the fact that it both had the results of and relied upon the sensitive TEM tests for its own building to Governor Whitman.

While utilizing the results of TEM to take action on its own building, Region 2 even refused the assistance of EPA Region 8 who offered free SEM testing for the dust in Manhattan, which is similar to TEM testing.

It is probable that Region 2 has similarly failed other citizens in smaller exposure situations, where public oversight has been less intense. I personally believe that the precedents of past failures should not hold sway in this unprecedented tragedy and time of need of the citizens of New York City.

I also personally believe that Region 2 is not supplying EPA Headquarters and the public with accurate information about its own activities, which is a disservice to all involved.

As stated at the beginning, this memorandum represents my own professional judgement and not necessarily the official position of the EPA.