

The 9-11 World Trade Center Collapse Asbestos Risk Assessment

A Call For Action



Figure 1: The Towers Under Attack – Photo: Aris Economopoulos The Star-Ledger

A Mesothelioma Applied Research Foundation Report



Klaus Brauch
Communications Director

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Introduction

The collapse of the World Trade Towers (WTC), in the aftermath of the 9-11 terrorist attacks, is one of the most catastrophic political, economic, and social disasters to ever occur in America. Ramifications from the collapse are both far reaching, and long lasting, and are expected to have an impact on the lives of the citizens of the United States, and indeed of the world, for the foreseeable future.

Sadly, the death of 2654¹ innocent individuals in Manhattan was celebrated as a great victory by supporters of Al Qaeda around the world. There is little doubt that further innocent deaths related to 9-11 would add to the prestige and influence of Al Qaeda, increasing their ability to recruit new martyrs and to continue and even expand their attacks on the West. It is imperative that we prevent further deaths related to 9-11 from happening.



Figure 2: The 9-11 dust cloud advances – Photo Bill Biggart © 2001

But are future deaths and injuries likely as a result of the terrorist attack of 9-11? Can we establish that contamination from the dust of the collapse of the towers might be the cause of future health problems among residents and rescue workers?

We know that the gray cloud which covered lower Manhattan on 9-11, and the immediate aftermath, contained a variety of substances that are usually injurious to human health. These included traces of glass shards, asbestos, fiberglass, pulverized concrete, lead, mercury, cadmium, dioxins, PCB's, polycyclic aromatic hydrocarbons as well as benzene.²

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Significant media attention has already been directed at the short term health impact of exposure to this concoction. It now appears that many first responders, cleanup crews and local residents have fallen ill with a variety of

¹ "The World Trade Center" Sad News Dot Net Weekly

² "Fallout", Jennifer Senior, New Yorker Magazine, September 20,2004, P 4

respiratory ailments, including a “World Trade Center Cough” caused by bronchial responsiveness³ as well as “ear, nose, and throat problems.”^{4 5} These have affected fully 88 percent of those who participated in a Mount Sinai School of Medicine study of the rescue workers. These data, and numerous anecdotal accounts of police⁶ and firefighters⁷ placed on disability due to similar ailments, have made it important to document more clearly the nature and degree of the exposure to potentially toxic substances that took place.

It is known that a large amount of asbestos was used to insulate the lower floors of the Twin Towers. Estimates range from 100 to as high as 1000 tons but it remains unclear how much asbestos actually became airborne on 9-11. It also isn't known yet how much asbestos found its way into adjacent buildings before they were cleaned up. The collapse of the towers was clearly an unprecedented event. Nothing like it has been seen before in connection with asbestos exposure. Was this asbestos event significant enough to cause future cases of mesothelioma?



Figure 3: 9-11 conditions in lower Manhattan – Photo Aris Economopoulos/ The Star-Ledger

Pictures and videos of pervasive dust clouds and “poor” protective equipment are widely available. Is this sufficient to prove that conditions on the ground in those first few days represented a bolus⁸, or extremely massive, toxin exposure of WTC dust? Unfortunately, none of these questions have yet been definitively answered and we therefore

don't understand the long term health risk. Resolving these questions is more than a moral imperative. It is a matter of the greatest urgency if we are to have the time to develop a cure for mesothelioma and stop any more names from being added to the list of victims of the terrorist attack of 9-11.

³ “Cough and Bronchial Responsiveness in Firefighters at the World Trade Center Site,” David J. Prezant et al, New England Journal of Medicine, Vol. 347, No. 11, September 12, 2002

⁴ EPA OIC Report No. 2003-P-00012, page 18, August 21, 2003

⁵ Nordgrén, Megan, et al., “The Environmental Impacts of the World Trade Center Attacks – A Preliminary Assessment,” National Resources Defense Council, Feb 2002

⁶ “Fallout”, Jennifer Senior, New Yorker Magazine, September 20, 2004

⁷ An Air of Discontent, Graham Rayman, Newsday, Long Island N.Y., Page A28, September 11, 2003

⁸ Bolus, n. a large pill [Late Latin from Greek bolus ‘clod’]

The purpose of this report therefore is to do the following:

1. research and document how much asbestos was actually installed in towers one and two of the World Trade Center;
2. research and document how much of this asbestos became part of the respirable environment on 9-11 and immediately afterwards;
3. establish what is known about the extent of residual asbestos contamination in lower Manhattan offices and residences;
4. identify the number and type of individuals exposed to asbestos and who might be at risk for mesothelioma in and around ground zero;
5. document the current prognosis for victims of mesothelioma using the latest medical technology;
6. develop a set of recommendations, define a strategy and build support for a well funded program of research into asbestos related cancer and related diseases.

Those of us who are familiar with the carnage caused by mesothelioma, are fully aware that research funding for a cure is disproportionately low. This is especially so when compared to other cancers. Mesothelioma largely remains an orphan disease and the medical community at large is often unaware of how to quickly diagnose and/or effectively treat the disease.

If there is any chance that mesothelioma might be a byproduct of the asbestos event of 9-11 then we must act. We must deny Osama Bin Laden and his followers any chance of creating additional victims of 9-11. The effects of asbestos exposure will take decades to make themselves felt. If we act now, we might still have time to undo the collateral damage that may be lurking just over the horizon.

Klaus A. Brauch
Communications Director
Mesothelioma Applied Research Foundation.
(714)969-1481

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Asbestos In The Towers

We will begin our report by establishing the amount of asbestos that was used in the construction of the Twin Towers. The World Trade Center wasn't completed until 1973 and New York City banned the use of asbestos in 1971. This meant that only the first 64 floors of the towers were sprayed with asbestos fire retardant.⁹ The upper floors of the building received a different, and some say a less effective, passive fire protection treatment. The other buildings that formed the rest of the WTC were completed after the towers and were also protected with an asbestos replacement.¹⁰

The metal beams that formed the frame of the Twin Towers were given a fire retardant coating by spraying an asbestos-containing foam onto the cross members during construction. Asbestos Corporation of Canada even advertised the "fire retardant" advantages of the asbestos used in the towers in a 1981 ad.



Figure 4: Asbestos advertisement - NYCOSH

How much asbestos was actually used in the construction of buildings one and two? A review of available sources was done by the Independent Media (www.indymedia.com) in 2001 and found that W.R. Grace, U.S. Mineral, and others were involved in placing asbestos insulation, floor tiles and other incidental building materials into the towers.

According to Indymedia's research, "W.R. Grace asbestos-containing insulation was used at the WTC." "Grace Vermiculite...was 2-5 percent asbestos. 100,000 80 pound bags of this vermiculite were used in the WTC. In addition, 9,150 pounds of MonoKote 3 was used at the WTC. MonoKote 3 was about 20 percent asbestos. Therefore, in total about 201,183 pounds of pure asbestos fiber from Grace alone was used in the WTC."¹¹ According to the National Resources Defense Council report of February 2002, an estimated 300 to 400 tons of asbestos from all vendors was used during construction.¹² We can reliably estimate, therefore, that at least 400

⁹ "Asbestos Could Have Saved WTC Lives", Fox News, Steven Milloy, Sept 14, 2001

¹⁰ "WTC Building Performance Study", FEMA, Volume 403, May 2002

¹¹ "WTC: Danger of Asbestos Fallout", www.immuneweb.org/911/articles/moeller.html Sept 16, 2001

¹² Nordgrén, Megan, et al., "The Environmental Impacts of the World Trade Center Attacks – A Preliminary Assessment," National Resources Defense Council, Feb 2002

tons of asbestos fibers, and possibly more, were in the buildings at the time of the collapse.

Asbestos Characteristics At Ground Zero

The RJ LeeGroup Report - 130 Liberty Street

The RJ LeeGroup (RJL) of environmental consultants completed an extensive and leading edge study of the dust found throughout 130 Liberty Street, across the street from the WTC. This study was undertaken on behalf of the tenant, the Deutsche Bank, after the building was damaged by the collapse of the towers. 130 Liberty Street could not be reoccupied until it was cleaned and repaired, and Deutsche Bank felt the building was too contaminated, so they hired RJL to prove their case to the insurers. Since the building was untouched until the study, it had not been repaired or purged of dust. In 2003 the building still provided RJL's investigators with a glimpse of what the true asbestos exposure in the immediate aftermath of the tower collapse must have been like. RJL's primary objective was to confirm that contamination was beyond recovery, not to consider potential exposure risk during, or shortly after, 9-11. The study has, however, proved to be useful as a model to evaluate asbestos exposure rates during that time.

Dust from the building and surrounding area, including ground zero, was analyzed and found to contain a unique and consistent set of characteristics which RJL called the "WTC Signature".¹³ The building's insurers and their experts claimed that the residual dust found between the walls and inside structures was innocuous, or could be easily remediated with conventional asbestos suppression techniques¹⁴. RJL's study successfully proved that the Deutsche Bank building was pervasively contaminated and could not be salvaged. This was possible because of the study's advanced sampling protocols, careful methodology and attention to detail. As of this writing, the building remains condemned and ways are being sought to demolish it without creating further contamination of the surrounding area.¹⁵

The WTC signature dust's profile of chemical and morphological properties¹⁶ made it unique to the 9-11 event. The asbestos content of WTC dust differed markedly from asbestos concentrations in "control" sites, where industrial levels of asbestos could be found in concentrations of from 0.0001 to 0.01 percent asbestos by volume. The WTC signature dust contained an average of 0.5 to

¹³ RJ LeeGroup Inc., Signature Assessment 130 Liberty Street Property, Expert Report – WTC Dust Signature, Page 10, May 2004

¹⁴ RJ LeeGroup Inc., Signature Assessment 130 Liberty Street Property, Expert Report – WTC Dust Signature, Page 4, May 2004

¹⁵ "Fallout", Jennifer Senior, New Yorker Magazine, September 20, 2004, P 9

¹⁶ RJ LeeGroup, WTC Dust Signature Report, Page 10, May 2004

1.0% of asbestos and some samples contained as much as 3.0% asbestos by volume.¹⁷ Concentrations of fibers found within the curtain walls of the building were "1,085 s/cm² or over 6,900 times above the Average Appropriate level"¹⁸. The maximum asbestos concentration is 48,930,000 s/cm² or over 61,000 times the Maximum Appropriate level."¹⁹

The WTC dust was created from the mix of volatile chemicals and toxic metals that had been vaporized in the tower fires and pulverized by the collapse. These materials were further combined with the friable substances found throughout the buildings, such as fuel oil, plastics, paper etc. The sheer impact of the collapse, combined with the intense heat of the fires, created a light and easily dispersed toxic dust that filled the air and entered nearby buildings under intense pressure, occupying every available space within the structures.²⁰ In the opinion of RJL, the WTC signature dust was more easily aerosolized and more easily respirable (breathable) due to the unique way in which it was created. It was found throughout the entire structure within accessible, as well as inaccessible, locations in the building.²¹



Figure 5: Unprotected 1st Responders – Photo - Bill Biggart
© 2001

Ordinary asbestos dust is created through destructive forces that are considerably less forceful than the tower collapse. The asbestos fibers found in the WTC signature dust were much thinner, lighter, and shorter, making them much more likely to penetrate the lung and to translocate across tissue boundaries. Such properties are directly implicated as being causative for mesothelioma.²² ²³ The Agency for Toxic Substances

and Disease Registry (ATSDR) states "Additional data indicate that short fibers

¹⁷ RJ LeeGroup, WTC Dust Signature Report, Page 13, May 2004

¹⁸ The Average Appropriate level is a standard developed by RJL for comparison of sites that have suffered industrial contamination. It represents a baseline of what is usually found to be the minimum threshold.

¹⁹ RJ LeeGroup, WTC Damage Assessment 130 Liberty Street, CR-07, Page 9, December 2003

²⁰ RJ LeeGroup, WTC Damage Assessment 130 Liberty Street, CR-06 Page 7, December 2003

²¹ RJ LeeGroup, WTC Dust Signature Report, Page 18, May 2004

²² RJ LeeGroup, WTC Dust Signature Report, Page 20, May 2004

²³ Suzuki and Yuen, "Asbestos Fibers Contributing to the Induction of Human Malignant Mesothelioma", Annals NY Academy of Science Vol. 982, pp 160-176, 2002

can contribute to injury. This appears to be true for mesothelioma, lung cancer, and asbestosis.²⁴ As well, some of the WTC asbestos fibers were contaminated with other toxins.

The above data leads to the conclusion that the collapse of the Twin Towers, combined with the intense fires of the impact of two aircraft laden with fuel, created a unique and far more dangerous medium of asbestos-laden dust than would normally be found in the kind of industrial situations used as “control” sites. The RJL findings of 2004 are distinctly more alarming than studies of post clean-up exposure risk, such as the report by the New York City Department of Health and Mental Hygiene²⁵. They also warn of a more serious prognosis for those that were breathing the air in the vicinity of ground zero.

Opposing Studies

The Residential Study

It is worth examining in detail one of the studies that has been used as a primary reference to gauge the exposure risk of the residents of Manhattan since the attack. The “Residential” study²⁶, which was conducted in late 2002 by the NYC Dept of Health, dealt only with ongoing exposure to residents from that point forward and sampled dwellings that had been previously cleaned before being assessed. Careful sampling and evaluation of 30 residential buildings using both optical and transmission electron microscopy (TEM) revealed continuing evidence of asbestos but at low ambient levels, both in the air and on surfaces.

²⁴ “Toxic Health Profile for Asbestos - Public Health Statement”, ATSDR, CAS# 1332-21-4, Page 6

²⁵ NYC Health and ATSDR, Final Report Of The Public Health Investigation to Assess Potential Exposures to Airborne and Settled Surface Dust in Residential Areas of Lower Manhattan, Sept 2002

²⁶ NYC Health and ATSDR, Final Report Of The Public Health Investigation to Assess Potential Exposures to Airborne and Settled Surface Dust in Residential Areas of Lower Manhattan, Sept 2002, P.6

The Residential Study found asbestos in 18% of the samples from residential dwellings and common areas, varying from <1% to 1.5% indoors and to as high as 3.5% outdoors.²⁷



Figure 6: Indoor WTC dust contamination – Photo Dr. Lung Chi Chen, NYU

The report acknowledges

that “results from this investigation do not necessarily reflect conditions just following the collapse.”²⁸ Furthermore, the report states that “individuals who were in the lower Manhattan area when the WTC collapse occurred may have received a bolus inhalation dose of dust.” The report further states that “Health affects of bolus doses are not known. Additional exposures would add to the potential for health effects.”²⁹ The report specifically refuses to judge exposure risk on the basis of measurements made in the study.

²⁷ NYC Health and ATSDR, Final Report Of The Public Health Investigation to Assess Potential Exposures to Airborne and Settled Surface Dust in Residential Areas of Lower Manhattan, Sept 2002, P.5

²⁸ NYC Health and ATSDR, Final Report Of The Public Health Investigation to Assess Potential Exposures to Airborne and Settled Surface Dust in Residential Areas of Lower Manhattan, Sept 2002, P.7

²⁹ NYC Health and ATSDR, Final Report Of The Public Health Investigation to Assess Potential Exposures to Airborne and Settled Surface Dust in Residential Areas of Lower Manhattan, Sept 2002, P.18

Interestingly, when indoor dust levels fell within the range of “control” buildings from north of 59th street, no TEM or scanning electron microscopy (SEM) was conducted so no evaluation as to asbestos content in this dust was made.³⁰ There was additional evidence that something was not correct in the air sampling that was undertaken. Progressive air filters were used to screen particles based upon their size in microns. Even though 4 micron particles should have been a



Figure 7: Indoor WTC dust contamination – Photo Dr. L. Chi Chen, NYU

subset of the 10 and 100 micron filters, the fiber counts were sometimes higher in the PM4 category. This caused the researchers to reject the sampling results and discount the evidence.³¹

Finally, in the asbestos findings section of the report, it is observed that the asbestos found at the site was chrysotile and that these fibers tended to be more easily cleared from the lungs. It is, however, precisely this movement of asbestos fibers out of the alveolar regions that is the primary reason these fibers wind up in the pleural lining and cause mesothelioma. The NYC report states that studies of ongoing low grade exposure cases don't indicate risk for asbestosis and mesothelioma.³² Yet this is a finding which they refute a page later when they write, “these data cannot rule out the potential for long-term risk”.

Asbestos Findings

It is noteworthy that the EPA in its principal study failed to identify the smaller, thinner fibers of asbestos found by RJL because they used polarized optical microscopy. These fibers were below optical resolution levels. RJL used the newer, and more precise transmission electron microscopy (TEM) to conduct its examination of the WTC dust. Consequently, the amount of asbestos detected by EPA and other agencies in earlier samplings fell far short of the actual levels of

³⁰ NYC Health and ATSDR, Final Report Of The Public Health Investigation to Assess Potential Exposures to Airborne and Settled Surface Dust in Residential Areas of Lower Manhattan, Sept 2002, P.24

³¹ NYC Health and ATSDR, Final Report Of The Public Health Investigation to Assess Potential Exposures to Airborne and Settled Surface Dust in Residential Areas of Lower Manhattan, Sept 2002, P.25

³² NYC Health and ATSDR, Final Report Of The Public Health Investigation to Assess Potential Exposures to Airborne and Settled Surface Dust in Residential Areas of Lower Manhattan, Sept 2002, P.40

asbestos present. The residential study also failed to identify the more dangerous thinner fibers known to be especially carcinogenic.³³

Based on the above, we believe the JRL report to be more representative of the asbestos exposure risk during and immediately after the collapse. If we accept that the WTC dust was more carcinogenic than usual and far more respirable than ordinary asbestos dust, then the levels of exposure to which pedestrians, tower survivors, rescue workers and local residents were subjected, must be taken seriously. Exposures in the first few hours of the attack should be considered as causative for asbestos related disease, including mesothelioma.

Also worrisome is the fact that local residents were not properly cautioned about cleanup procedures. They were left to clean their apartments with simple tools like mops, brooms and vacuum cleaners, completely inadequate for safe removal of asbestos under any circumstances. Given adequate warning, the public could have arranged to professionally remove the hazardous levels of



Figure 8: Fruit Stand In Manhattan – Photo- Aris Economopoulos / The Star-Ledger

asbestos using the most stringent of controls, (see figure 11). Moreover, since the WTC dust was so fine and so pervasive, the chances of recontamination or resuspension in the air of the residual asbestos particles by simply using the furniture, walking on the carpets or operating the HVAC systems were, and continue to be, extreme. This puts nearly all residents at risk for long term exposure to hazardous levels of the form of asbestos, short and thin fibers, best suited for causing mesothelioma.

That a serious asbestos exposure of lower Manhattan residents and first responders took place is no longer in question. The EPA Office of the Inspector General (OIG), clearly states that the EPA had issued press releases indicating that the air was safe before the data to support these claims was proven.³⁴ The OIG report also points out that once asbestos was detected, warnings about “higher levels of asbestos” in the dust and in the air were removed and replaced with more soothing language stating that there was “no significant risk to the general public”³⁵. The OIG has come down on the side of caution and feels that

³³ RJ LeeGroup, WTC Dust Signature Report, Page 19, May 2004

³⁴ EPA OIG Report No. 2003-P-00012, page 15, August 21, 2003

³⁵ EPA OIG Report No. 2003-P-00012, page 16, August 21, 2003

exposure did indeed take place and that adequate precautions were not taken. It seems clear, therefore, that an undetermined portion of those exposed during 9-11 are at risk for mesothelioma. We shall now examine who those exposed individuals were.

Demographics Of Exposure

As of this date, no comprehensive health surveys of the civilian population of lower Manhattan have been done. A registry of individuals exposed to the WTC dust cloud has been created by the New York City Department of Health and Mental Hygiene³⁶.

This registry lists almost 45,000 individuals who consider themselves to have been exposed. It is limited in scope to those who knew about the registry and bothered to enroll on, or before, August 2004. This still falls far short of documenting the actual number of people who might be at risk, since it fails to account for large numbers of temporary out-of-state rescue workers, area



Figure 9: Survivors seek shelter in Manhattan – Photo- Aris Economopoulos / The Star-Ledger

school children and “undocumented” clean up crews hired by landlords. Furthermore, of the 57,071 residents of lower Manhattan (2000 census) only 9,939, or 17% have enrolled in the registry³⁷ to date.

Initial health data about the registrants will be available after October of 2004, but the purpose of the registry is to track the affected population and provide a benchmark for assessment against control populations that were not exposed. There are no announced plans to directly address the illnesses documented by the survey.

At Risk Population Analysis

The 2000 census reveals that 29,667 people lived within $\frac{3}{4}$ of a mile of ground zero in 16,482 housing units³⁸. The entire area of lower Manhattan has a

³⁶ “World Trade Center Health Registry”, New York City Dept. of Health and Mental Hygiene, Volume 1, Number 3, April 2004

³⁷ “World Trade Center Health Registry”, New York City Dept. of Health and Mental Hygiene, Volume 1, Number 3, Page 6, April 2004

residential population of more than 67,000 people. This would have been supplemented by an additional population of commuting workers who spent their working days in the WTC and adjacent office buildings. The WTC towers had a worker population in excess of 40,000 people³⁹. How many of these individuals actually lived in the area is unknown but records indicate that they probably weren't local residents. A demographic profile of the WTC victims has been assembled and is revealing in that regard.⁴⁰ Most of the victims were between 35-39 years of age. The majority were college graduates and many were in managerial, business and finance, or professional and related occupations.⁴¹ The family incomes of many of the tower workers in these professions exceeded \$200,000 per year.



Figure 10: NYPD Officers Exposed - Photo- Aris Economopoulos / The Star-Ledger

According to a recent Asian American Federation study, the majority of residents of lower Manhattan at the time were of lower income and education and were likely to be recent immigrants⁴². 2000 Census figures in that report showed that 36,124 (24%) of lower Manhattan residents lived below the poverty line. 34% (21,680) of lower Manhattan households had incomes of

less than \$20,000 per year. A large number of these residents lived in Chinatown. 45,222 or 41%⁴³ did not have a high school diploma. Since the occupants of the WTC and surrounding office towers represented the cream of America's financial industry, it is highly unlikely that these people would have been local residents.

Since only 2,016 of the nearly 40,000 professional⁴⁴ tower workers died in the attack, a significant portion of the remaining tenants must have been evacuated

³⁸ NYC Health and ATSDR, Final Report Of The Public Health Investigation to Assess Potential Exposures to Airborne and Settled Surface Dust in Residential Areas of Lower Manhattan, Sept 2002, P.56

³⁹ Sad News.Net Weekly, The World Trade Center, Sept 24, 2001

⁴⁰ New York Metro Online Edition, 9-11 By the Numbers, 2004

⁴¹ Gotham Gazette, The Affluent of Manhattan, Andrew Beveridge, June 6, 2003

⁴² Asian American Federation of New York, Lower Manhattan is Poorer, Less Educated and Growing Faster than Manhattan as a Whole, Census Profile Reveals, Jan 12, 2004

⁴³ Asian American Federation of New York, Lower Manhattan is Poorer, Less Educated and Growing Faster than Manhattan as a Whole, Census Profile Reveals, Jan 12, 2004

⁴⁴ Cantor Fitzgerald alone lost 658 highly paid employees. New York Metro Online Edition, 9-11 By the Numbers, 2004

from the lower floors,⁴⁵ or still on their way to work, or in the streets and subways at the time of the attack. A large number of workers from adjacent buildings would also have been in a similar situation, i.e. either at work and evacuated, or in the street, or in the subway. Data on the exact number of office workers in buildings nearby is sketchy but probably equaled the population of towers one and two.

This brings us to the conclusion that three populations were exposed during the attack. The first group was a residential population of approximately 30,000 people, some of whom would have returned home during the first several days of the attack, if not on 9-11. The second group consisted of an office worker population of approximately 80,000 people. This would have been supplemented by the first responders at the scene, approximately 4000 individuals.



Figure 11: Post Clean Up Sampling – Note the protective attire of the workers and compare to previous photos – Photo: EPA Confirmation Cleaning Study 110 Liberty Street

New York Police alone sent over 2,000 officers, sergeants, lieutenants and specialists to the scene.⁴⁶ The New York Fire Department supplemented its initial response of 235 firemen, 21 engines, 9 ladders and 4 elite rescue units with an additional 20 engines and 6 ladder companies plus EMS paramedics. In short, over a third of New York's fire resources were present at the towers at the time of collapse and 98 of the fire department's vehicles were destroyed⁴⁷, 343 firefighters and paramedics killed, 23 NYPD officers killed and

37 port authority officers killed. The exact number of first responders is still unclear.

In the days following the attack, there was an influx of rescue workers, construction crews, heavy equipment operators, NY state policemen, NY National Guardsmen and others. Numbers for these may never be known exactly but numbered into the thousands as well. Finally, there were thousands of rescue specialists and volunteers who entered the area in the days following the collapse. According to the EPA OIG report, the first responders, tower workers

⁴⁵ Only 18 tower workers from above the impact zone were evacuated. Sad News.Net Weekly, The World Trade Center, Sept 24, 2001

⁴⁶ The National Commission on Terrorist Attacks, The 9-11 Commission Report, Aug 5, 2004, PP 291-302

⁴⁷ New York Metro Online Edition, 9-11 By the Numbers, 2004

and selected local residents would have been subjected to a bolus asbestos exposure and most of them were poorly or not protected against such an exposure. When compared to the standards set by industry and the EPA for protective equipment and procedures to be used with asbestos clean up, the above populations were naked in the face of massive exposure. See Figure 11 above for the usual standards employed.

For rescue workers, cleanup crews and volunteers who came later, inadequate warning was given of the potential asbestos exposure risk. Urgency to complete the cleanup and expediency often meant that strict asbestos work rules and abatement techniques were not always followed. Those individuals who came later are not considered in our study.

Table A: Summary of Exposed Populations^(a)

Tower Workers	Approximately 80,000
Local Residents	Approximately 30,000
First Responders	Approximately 4,000
TOTAL	Approximately 114,000

Table A: Summary of exposed Populations During 9-11

(a) exposure to bolus amounts of asbestos prior to cleanup operations only. Does not consider ongoing exposure during site clearing and debris removal.

Asbestos Impact and Prognosis:

Overview of Mesothelioma

It has been established beyond doubt that exposure to asbestos can cause mesothelioma.⁴⁸ Even a minimal exposure can be causative and the EPA has long held the view that there are no safe levels of asbestos exposure. Mesothelioma is an aggressive malignancy of the pleura and of the peritoneum.⁴⁹ The tumor develops slowly, taking over 10 to 30 years to develop after exposure. Mesothelioma is found to consist of three subtypes, epithelial, mixed type, or sarcomatous, the latter having the worst prognosis for survival. In pleural mesothelioma, the tumor tends to appear in one lung, with a right/left preference of 60% to 40%. Pleural mesothelioma occurs about four times more frequently than peritoneal, with peritoneal being on the decline and pleural on the upswing. Men are five times more likely than women to get pleural mesothelioma and both sexes are equally represented with peritoneal.

⁴⁸ "Therapeutic Advances in the Management of Malignant Mesothelioma", Medscape.com, article 460026, Page 1

⁴⁹ "Therapeutic Advances in the Management of Malignant Mesothelioma", Medscape.com, article 460026, Page 1

As of this time, there are no medical procedures that are curative. Survival times vary based on several prognostic indicators but the overall median survival time is between 8 and 18 months. Epithelial cases without lymph node involvement, and who are younger than 50, have the best chance for long term survival.⁵⁰ Median survival numbers for this group are trending up, and vary based on the type of treatment chosen. Sarcomatous subtype patients or patients with nodal involvement tend to have no long term survivors with two year survival rates of 0% and a median survival time of only 5.5 months⁵¹.

The symptoms of mesothelioma are cruel and painful. As the tumor grows and expands, it produces fluid that fills the chest or the abdomen, depending upon whether it is pleural or peritoneal mesothelioma. This fluid places pressure on vital organs. In the case of pleural mesothelioma, which represents 80% of cases, the fluid compresses the lung, causing intense pain, shortness of breath and overwhelming fatigue. The mesothelioma sufferer cannot sleep comfortably, loses appetite and endures excruciating pain as the fluid and the expanding tumor slowly fills up the chest, crushing the lung. Relieving the fluid pressure is only short term and provides only symptomatic relief. Patients rarely survive long enough for medical science to establish whether or not mesothelioma actively metastasizes or not. As median survival times lengthen, we will learn more about this.

Surgery is the only proven treatment to produce long term survivors. It is, however, extremely difficult, painful and dangerous. Surgery involves either the complete removal of the lung or the stripping of the lining of the lung. In all successful surgery cases, the pleural lining is removed, including all or part of the affected diaphragm, as well as the outside cover of the heart, the pericardium. Despite all of these interventions, only six percent of patients live five years after treatment. A large percentage of mesothelioma patients are found to be ineligible for surgery, in some cases after surgery begins. As mentioned above, this cancer is considered incurable.

Treatment for mesothelioma is consequently considered purely palliative and has three goals: improve quality of life, increase median survival, and decrease disease progression. Current research, as modest as it is, is focused on halting the progress of the disease and alleviating symptoms. There is no "gold" standard of treatment for the medical community to look to.

⁵⁰ "Prognostic Indicators Predictive of Survival" in "Therapeutic Advances in the Management of Malignant Mesothelioma", Medscape.com, Article 460026, Table 1, Page 3

⁵¹ "Therapeutic Advances in the Management of Malignant Mesothelioma", Medscape.com, article 460026, Page 3

Diagnosis and staging of the disease is difficult. Examination of pleural effusions (fluid around the lung or in the abdomen) is only rarely conclusive⁵² without a laparoscopic exam (abdomen) or video assisted thoracoscopy (chest). A diagnosis of mesothelioma can only be made from pleural fluid in about 33% of cases,⁵³ so a definitive diagnosis is difficult without intrusive surgery and a tissue biopsy.⁵⁴ This in itself is difficult surgery and many people don't receive it and/or are long delayed in diagnosing their cancer. Finding the stage of the cancer is therefore even more difficult.

Staging is essential to selecting the appropriate treatment and is still a fairly imprecise process, although progress is being made in establishing a standard. Patients with stage 3 or higher disease are almost always only considered for chemotherapy. Surgical candidates tend to be stage 1 and 2 patients, while radiation treatment is still considered only as an adjuvant treatment, having little effect on its own. Single protocol treatments are universally ineffective and are no longer in favor. Multimodal treatments that combine several treatment approaches, i.e. surgery in combination with a single or a combination of chemotherapy agents, are rapidly becoming the recommended treatment paths for mesothelioma. Multimodal surgery is the primary option and combination chemotherapy is an alternative treatment for patients who are not candidates for surgery. Survival rates tend to fall into distinct categories based on these treatment paths.

The various treatment options for Pleural Mesothelioma and their effects are outlined in table B on the next page.

⁵² "Malignant Pleural Mesothelioma: Surgical Roles and Novel Therapies," Clinical Lung Cancer, Harvey I. Pass, Nov 2001, Page 105

⁵³ "Malignant Pleural Mesothelioma: Surgical Roles and Novel Therapies," Clinical Lung Cancer, Harvey I. Pass, Nov 2001, Page 105

⁵⁴ "Malignant Pleural Mesothelioma: Surgical Roles and Novel Therapies," Clinical Lung Cancer, Harvey I. Pass, Nov 2001, Page 106

Table B: Treatments And Outcomes For Pleural Mesothelioma⁵⁵

Legend: 1 = lowest, 5 = highest, na = not available. **Note** that lower can mean both best and worst. Stage = 1 is best, but a QOL = 1 is worst.

Treatment	Recommended Stage ^(c)	Quality of Life QOL ^(a)	Risk of Morbidity ^(b)	Median Survival (months)
Supportive Care	3 to 5	1 to 3	1	6 to 8
Thoracoscopic Pleurodesis	All	1 to 3	1 to 2	7 to 9
Pleurectomy	1 to 2	2 to 4	1 to 3	13
Multimodal Extrapleural Pneumonectomy (EPP) With Intracavitary Chemo ⁵⁶	1 & 2	2 to 4	3 to 4	30
Pleurectomy/Brachytherapy	na	na	na	11
Multimodal Extrapleural Pneumonectomy (EPP)	1 & 2	2 to 4	3 to 4	13 to 19
Surgery/Photodynamic Therapy	na	na	na	14
Radiotherapy alone	na	3 to 4	1 to 2	8 to 15
Single Agent Chemotherapy	3 to 5	3 to 4	1 to 2	6 to 9
Combination Chemotherapy	3 to 5	3 to 5	1 to 2	6 to 16

(a) (b) Author's view based on 100+ patient interviews. (c) Since surgery is not always possible patients tends to be segregated into surgical and other treatment groups by stage. Lower stage is usually more likely to obtain surgery.

Data in the above table is mostly from 2001 or before, and some advances are being made, but we can conclude that a cure for mesothelioma still eludes us, and that the disease is still terminal. Research investments for mesothelioma are inadequate and not comparable to other cancers with similar annual death rates. Cervical cancer, with 4,100 cases a year, receives \$17,340 of funding per case as opposed to mesothelioma with 3,000 cases a year and only \$933 per case.⁵⁷

⁵⁵ "Malignant Pleural Mesothelioma: Surgical Roles and Novel Therapies," Clinical Lung Cancer, Harvey I. Pass, Nov 2001, Page 111

⁵⁶ Sugarbaker, Bueno et. Al. Proceedings of the First International Mesothelioma Symposium, Oct 2004

⁵⁷ "Curing Mesothelioma: Who Will Take the Initiative", Roger Worthington, Proceedings of the First International Mesothelioma Symposium, Oct 2004, Slide 6

While mesothelioma cases continue to increase annually, and have skyrocketed since the late 1960's⁵⁸, funding has not kept step, increasing this disparity.

Since 32% of American mesothelioma cases per year served in the navy or worked in navy shipyards⁵⁹, the department of defense would be well served by investing in mesothelioma research. They currently don't spend even a dollar on this cancer⁶⁰ but have provided over \$1.5 billion dollars of research funding for prostate and breast cancer from 1992 to 2003.⁶¹ Without a significant increase in mesothelioma cancer research, there is little hope that the suffering from this disease will end in time to help those exposed to asbestos during 9-11. Given the current state of affairs, it seems inevitable that the bolus exposure of over 100,000 individuals to a highly toxic form of finely ground asbestos dust will prove to be deadly to many of them. Yet the long latency of the cancer is in our favor. If we act swiftly, we may have several decades to find a cure before we are confronted with the first victims.

Recommendations

The brave men and women who responded to their countrymen on 9-11 are our true American heroes. Too many of them died in the disaster. Can we allow mesothelioma attributable to 9-11 to claim more of our finest citizens in the future? What can Americans do to help the victims of asbestos, present and future? How can Americans find the resources in these difficult times to invest in a leading edge research effort to cure this disease?

There are already many good reasons to invest in mesothelioma research. Mesothelioma is a solid tumor and any advances we make in treatment may be useful in the treatment of other solid tumors. Mesothelioma metastasizes into the liver, adrenal gland, kidneys, brain and contralateral lung.⁶² Despite minimal funding to date, some progress has been made in the last decade that indicates mesothelioma may, in fact, be a curable disease.⁶³ Although finding sources of funding won't be easy, isn't an insurmountable obstacle either. MARF's directors have set forth a strategy and specific goals for accomplishing this mission:

⁵⁸ "CDC Says Asbestos Deaths Will Probably Keep Climbing", Associated Press, July 22, 2004
http://abcnews.go.com/wire/Living/ap20040722_1032.html

⁵⁹ "Curing Mesothelioma: Who Will Take the Initiative", Roger Worthington, Proceedings of the First International Mesothelioma Symposium, Oct 2004, Slide 10

⁶⁰ "Curing Mesothelioma: Who Will Take the Initiative", Roger Worthington, Proceedings of the First International Mesothelioma Symposium, Oct 2004 Slide 10

⁶¹ "Curing Mesothelioma: Who Will Take the Initiative", Roger Worthington, Proceedings of the First International Mesothelioma Symposium, Oct 2004 Slide 11

⁶² "Malignant Pleural Mesothelioma: Surgical Roles and Novel Therapies," Clinical Lung Cancer, Harvey I. Pass, Nov 2001, Page 104

⁶³ "Letter to Trustees of the National Gypsum Asbestos Settlement Fund", Dr. Harvey Pass, Sept 9, 2004

1. All Americans should join MARF in lobbying for a Congressionally Directed Medical Research Program specifically for mesothelioma. This could be done under the auspices of the Dept of Defense or the Dept of Veterans Affairs.
2. MARF has already begun to approach the administrators of the various asbestos settlement trusts and asked them to fulfill their obligations to the plaintiffs of those trusts. They can do this by setting aside a portion of the trust for mesothelioma and other asbestos related disease research. After all, every mesothelioma sufferer wants a cure, first and foremost.
3. MARF plans to approach the parties in ongoing and future asbestos injury litigation about making a "research reserve" out of a portion of any settlements that are reached. All parties should contribute a portion of the reserve, defendants, plaintiffs and the lawyers for both sides.
4. MARF must approach the media, the government and the general public through advertising and through lobbying, to spread the understanding that, in this case, mesothelioma is a side-effect of the fight against terrorism. Those exposed to the 9-11 WTC dust cloud were the first Americans to be involved in a "dirty bomb" scenario. Such a scenario involves not only casualties caused directly by the attack, but involves collateral deaths and injuries due to the "fallout", which in this case consisted of toxic compounds and carcinogenic fibers.

Conclusions

The attack of 9-11 was unprecedented in terms of an asbestos exposure event. History, therefore, can't guide us as to what the exact cancer risk is, but it appears more than likely that a health crisis will unfold over the next two to three decades unless we find a cure for mesothelioma. We can wait until the health registries fill up with casualties to confirm that the asbestos exposure of 9-11 was lethal or we can set our minds and our resolve on finding a cure.

There are many parties currently involved in a debate about the events of September 11, 2001. They include the government and non-governmental agencies, families of victims, the injured, the media, and insurance companies. Union groups representing the first responders and clean up workers who were there are also involved, because many of their members have fallen ill. Most of these groups have conflicting goals that either involve assigning blame, or minimizing the risk, or seeking to evade responsibility. Some are merely cataloguing the damage while others are seeking reparations.

MARF is unique in its focus and its mission. We seek to save the lives of those who are exposed to asbestos and become victims of mesothelioma. This is even more important now that we are fighting to save the lives of the heroes and innocents whose health was endangered by the catastrophic events of 9-11. We

cannot retrace our steps and erase what happened that day, nor can we adequately address the coming carnage with our existing medical technologies.

Solving the riddle of asbestos induced illness will be a giant step forward in the fight against all cancers. We believe our approach is the best one, and will lead to a productive, rather than a divisive, or rancorous outcome. By defeating mesothelioma we can salvage some good from this epic tragedy. There is no nobler cause than to invest in mesothelioma research. Curing this disease will deny the terrorists another victory from the shadow of September 11th, 2001. We firmly believe the goal of a cure is attainable.