



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

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

DATE: January 11, 2002

SUBJECT: PRELIMINARY ASSESSMENT

- 1. Asbestos in Manhattan compared to Libby Superfund site**
- 2. Why cleanup of WTC contamination is ineffective to date**
- 3. Advantages of cleanup under Superfund statute**
- 4. Summary risk assessment for WTC fallout**

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A handwritten signature in green ink that reads "C Jenkins".

TO: Affected Parties and Responsible Officials

This memorandum compares data for asbestos in settled dusts and air inside residences in the town of Libby, Montana, which is designated as a Superfund site due to this residential contamination, and similar data for the interior of buildings in Lower Manhattan contaminated by fallout from the World Trade Center (WTC). The reasons why the current cleanup of WTC dusts inside buildings is ineffective is also discussed, along with the advantages in addressing the cleanup through the Superfund statute.

In addition, this memorandum provides a summary of calculated cancer risks for occupancy of Lower Manhattan buildings, which was performed in more detail in my December 19, 2001 memo.¹ Whereas high level EPA and NYC officials have stated in sworn testimony and to the press that there were no such risks,² the appropriate offices in EPA have been effectively proscribed from conducting such a preliminary evaluation.

The analyses, projections, and opinions in this memorandum represent my own professional judgement and do not necessarily represent the official position of the U.S. Environmental Protection Agency, and has not been reviewed by EPA. This memorandum is not intended as any final or definitive assessment risks from continued and past exposures to asbestos in Manhattan.

1. ASBESTOS CONTAMINATION IN BUILDINGS, MANHATTAN COMPARED TO LIBBY SUPERFUND SITE

In Libby, Montana, interiors of homes and residential soils have been contaminated with asbestos from an adjacent vermiculite mining operation. Homes have vermiculite insulation in attics, and vermiculite was used for gardening. In addition, there are numerous waste piles of vermiculite in the area.³ On December 20, 2001, the Governor of Montana designated Libby for fast-track listing as a Superfund site under the Comprehensive Environmental Response and Liability Act (CERCLA).⁴

In Lower Manhattan, interiors of residences and offices were contaminated with asbestos, fiberglass, fine particulate matter, and possibly significant concentrations of other toxic materials from the fallout from the implosion of the World Trade Center (WTC).

Tables at the end of this memo provide levels of asbestos in settled dusts and air in two apartments before cleanup from the Ground Zero Task Force Study,⁵ and levels of asbestos in settled dusts in one apartment after cleanup from a study by the New York Environmental Law and Justice Project.⁶

Use of “PCM-equivalent” asbestos data from Manhattan for comparison to Libby

In order to compare asbestos levels found in Manhattan with that from Libby, the data in the tables is for asbestos fibers longer than 5 μm , width greater than 0.25 μm , and an aspect ratio greater than or equal to 3 to 1. This is called “PCM-equivalent asbestos.” The data from Libby only includes asbestos levels that are PCM-equivalent. The Ground Zero Task Force Study⁷ of WTC contamination provided not only total asbestos levels, but also PCM-equivalent asbestos levels.

The reason why only fibers longer than 5 μm (PCM-equivalent) are given in the Libby risk assessment is because many believe that asbestos fibers shorter than this cannot cause cancer, because they can be eliminated from the body. Not all agree.

Comparison of Libby and Lower Manhattan data

As can be seen from the above tables, the asbestos contamination in Lower Manhattan, up to seven blocks away from Ground Zero, is comparable or higher than that found in Libby,

Montana, a designated Superfund site.

Most of the available data for Manhattan is before even a rudimentary cleanup. One particular piece of data, the residue inside an air vent at 105 Duane St., three blocks outside the boundary where EPA said there was any contamination (7 blocks from Ground Zero), is particularly alarming. This air duct sample was taken on December 3, 2001, long after all cleanups that had been thought necessary were completed.

The highest level of dust inside a building in Manhattan was 79,000 structures (asbestos fibers) per square centimeter (s/cm²). This was at 45 Warren St., an apartment building 4 blocks away from Ground Zero where all of the windows faced north, away from the World Trade Towers, locked in on all other 3 sides by other buildings. To the casual observer, this apartment would not be described as being heavily contaminated. There is a color photograph included at the beginning of the study,⁸ where a dining room table showing only a light dusting from WTC fallout, the dark grain of the wood clearly visible.

In comparison, the highest concentration of interior dust found inside a home at Libby was only 3658 s/cm². This means the highest amount of asbestos lying on a surface in Manhattan was 22 times that ever found in Libby.

The logical question thus arises: Why is EPA leaving people to their own devices in the cleanup of New York City, while intervening to clean homes at taxpayers expense in Libby because of an “imminent and substantial endangerment to public health”?

2. INEFFECTIVE CLEANUP OF WTC ASBESTOS TO DATE

To date, the cleanup of the WTC fallout containing asbestos, fiberglass, fine particulate matter, and possible significant concentrations of other toxic materials is not proceeding efficiently or effectively.

Asbestos does not leave buildings with ordinary cleaning methods

The asbestos contamination is not going to leave buildings in Manhattan by itself with ordinary cleaning any more than it will in Libby. In the case of Libby, MT, the EPA stated:⁹

This indicates that there are multiple locations around Libby that are likely to contain asbestos fibers in indoor dust, and that this dust may serve as an on-going source of potential exposure for residents.

Note that the dusts inside Libby residences were found to have the highest calculated cancer risks for the Superfund-designated site.

Complex regulatory strategies and whole environmental statutes address the necessary protocols for asbestos abatement inside buildings, just because it will not go away by itself after a few weeks, months, or years with ordinary cleaning measures. The National Emission Standards for Hazardous Air Pollutants (NESHAPS) under the Clean Air Act and the regulatory requirements under the Asbestos Hazard Emergency Response Act (AHERA) both include rigorous methods to stringently clean every surface, like inside air ducts, and removal of carpets, drapes, and upholstered furniture which cannot be effectively cleaned, even AFTER the offending asbestos objects such as insulation, ceiling tiles, and asbestos floor tiles have been removed from the building. During these abatements, trained certified personnel must be wearing HEPA respirators and protective clothing. Etc.

EPA's crude air testing cannot detect hazardous levels of asbestos

EPA has demonstrated a willingness and promptness in responding to concerns of citizens by coming out to apartments and other buildings and conducting an air test for asbestos. This test is called the "AHERA TEM clearance test," which stands for Asbestos Hazard Emergency Response Act transmission electron microscopy. EPA is using this AHERA TEM clearance test and claiming that if it shows 70 or fewer asbestos structures per square millimeter, then the air is safe:¹⁰

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 . . . 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 . . .

This statement by EPA is false and a gross misrepresentation of the AHERA regulations which do not in any way claim that a simple air test alone showing 70 or fewer structures per square millimeter can be used directly to determine if air is safe.

AHERA TEM clearance test not sensitive enough to detect hazardous levels of asbestos

The first, and fatal problem in using the AHERA TEM test is that it is quite insensitive. It cannot detect airborne asbestos at levels that are shown to cause excessive cancers.

First, it is necessary to explain a very confusing way in which the results of the AHERA TEM test are reported. There are three different ways to express the results, using one or all of the following units of measure:

structures per **square millimeter** (s/mm²)

structures per **milliliter** (s/mL)

structure per cubic centimeter (s/cm³)

The “structures per square millimeter” unit is the value the laboratory gets first, before converting it to structures per milliliter. The lab needs to use the volume of air pulled across the filter to make this conversion. Since a “milliliter” is the exact same volume as a “cubic centimeter,” the last two units are identical and used interchangeably. See my December 19 memo for a more detailed explanation.

EPA has been giving test results using the “structures per square millimeter” units. EPA will typically describe results as “below 70 structures per square millimeter” or however much was detected above 70. But what does 70 s/mm² mean? This is not a SAFE level. This is only the lowest level that the method can detect. This 70 structures per square millimeter (s/mm²) level is equivalent to 0.02 structures per milliliter (s/mL):

The 0.02 s/mL (which is equivalent to 70 s/mm²) level is not a safe level. It is only the lowest level that the method can detect because of the method background (there is asbestos in the cellulose filters used to collect the air). The EPA has determined that a concentration of asbestos in air that is 0.0004 s/mL will result in an increased risk of cancer of 1 in ten thousand.¹¹ An elevated cancer risk of over 1 in ten thousand is the action level, or trigger, for EPA to declare an imminent and substantial endangerment to public health under CERCLA, as explained in Section 4 of this memo. Thus, the AHERA TEM clearance text can only tell if the air has 50 times the safe level (or 10 times the safe level if it is assumed that only 20% of the asbestos is in the hazardous size range called “PCM-equivalent.”).

Air testing under passive conditions will not detect “real world” asbestos levels

EPA is conducting the AHERA TEM clearance test under passive conditions when the dusts are not being disturbed. As discussed in the Ground Zero Task Force study¹² and my December 19 memo,¹³ any activities which stir up dusts will result in vastly higher airborne asbestos concentrations.

I suggest that when a government agency comes out to test air for asbestos, be prepared to have the air drawn from a “human activity simulator.” Have a large box with the open end sitting on carpeting or on a couch that was contaminated. Have a plunger like a broom stick mounted to a flat board about 1 foot square. (Use a broom if you have to.) Put the plunger through a hole in the top of the box. You will be making something the equivalent to a butter churn. Have 3-inch holes on both sides of the box so that air can enter and exit. Then, the EPA or NYC health inspector can draw air through the hole in one side of the box while you are beating the carpet or the couch with the paddle. If EPA tells you that this violates the testing protocols, reply that even using the AHERA TEM test in lieu of certified professional abatement violates the protocols.

EPA’s air testing violates the AHERA protocols

By even performing the AHERA TEM clearance test in lieu of professional asbestos abatement, EPA is violating the AHERA regulations. This is because the AHERA TEM clearance test is only allowed in conjunction with a whole range of asbestos abatement procedures that go on prior to even taking the test.¹⁴ It was designed to catch only gross contamination problems caused by some worker on the asbestos abatement project, such as emptying one bag of asbestos contaminated material into another inside a room that had previously been carefully abated.

EPA use of 1% asbestos level for cleanups will result in ineffective cleanups

There is another reason why the cleanup will be ineffective. Both EPA¹⁵ and the NYC Department of Environmental Protection (NYC DEP) are claiming that only dusts over 1% asbestos or more are hazardous. The NYC Department of Environmental Protection (NYC DEP) advised building owners¹⁶ to test dusts inside buildings to see if they were over 1%. They said that if the dusts were over 1%, a professional asbestos abatement contractor should be used for an inspection and cleaning:

EPA is using the 1% definition in evaluating exterior dust samples in the Lower Manhattan area near the World Trade Center. All affected landlords have been instructed to test dust samples within their buildings utilizing this standard. Landlords were notified that they should not reopen any building until a competent professional had properly inspected their premise. If more than 1% asbestos was found and testing and cleaning was necessary, it had to be performed by certified personnel.

This has presented problems, because there was no way for a landlord to test at the 1% level if the dust was present in a fine layer, and because dusts containing less than 1% are known to be hazardous by EPA.

EPA determination that dusts and soils containing less than 1% asbestos are hazardous

The U.S. EPA has clearly stated that levels of asbestos lower than 1% could present hazards:¹⁷

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.

In one independent study, it was found that soils containing only 0.001% asbestos were still capable of producing measurable airborne asbestos concentrations greater than 0.01 fibers per milliliter (equivalent to structures per milliliter).¹⁸ This air concentration is over the action level for declaring a public health emergency, as discussed above for the sensitivity for the AHERA TEM clearance test.

EPA Region 2, by its own actions, has demonstrated its belief that asbestos in dust at levels lower than 1% are hazardous

There is another very important reason to believe that dust containing less than 1% asbestos is unsafe: EPA Region 2 believes it is, and was willing to use taxpayer dollars to remove it from their own building in NYC. This is what happened:

First, the EPA found no asbestos in any of WTC fallout samples outdoors that was over 1% north of Warren St.¹⁹ As a result, EPA told the press and everyone that the only contaminated areas were below Warren St. and West of Broadway, the “zone of contamination.” Next, EPA referred everyone to the NYC Department of Health (NYC DOH) cleanup recommendations²⁰ inside this same “zone of contamination” south of Warren. These are the controversial recommendations which do not even recommend HEPA respirators, which just say “avoid breathing the dust” while you mop up the asbestos.

This is what happened next: EPA's offices are at 290 Broadway, which is 2 blocks north of Warren St., outside the "zone of contamination." Even though EPA said there was no asbestos over 1% up this far north at its offices, and that it was safe, EPA had its own offices cleaned by certified asbestos abatement contractors. At taxpayer expense.

Aside from considerations of criminal negligence and intentional failure to warn citizens in both the "zone of contamination" and outside this zone that they also should be using certified professional asbestos abatement contractors — aside from these considerations, EPA Region 2 at a minimum has demonstrated its recognition that dusts containing less than 1% asbestos are hazardous.

There are no AHERA or other test methods for percent levels of asbestos in thin layers of settled dusts

Unless the windows were blown out by the blast, WTC fallout inside buildings in Manhattan was usually in thin layers, too thin to scoop up into a jar or bag. Only dusts that can be put into a bag or jar can be tested for the percentage of asbestos by the PLM % asbestos method.

If there is only a thin, visible surface dusting, or even an invisible layer of dust, you are required to use what are called "wipe" samples or "microvacuum" samples. Wipe samples can only be tested for the number of asbestos fibers per area, not a percentage of asbestos in the total dust. These are not AHERA methods or even EPA-validated methods, but they are used for Superfund investigations. Thus, it was impossible for a landlord to test premises in most cases for whether or not the asbestos was present at 1% or higher, because there was not enough dust to use the PLM method..

It is inexcusable to try to brush together enough surface dust to make up a "bulk" sample that can be placed in a jar for PLM % asbestos testing. This violates the method, and results in a highly diluted sample due to the mixture with other dusts that are present, as well as subjecting the very fine asbestos to escape to the air during the brushing process.

Under the AHERA standard, which EPA claims it is using, the 1% level only applies to the material from which the asbestos dust originated. All of the sample collection methods for PLM % asbestos analysis in the AHERA regulations at 40 CFR Part 763 address collection of asbestos containing materials themselves. There are very strict separate procedures for collecting samples of each particular type of asbestos containing material, such as floor or ceiling tiles, or insulation.

There are no methods or protocols for taking dust samples from surfaces. Thus, trying to run a PLM % asbestos test on dust violates the AHERA regulations.

The PLM method for % asbestos is too insensitive to find asbestos at levels of concern

EPA used PLM % asbestos analyses of thick WTC fallout on streets outdoors. Many, if not most, of these samples showed no detectable asbestos.²¹ See the tables at the end of this memo for a summary of the findings. The PLM method is unreliable at concentrations of 1% and less. In other investigations, EPA found that soil samples below the level of detection of PLM did in fact have high levels of asbestos when analyzed with SEM (scanning electron microscopy) methods.²² Thus, many of the outdoor dust samples in Manhattan probably were actually contaminated with asbestos.

Likewise, if landlords did manage to test their fine indoor dust layers and found no asbestos by the PLM method, it could well have been there in hazardous amounts.

Current EPA recommendations for Manhattan cleanup will leave most asbestos

To this date, EPA still recommends the unsafe and ineffective cleanup recommendations of the NYC Department of Health (NYC DOH). The EPA web page from early October until this present day specifically states that schools, businesses, and residences should be cleaned using the NYC DOH methods.²³ Not only are these methods ineffective, they are also unsafe to those who follow them, as detailed in my December 3 and 19, 2001 memoranda.²⁴

Dry-type HEPA vacuums do not remove asbestos from carpets

The NYC DOH recommends dry-type HEPA vacuum cleaners, even though the EPA has found that dry-type HEPA vacuum cleaners simply do not remove the asbestos from the carpeting any better than a regular vacuum cleaner, removing essentially none at all.²⁵ Professional abatement firms recognize that dry HEPA vacuums are ineffective in removing asbestos. There is documentation of at least one certified asbestos abatement firm who removed and disposed of all carpeting which was over padding in common areas in an apartment building near Ground Zero, in recognition of the fact that there was no way to remove the asbestos.²⁶

The same EPA studies also document the fact that even the wet-extraction HEPA vacuum cleaners are inefficient in removing asbestos from carpeting – only 60-70%.

Upholstered furniture, drapes, vents and ducts not addressed by NYC recommendations

The NYC DOH recommendations also do not address the problem of upholstered furniture, which is almost impossible to effectively clean. Draperies are another problem, often too large for washing in machines, and some must be dry cleaned. Therefore, cross-contamination will occur if these drapes are sent to commercial facilities for cleaning.

The NYC DOH also does not address the problem of contaminated duct work, or air conditioners or other contaminated equipment, like the insides of computers which use cooling fans.

Any EPA recommendation of professional asbestos abatement not enforceable

EPA officials have claimed they recommended professional asbestos abatement for buildings “unless they only had a light dusting.”²⁷ Even if EPA has issued such guidance, it will not result in effective asbestos removal, because EPA has no legal authority to enforce the use of certified asbestos abatement contractors. The EPA has stated that it is using the AHERA statute as the authority or standard for cleanup after the WTC disaster. This statute only requires schools to use certified asbestos abatement professionals. For the owners of buildings, the only requirement is that if the owner does choose to have an asbestos inspection, then a certified professional must be used. It does not require that any advice or action resulting from that inspection be followed. The owners of many buildings have not been hiring certified asbestos abatement professionals, even when they were heavily contaminated.²⁸

For tenants, the AHERA has no effect whatsoever. Many, if not most, tenants have been cleaning their own apartments.²⁹

High cost of professional abatement prohibitive to most, preventing effective cleanup

Because professional asbestos abatement is expensive, tenants have chosen to perform their own cleanups or hire unqualified persons. For a 2 bedroom apartment, the cost of professional abatement is \$5000; for a 2 bedroom apartment, the cost is around \$10,000. That would not include the costs of replacement of any carpeting, upholstered furniture, or draperies that cannot be effectively cleaned.

Recently, Bonnie Bellow of the EPA Region 2 press office claimed that tenants do not have to pay for their cleanups; that all they have to do is apply to the Federal Emergency Management

Administration (FEMA) for reimbursement. This is false, and not borne out by the many accounts of citizens trying to apply for such costs. Some insurance companies have paid for cleaning, but others have not. Sometimes volunteers cleaned out buildings, and sometimes the Red Cross handed out vouchers for cleaning, but not by professional asbestos abaters. There are no statistics on what has actually happened.

Disorganized cleanup resulting in re-contamination of previously cleaned areas

The disorganization of the cleanup is resulting in cross-contamination of previously cleaned areas. Some individual apartments may well be cleaned using professional abatement. But if another apartment is not cleaned, the air ducts for the whole building can become contaminated again. Dusts can be tracked from one area inside the building which is not effectively cleaned to another area which is cleaned.

3. ADVANTAGES FOR A CLEANUP UNDER SUPERFUND

At this time, I believe that the best solution to the problem in Lower Manhattan is to invoke one or more parts of the Comprehensive Environmental Response and Liability Act (CERCLA), or Superfund. It would bring order to the situation and begin to alleviate the current exposures to asbestos, fiberglass, fine particulates, and other toxic substances like mercury and lead. It would enable the use of better methods to test and monitor the contamination, particularly for asbestos. It would take the financial burden away from citizens and transfer them to the government.

It would add credibility to the final solution after the action was completed. Under CERCLA, there would be a point in time where the government could announce that the action was finished, and that Manhattan was restored. Otherwise, there will be no opportunity for the government to declare closure.

Two types of action under Superfund are possible

In Montana, the governor exercised the “silver bullet” option under CERCLA by requesting that EPA put Libby on the fast track for listing on the National Priorities List, which means making it a Superfund site. As a result, Libby does not have to wait years for EPA to assess its hazards and make comparative cost-benefit judgements. Federal money would go immediately to the cleanup, although the state would be required to contribute 10% of the costs. The costs should not be a problem to New York, as the federal government is already contributing as much as it

will take to put Manhattan back together.

Another option would be to declare a public health emergency under the CERCLA authority. Even though Libby is now scheduled for fast track Superfund listing, EPA is now apparently intending to invoke this other authority to address the situation at Libby. EPA has never before invoked this authority under CERCLA. If EPA does invoke it for Libby, it should be no problem to use it for Lower Manhattan.

Stigmatization of a Superfund balanced by public confidence and a point of closure

There would be considerable stigmatization in a Superfund listing for Lower Manhattan, potentially increasing the rate of economic decline. However, the widespread knowledge of health concerns even without a Superfund listing may have already had that effect. Declaration of a public health emergency or a Superfund listing, followed by an efficient and organized cleanup, with all watchdog scientists agreeing on protocols, may actually help the public's perception and restore confidence. Right now there is nothing but chaos.

Cleanup using AHERA is not working

As seen from the preceding section, the cleanup is not proceeding effectively. This is because EPA is trying to use the AHERA statute as the authority. The AHERA statute is voluntary for all but schools. The AHERA statute places the financial burden on the public.

The AHERA statute also specifies certain antiquated test methods for asbestos, which offer some protection, but only if used in conjunction with all of the other rigorous asbestos abatement procedures which can only be performed by certified contractors. EPA is trying to adapt these insensitive test methods, the AHERA TEM clearance test for air, and the PLM test for % asbestos, to situations which they were not intended by the regulations.

Cleanup under CERCLA authority would allow the use of better testing methods

Under the CERCLA statute, there is no prohibition against using the best testing methods available. See the tables at the end of this memo. The test methods which were used are described along with the data. For the Libby Superfund site, Dr. Eric Chatfield designed the testing protocols and chose the methods he believed were the best. These methods were not limited to methods that the EPA had developed and validated, but included methods developed

by the American Society for Testing and Materials (ASTM) and the International Standards Organization (ISO).

Dr. Chatfield was also the lead investigator in the Ground Zero Task Force study of Lower Manhattan, where state of the art methods were again used. The HP Environmental study, also included in the tables, utilized the best methods which could be devised for characterizing Lower Manhattan.

Whether addressed through a CERCLA action or any other means, Lower Manhattan has not undergone adequate testing. Within EPA itself, we do not have the expertise to design or carry out state of the art testing protocols for asbestos. For other hazardous substances, we do have expertise, but not for asbestos. The experts I know of at this present time include the researchers responsible for the Ground Zero Task Force study (Eric Chatfield and John Kominsky), the researchers for the HP Environmental study (Hugh Granger, Thomas McKee, James Millette, Piotr Chmielinski, and George Pineda), and Michael Beard of Research Triangle Institute.

4. SUMMARY, ASBESTOS RISK ASSESSMENT FOR WTC DUSTS

My December 19, 2001 memo³⁰ provided a detailed rationale for projecting cancer and asbestosis risks from WTC fallout by calculating exposures from the very limited data which is currently available. In that assessment, various exposure scenarios were hypothesized, and risks of lung cancer for smokers and non-smokers, mesothelioma (a cancer of the chest cavity), and asbestos risks were hypothesized. As stated at the beginning of this memorandum, I believe that initiating such an effort fills a critical need that was thwarted in the appropriate EPA offices by the constant reassurance of high level EPA officials that no such assessment was necessary.

PCM-equivalent correction factor and other changes to risks in December 19 memo

My December 19 risk assessment used the concentration of all asbestos fibers, not just “PCM-equivalent” fibers (those longer than 5 μm , width greater than 0.25 μm , and an aspect ratio greater than or equal to 3 to 1) in making calculations of risk. An explanation was provided as to why this correction was not made, along with providing a range of 80 to 90% non-PCM-equivalent fibers for WTC asbestos if such a correction were to be used. This was based on two studies: From the Ground Zero Task Force study,³¹ the PCM-equivalent fibers ranged from 1.3 to 20% of total asbestos fibers/bundles for 8 different samples of settled dusts, with a mean of 8.7%. For the HP Environmental study,³² for 3 air samples, PCM-equivalent fibers ranged from

3.1% to 6.5%, with a mean of 5.6%. Because of the uncertainty from such limited data, if any conversion were to be made at this time for WTC fallout, then 20% of the total asbestos should be assumed to be PCM-equivalent.

No correction should be made for PCM-equivalents to asbestosis risks that were projected in the December 19 memo. This is because the ATSDR reviewed studies showing that asbestosis is associated with shorter asbestos fibers.³³ In addition, it would probably be appropriate to use an uncertainty factor of 1000 for asbestos risks, according to CERCLA guidelines,³⁴ so that the risks I had previously projected in the December 19 memo for asbestosis would be 1000 times higher.

No correction should be made for the type of asbestos, chrysotile vs. amphibole vs. amosite, etc. This is because EPA does not recognize any difference in toxicity for the purpose of making risk assessments.³⁵

Cancer risk level constituting an imminent and substantial endangerment to public health pursuant to Superfund

The EPA generally considers an upper-bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} as a safe range. A risk of 10^{-4} represents a probability that there may be one extra cancer case in a population of 10,000 (1 per 10,000). A 10^{-6} risk is the probability that there may be one extra cancer case in a population of one million people over a lifetime of exposure (1 per 1,000,000). The National Contingency Plan (NCP) (Superfund) requires that the 10^{-6} risk level should be the point of departure; the goal in any response by the EPA to ameliorate exposures to carcinogens from man-made sources. A response action is generally warranted if the cumulative excess carcinogenic risk for any single individual affected by a site exposing humans to carcinogens exceeds 1 in 10,000 (the 10^{-4} risk level) using reasonable maximum exposure assumptions for either the current or reasonably anticipated future exposures.³⁶

Cancer risks for Libby compared to Lower Manhattan

The December 20, 2001 risk assessment³⁷ prepared by Dr. Weis of EPA's Carcinogen Assessment Group (CAG) found that for maximum concentrations of asbestos exposures to Libby residents through breathing suspended dusts inside residences, the cancer risk was between 1 in 1000 to 1 in 100. This cancer risk exceeded the threshold of 1 in 10,000 necessary to be considered an endangerment to public health.

My December 19, 2001 preliminary risk assessment, based on much more limited data, projected maximum risks as high as 1 in 1000, to cancer risks of 1 in 10 for a persons either living apartments and/or working in buildings that retained much of the asbestos in carpeting, ducts, furniture, and draperies. If a correction factor for PCM-equivalents of 20% is applied to these projections, the risks range from 2 in 10,000, to risks of 2 in 100. For a laborer spending only 3 months cleaning out buildings in Lower Manhattan without proper protection, cancer risks of 1 in 5 were projected, which would be 4 in 100 if a correction for PCM-equivalents was applied. Other possible exposure scenarios were evaluated as part of my December 19 memorandum.

Risks could be much higher if there were also exposures to fiberglass, fine particulate matter, and other toxic substances at the same time. There are wide ranges of uncertainty in these calculated risks, because only limited data was available. However, I believe that these calculations establish the need for a more rigorous evaluation of risks.

TABLES - LOWER MANHATTAN ASBESTOS DATA

Note: The total asbestos levels found in Manhattan by the Ground Zero Task Force study are much higher. The reason why only the “PCM-equivalent” asbestos levels are given in the tables below is to make comparison with the Libby data possible. See the explanation at the beginning of this memo.

SETTLED ASBESTOS DUSTS, BUILDING INTERIORS MANHATTAN Fibers and Bundles (Structures) Longer than 5 Micrometers	PCM-equivalent structures per square centimeter (s/cm ²)
Ground Zero Task Force Study , ³⁸ data from Table 21. HIGH EXPOSURE BUILDING, BEFORE CLEANUP, 250 South End Ave. Fibers and bundles longer than 5 micrometers. Heavy visible dust layer, could still read addresses on envelopes on table and see the lines on a yellow legal pad on the table. Windows had been blown out from some apartments. [Note Table 21 says fibers/cm ² , but title of table is “fibers plus bundles”, which equals structures.] TEM analysis using American Society for Testing and Materials ASTM D6480-99.	
250SEA-10D-D1 (A) (sample collected with toothbrush sample) top of cupboard with glass doors	21,000
250SEA-10D-D1 (B) (wipe sample) top of cupboard with glass doors	19,000
250SEA-10D-D2 (A) (sample collected with toothbrush) living room high boy side table	18,000
250SEA-10D-D2 (B) (sample collected with toothbrush) living room high boy side table	28,000
Ground Zero Task Force Study , ³⁹ data from Table 19. LOW EXPOSURE BUILDING, BEFORE CLEANUP, 45 Warren St., dust layer visible on dark table, grain of wood still visible. 5 blocks from Ground Zero, building faced north away from Ground Zero. Only light dusting. See photo in study itself. Fibers and bundles longer than 5 micrometers. [Note Table 19 says fibers/cm ² , but title of table is “fibers plus bundles”, which equals structures] TEM analysis using American Society for Testing and Materials ASTM D6480-99.	
45WAR-2-D1, 2nd floor, living room table near window, wipe sample	2,300
45WAR-2-D2, 2nd floor, living room window sill, wipe sample	60,000
45-WAR-5-D1, 5th floor, living room, window sill, wipe sample	79,000
45-WAR-5-D2, 5th floor, roof level office, green wooden chair, wipe sample	22,000
NY Environmental Law and Justice Project. 105 DUANE ST, AFTER CLEANUP. ⁴⁰ Microvacuum method followed by American Society for Testing and Materials ASTM D-5755.	
Sample inside central air conditioning duct. Total asbestos concentration reported as 555,000 s/cm ² . Estimated that 20% of the structures are over 5 micrometers, or 111,000 s/cm ²	111,000

<p>THICK WTC FALLOUT DUST DEPOSITS OUTDOORS MANHATTAN Includes all asbestos, not just fibers longer than 5 micrometers</p>	<p>weight percent (%) (all asbestos included, not just PCM-equivalent asbestos)</p>
<p>Ground Zero Task Force Study,⁴¹ data from Table 22. Analyses by gravimetric matrix reduction (American Society for Testing and Materials ASTM STP 1342) followed by PLM analyses of larger fractions and TEM measurement of fine portion of samples</p>	
<p>Roof of automobile, Church St. south of Duane St.</p>	<p>0.67 %</p>
<p>45 Warren St., roof, outside 5th floor loft, gaps in stone floor</p>	<p>1.05 %</p>
<p>250 South End Ave., Apartment 11D, exterior window ledge</p>	<p>2.25 %</p>
<p>250 South End Ave., ground level courtyard, top of wall</p>	<p>2.05 %</p>
<p>HP Environmental Study, Table 5.⁴² PLM analyses.</p>	
<p>#1 - Barkley St. west of Church</p>	<p>< 0.25 %</p>
<p>#2 - Barkley St. between Broadway and Church</p>	<p>ND</p>
<p>#3 - Barkely and Greenwich</p>	<p>ND</p>
<p>#4 - Barkey between Greenwich and Joe Dimaggio Hwy</p>	<p>ND</p>
<p>#5 -Barkely at Joe Dimaggio Hwy</p>	<p>0.5 %</p>
<p>#6 - Warren and Church</p>	<p><0.25 %</p>
<p>#7 - Murray near Broadway</p>	<p>0.75 %</p>
<p>#8 - Murray and Greenwich</p>	<p>ND</p>
<p>#9 - Chambers between Broadway and Greenwich</p>	<p>ND</p>
<p>#10 - Murray between Greenwich and Joe Dimaggio</p>	<p>0.75 %</p>
<p>#11 - Warren between Greenwich and Joe Dimaggio</p>	<p>0.75 %</p>
<p>EPA data on bulk dusts taken outside buildings in Manhattan.⁴³ All the analyses performed EPA for Manhattan used the less sensitive PLM method. EPA did not fraction the sample and use electron microscopy techniques in addition to PLM as did the Ground Zero Task Force study above. EPA in its risk assessment for Libby, however, noted that soil samples showing non-detectable asbestos by PLM alone actually had high levels when analyzed by scanning electron microscope (SEM) methods.⁴⁴</p>	
<p>48 of 177 dust samples</p>	<p>1 - 4.46%</p>
<p>129 dust samples</p>	<p>ND</p>

AIRBORNE ASBESTOS, BUILDING INTERIORS MANHATTAN PCM-equivalent fibers and bundles longer than 5 Micrometers	PCM-equivalent fibers per milliliter (f/mL)
Ground Zero Task Force Study , ⁴⁵ data from Table 16. HIGH EXPOSURE BUILDING, 250 South End Ave, BEFORE CLEANUP, PASSIVE CONDITIONS (no activities to disturb dusts). Fibers and bundles longer than 5 micrometers. TEM analysis using the International Standards Organization ISO10312 direct transfer method	
250SEA-10D-A1, Apartment 10D, den	0.063
250SEA-10D-A2, Apartment 10D, den	0.060
250SEA-10D-A3, Apartment 10D, living room	0.048
250SEA-10D-A4, Apartment 10D, living room	0.075
250SEA-10D-A5, Apartment 10D, bedroom	0.081
Ground Zero Task Force Study , Table 8. ⁴⁶ PCM-equivalent fibers and bundles longer than 5 micrometers. PASSIVE CONDITIONS (no activities to disturb dusts) LOW EXPOSURE BUILDING, 45 Warren St. BEFORE CLEANUP. TEM analysis using the ISO10312 direct transfer method.	
45 WAR-2-A1, 2nd floor living room	"not statistically significant" [detected but uncertain]
45 WAR-2-A2, 2nd floor living room	ND
45 WAR-2-A3, 2nd floor master bedroom	0.010
HP Environmental Study , Table 6. ⁴⁷ Two building interiors near Ground Zero. PASSIVE CONDITIONS, BEFORE CLEANUP. Analyses by the modified EPA Level II TEM method where samples were heavily loaded (all 3 samples below where asbestos detected), which uses indirect preparation to separate out interferences from other non-asbestos parts of WTC dusts. Study demonstrated that up to 10 times more asbestos was detectable by this method.	
Sample 2	0.007
Sample 7	0.167
Sample 9	0.346
8 out of 11 samples, interior of 2 buildings near collapsed WTC towers,	ND
EPA data , PASSIVE CONDITIONS, AFTER INCOMPLETE CLEANUP. EPA has been using the simple AHERA TEM clearance test method inside buildings at the request of tenants and others. This is a violation of the AHERA protocols, which only allow this test to be performed AFTER professional and complete asbestos abatement, which must thoroughly clean all surfaces. The AHERA TEM clearance method is only meant as an inexpensive, but not an assurance by itself, that asbestos has been adequately abated. The use of a leaf blower or other strong fan in conjunction with taking the air sample would be needed for that in addition to wipe samples of surfaces. EPA Region 8 found that at Libby, even when there were activities going on to disturb dusts, air monitors worn by people sitting on couches, etc. always gave higher readings than a stationary air monitor in the same room (such as is the case in the AHERA TEM test).	usually not detected

TABLES - LIBBY ASBESTOS DATA

SETTLED ASBESTOS DUSTS, BUILDING INTERIORS LIBBY Fibers and Bundles (Structures) Longer than 5 micrometers (μm)	PCM-equivalent structures per square centimeter (s/cm^2)
EPA Region 8 data. ⁴⁸ Microvacuum sampling by American Society for Testing and Materials ASTM D-5755 with analyses by TEM and counting rules specified in International Standards Organization ISO 10312.	
33 out of 261 samples (13%) that had detectable asbestos	20 - 3658
228 out of 261 samples (87%) had non-detectable asbestos	ND

RESIDENTIAL AND GARDEN SOILS LIBBY Includes all asbestos, not just fibers longer than 5 micrometers	weight percent (%) (all asbestos included, not just PCM-equivalent asbestos)
EPA Region 8 data. ⁴⁹ Analysis by PLM. EPA found that for those Libby samples with non-detectable analysis by PLM, many were found to actually have high levels when scanning electron microscope (SEM) methods were used.	
yard soil, 13 of 258 (5%) samples had detectable asbestos	1 - 5 %
yard soil, 106 of 258 (41%) samples had a trace asbestos	trace
yard soil, 139 of 258 (54%) had non-detectable asbestos	ND
garden soil, 43 of 109 (39%) had detectable asbestos	1 - 5 %
garden soil, 59 of 109 (54%) had a trace asbestos	trace
garden soil, 43 of 109 (39%) had non-detectable asbestos	ND
driveway, 21 of 263 (8%) had detectable asbestos	1 %
driveway, 141 of 263 (54%) had a trace asbestos	trace
driveway, 101 of 263 (38%) had non-detectable asbestos	ND

AIRBORNE ASBESTOS, BUILDING INTERIORS LIBBY PCM-equivalent fibers and bundles longer than 5 Micrometers	PCM- equivalent MEAN fibers per milliliter f/mL	PCM-equivalent RANGE fibers per milliliter f/mL
EPA Region 8 data. ⁵⁰ ROUTINE AND ACTIVE OCCUPANCY. Analyses by TEM.		
routine activities, personal air monitor, 2 of 5 (40%) samples had detectable asbestos	0.35	0.023 - 0.048
routine activities, personal air monitor, 3 of 5 (60%) samples had non-detectable asbestos	ND	ND
routine activities, remote stationary air monitor, 4 of 10 (40%) samples had detectable asbestos	0.009	0.0003 - 0.036
routine activities, remote stationary air monitor, 6 of 10 (60%) samples had non-detectable asbestos	ND	ND
active cleaning activities, personal air monitor, 6 of 26 (23%) samples had detectable asbestos	0.010	0.004 - 0.013
active cleaning activities, personal air monitor, 20 of 26 (77%) samples had non-detectable asbestos	ND	ND
active cleaning activities, remote stationary air monitor, 3 of 17 (18%) samples had detectable asbestos	0.008	0.007 - 0.010
active cleaning activities, remote stationary air monitor, 14 of 17 (82%) samples had non-detectable asbestos	ND	ND

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