



THE
ENVIRONMENTAL
IMPACTS OF THE
WORLD TRADE
CENTER ATTACKS

*A Preliminary
Assessment*

February 2002

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Natural Resources Defense Council
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SUMMARY

SUMMARY OF FINDINGS

- The terror attacks on the World Trade Center, in addition to their heart-wrenching toll on human life and wide-ranging economic impacts, constituted an unprecedented environmental assault for Lower Manhattan. At least 10,000 New Yorkers have suffered short-term health ailments from Trade Center-generated air contaminants.
- There is good news to report concerning the quality of outdoor air in Lower Manhattan today. In general, outdoor air quality in Lower Manhattan is now approaching, or is similar to, levels in this area prior to September 11th.
- Other than isolated outdoor hotspots, the most worrisome air pollution problem now facing Lower Manhattan in the aftermath of the September 11th attacks involves indoor pollution threats in some residences and offices that received high doses of debris and dust and whose buildings were not properly cleaned. The remaining indoor pollution is manageable.
- Despite much that is praiseworthy, the overall government response to the environmental health challenges presented by September 11th fell short in several crucial areas. Among the key problems were gaps in coordination and leadership, difficulties in communicating environmental information to the public, occupational safety shortcomings at Ground Zero and problems assisting Lower Manhattan residents on environmental safety and cleanup. Of the more than nine city, state and federal agencies involved in aspects of the environmental health response to the September 11th attacks, the performance of the New York City Department of Environmental Protection and the federal Occupational Safety and Health Administration were particularly disappointing.
- There is still much that remains uncertain about specific environmental conditions and impacts following the September 11th attacks. The scale of the September 11th pollution event, in which hundreds if not thousands of toxic components were simultaneously destroyed, was unprecedented. And the synergistic impacts of multiple pollutants on human health in the aftermath of an air quality emergency such as the one that began on the day of the attacks are unknown.
- On the whole, debris removal from the World Trade Center site has advanced swiftly and without major environmental problems (other than troubling inconsistencies in covering and wetting down debris). Nevertheless, additional attention is warranted concerning the burial of potentially contaminated waste at the Fresh Kills landfill and the final waste cleanup plan at Ground Zero. As to the Hudson River and surrounding waterways, limited data do not appear to reveal significant environmental impacts from

the September 11th attacks, although further testing is needed. And as to New York City drinking water quality, all available data indicate that the city's water supply was unaffected by the events of September 11th.

SUMMARY OF RECOMMENDATIONS

- The Occupational Safety and Health Administration, along with appropriate state and city agencies, should immediately undertake stringent enforcement of workplace safety standards for workers at Ground Zero and workers involved in cleanup of dust- and/or debris-filled offices or residences in the vicinity of the Trade Center site.
- The U.S. Environmental Protection Agency, the New York City Department of Environmental Protection and other relevant agencies should immediately create a joint task force to address remaining indoor air problems in Lower Manhattan residences and office buildings.
- State and city agencies and the Lower Manhattan Redevelopment Corporation should act without delay to require the use of low-sulfur fuel (that is, no more than 15 parts per million) for all diesel trucks and equipment operating in connection with Trade Center recovery, cleanup, and rebuilding operations.
- The federal government should provide additional funding to assist in the completion of recently initiated health studies of the environmental impacts of the September 11th attacks on workers and residents of Lower Manhattan.
- The federal government should provide funding to the Centers for Disease Control to assist in the establishment of a comprehensive health registry for workers, residents, schoolchildren and newborns in the Ground Zero vicinity who may have been impacted by the attacks on the World Trade Center.
- New York City Mayor Michael Bloomberg should officially designate the New York City Department of Environmental Protection to lead and coordinate the response of various government agencies to future environmental emergencies in New York City.
- Mayor Bloomberg and the New York City Council should advance legislation creating a New York City Committee of Environmental Science and Health Advisors to work, in conjunction with the Board of Health, to assist city officials in evaluating information and communicating it to the public during future environmental health emergencies.
- Mayor Bloomberg and the New York City Council should commission an independent assessment of the response of government agencies to the environmental health challenges presented by the September 11th attacks.
- Congress should enact S.1621 to establish a permanent health monitoring system at disaster sites.

- The U.S. Environmental Protection Agency should initiate a review of existing national ambient air quality standards with the aims of revising particulate matter standards to account for high-intensity, short-term pollution bursts and of reviewing whether new standards for other pollutants discharged on September 11th are warranted.
- The U.S. Environmental Protection Agency, the New York State Department of Environmental Conservation and the New York City Department of Environmental Protection should review New York City's entire air quality monitoring network with the aim of adding stationary and mobile monitors to the existing system, so as to provide comprehensive monitoring information on an ongoing basis and in future environmental emergencies.
- Congress, the U.S. Environmental Protection Agency and the New York State Legislature should develop and advance proposals to minimize the amount of toxic substances that are used in office products and consumer goods.

INTRODUCTION

The September 11, 2001, terrorist attacks on the World Trade Center constitute perhaps the worst episode in the history of New York City. The death toll of nearly 3,000 persons is greater by far than any other New York calamity. Indeed, with the exception of the Civil War battle of Antietam, more lives were lost on September 11th than on any other day in the nation's history.¹ September 11th also caused huge economic dislocations to the city and the nation. According to the New York City Comptroller's Office, the economic cost to the city in just the current and next fiscal years could be as high as \$90 to \$105 billion dollars.² And, as if all this were not enough, the events of September 11th resulted in a significant environmental health emergency, particularly for those who live and work in Lower Manhattan.

At the same time, the events of September 11th brought out the best in New Yorkers. Thousands of heroes — firefighters, police officers, Port Authority staff, emergency medical personnel and many other government workers — displayed their skills that day, including hundreds who made the ultimate sacrifice. Mayor Rudolph Giuliani demonstrated personal courage and leadership during a period when his fellow citizens needed it most. And residents of New York City and the region also rose to the occasion — pulling together in an unprecedented spirit of cooperation and support for our city and our nation.

It is in that spirit that NRDC is issuing this report. This document is NRDC's first written evaluation of the environmental consequences of the attacks of September 11th. The purpose of the report is to lay out the facts, as best as we know them at this point, regarding both the environmental impacts of the attacks and the response of government officials to the ensuing environmental emergency. This analysis, completed five months after the attacks, is not intended to cast blame, but to report on, and learn from, what happened to our environment on September 11th. Consistent with that objective, it also sets forth recommendations for improving New York's readiness for future environmental health emergencies.

There is still much that is not known about specific environmental conditions on and after September 11th. Accordingly, this report is a preliminary study and not intended as a definitive analysis of the environmental impacts of September 11th. In fact, such an analysis may not be available for years — until after long-term health studies such as those now being undertaken by Columbia University's Mailman School of Public Health, Mount Sinai's School of Medicine and others are complete, and after additional monitoring data have been produced and analyzed. Recognizing such limitations, NRDC intends to release a follow-up analysis in September 2002.

In preparing this preliminary report, NRDC followed a straightforward methodology. First, we contacted city, state and federal environmental and health agencies to obtain air pollution monitoring data, official press releases and other documents related to the September 11th disaster. (Much of these data were ultimately posted on the websites of the agencies.) We also spoke to consultants who conducted their own environmental monitoring for various businesses, schools, residential buildings and apartments.³



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Finally, we conducted numerous telephone interviews with employees of various government agencies, independent medical experts at leading academic institutions, other environmental health specialists and representatives of the Lower Manhattan community.

The remainder of this report is divided into five chapters. In Chapter I, we describe environmental impacts of the September 11th attacks on Lower Manhattan, its residents, and workers. In Chapter II, we discuss the response of government agencies to the environmental health emergency that followed the attacks. In Chapter III, we outline, in preliminary form, the air pollution impacts of September 11th. In Chapter IV, we summarize the impacts of the waste disposal and cleanup operations associated with the World Trade Center attacks, as well as effects of the disaster on New York's waterways and drinking water supply. Finally, in Chapter V, we outline recommendations for government action based on our initial research and analysis.

AN UNPRECEDENTED ENVIRONMENTAL ASSAULT

The terror attacks on the World Trade Center, in addition to their heart-wrenching toll on human life and wide-ranging economic impacts, constituted an unprecedented environmental assault for Lower Manhattan. On that tragic morning, more than 1.2 million tons of building materials collapsed in the midst of one of the nation's most densely populated neighborhoods.⁴ An intense fire, fueled by thousands of gallons of jet fuel, spewed toxic gases into the air. Asbestos, used in the construction of one of the towers, rained down over the streets. Burning computers and other electrical equipment sent dioxins, mercury and other hazardous substances into the drifting plume. Vast quantities of dust, glass and pulverized cement were blown throughout the surrounding neighborhood. For more than three months after the event, acrid smoke continued to waft into the air. Dust particles continued to be dispersed throughout the neighborhood from the site's cleanup operations. In addition to these air quality issues, the destruction of the World Trade Center created a monumental waste-disposal challenge and potential threat to New York's waterways.

Exposure to pollutants from the World Trade Center attacks has come primarily in three phases. First, the collapse of the two 110-story towers and adjacent structures generated high-intensity, peak pollution discharges on September 11th. Second, fires from the crash of two fuel-filled airliners into the Trade Center towers and fires and the resulting smoke plume at Ground Zero following the towers' collapse created significant additional pollution discharges, which continued to some degree for at least three months. Finally, the resuspension of asbestos, dust, pulverized cement, fiberglass etc., during the cleanup and transport of wastes at Ground Zero and in cleanups of residences and office buildings in the immediately surrounding area produced localized pollution hot spots. While addressed to some degree as of February 2002, such hot spots still pose problems in isolated locations (for example, improperly cleaned apartments and poorly cleaned building rooftops and ventilation systems in Lower Manhattan).

A major reason for concern is the large volume of toxic materials that was apparently present in the World Trade Center towers. For example, by some accounts the north tower had as much as 300 to 400 tons of asbestos.⁵ Also in the two towers were as many as 50,000 personal computers, each of which contained a wide variety of harmful constituents including four pounds of lead, as well as much lesser but still troubling amounts of mercury. The towers also contained 300 mainframe computers, and powering all these devices were hundreds of miles of wires and cables containing polyvinyl



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chloride and copper. The thousands of fluorescent lights used in the towers also contained mercury, a toxic metal. In addition, large amounts of fiberglass, used in insulation, were contained in the towers. To this must be added the unknown tons of plastics, which when burned produce harmful dioxins and furans; an unknown amount of painted or stained products and materials, which were one of many sources of volatile organic compounds within the destroyed buildings; and thousands of chairs and other office furniture containing such chemicals as polybrominated diphenyl ethers, which are persistent organic pollutants believed to pose dangers similar to PCBs. Additionally, several storage tanks containing petroleum products and a number of small hazardous-waste-generating entities at the World Trade Center complex, which were destroyed on September 11th, added to the toxic mix.⁶ And two Con Edison substations below 7 World Trade Center contained approximately 130,000 gallons of transformer oil contaminated with PCBs.⁷ This listing is only illustrative and does not capture the full breadth of the toxic constituents that were dispersed into the environment on September 11th.

Assessing the environmental health risks from the World Trade Center attacks and the aftermath is extremely complex. For one thing, an environmental emergency such as this, with hundreds, if not thousands, of toxic components simultaneously discharged into the air on the scale of September 11th is unprecedented. The synergistic impacts of multiple pollutants on human health in the aftermath of an air quality emergency such as the one that began on the day of the attacks are unknown. In addition, information on precise levels of human exposure is incomplete. As described in Chapters II and III below, air-monitoring equipment was not fully deployed for all pollutants of concern in the initial days and weeks after September 11th. Moreover, for several key pollutants, no comprehensive monitoring system was ever established. Nevertheless, some basic and preliminary conclusions can be drawn.

Not all New Yorkers faced similar risks from the pollution generated from the World Trade Center site. As has often been true in history, the greatest risk from exposure to environmental toxins comes in the workplace. And in the case of the World Trade Center attacks, available information suggests that it was the first responders, including firefighters and police officers, along with construction workers and other personnel at Ground Zero, who faced the greatest air quality risks. They were at the point of maximum discharge for relatively long periods of time and, in many cases, were not properly utilizing respiratory equipment. A second category of New Yorkers who likely faced higher risks includes office workers and others who were exposed to the initial plume on September 11th and/or who returned to work in the buildings in the immediate vicinity of Ground Zero. A third category of at-risk New Yorkers includes residents and office workers returning to buildings in the neighborhood surrounding the Trade Center site, whose apartments or offices were not properly cleaned after receiving heavy soiling from the towers' collapse.

Based on all available, although incomplete, information we have obtained thus far, the environmental risk to New Yorkers living and working outside of Lower Manhattan, with the possible exception of some unprotected workers who have been handling World Trade Center wastes, seems to have been low.

While the data are sketchy, it appears as if thousands of people suffered some form of respiratory problems in the days, weeks and months following September 11th. Among those who experienced respiratory ailments were more than 2,500 firefighters, with over 750 who took medical leave as a result of Ground Zero exposures.⁸ In addition, hundreds of first responders and other emergency personnel who were on the scene in the first days and weeks after the attacks also appear to have suffered from the impacts of the dust and smoke-plume toxins. For example, more than two-thirds of the 62 rescue workers who came to Ground Zero from Menlo Park, California, experienced respiratory problems following their service at the World Trade Center site.⁹ And according to U.S. Senator George Voinovich, 37 of the 74 FEMA emergency responders from Ohio who assisted in Trade Center rescue efforts also became ill: three were hospitalized with viral pneumonia, eight suffered extreme weight loss, two were diagnosed with adult-onset asthma, one with acute bronchitis and the remainder experienced various respiratory disorders and rashes.¹⁰ As yet, no comprehensive tally of New York police officers and other first responders who suffered respiratory or related problems from their service on and after September 11th has been created. But one lawyer has filed legal notices to preserve the rights of 300 New York City police officers and emergency medical technicians, among others, to sue the city should their respiratory problems persist or other complications arise.¹¹

Getting accurate counts of persons not associated with on-site rescue or cleanup operations who were adversely affected is even more difficult. According to the federal Centers for Disease Control, nearly 600 people were treated at five New York hospitals for lung and/or eye injuries just within the first 48 hours after the September 11th attacks.¹² (The number of persons treated at other hospitals is unknown, although NRDC is seeking to obtain such information.) In all likelihood, emergency personnel at or near the World Trade Center site treated hundreds of other office workers and first responders. An unknown number of individuals visited their private physicians in connection with respiratory problems following September 11th, but no listing or registry of such persons has yet been created.¹³ According to a Centers for Disease Control/New York City Department of Health survey of residents in three residential neighborhoods of Lower Manhattan closest to the World Trade Center, as of late October 2001, roughly 50 percent of those surveyed reported they were suffering from physical symptoms likely to be related to the attacks, such as nose, throat and eye irritation, with 40 percent reporting coughing problems.¹⁴

Extrapolating from that sampling to the total population of just those three residential developments, it is likely that as many as 5,000 to 6,000 (40 percent to 50 percent of 12,300) persons living closest to Ground Zero experienced short-term health problems associated with air pollution from the September 11th attacks. In addition, some students and teachers at nearby Stuyvesant High School, which reopened October 9th, have experienced health problems associated with World Trade Center-related pollution and cleanup operations.¹⁵ Also, an unknown number of undocumented workers who were hired to clean nearby office buildings and apartments, and who apparently did not receive proper training or safety equipment, also suffered respiratory ailments. In January, hundreds of these individuals sought medical attention at a mobile medical monitoring

unit run by the Center for the Biology of Natural Systems and New York Committee for Occupational Safety and Health, in Lower Manhattan.¹⁶

Combining the incomplete estimates of on-site first responders adversely affected with the extrapolated data from the Centers for Disease Control/New York City Department of Health survey, it is reasonable to conclude that at least 10,000 New Yorkers have suffered short-term health ailments from Trade Center-generated air contaminants. If one factors in that others among Lower Manhattan's total residential population of 34,000 who were not counted in the Department of Health survey, and others who were at the Trade Center site on September 11th and who sought medical attention in suburban hospitals or doctor's offices (or self-medicated) also have not been tallied, it is likely that the total number of those affected could exceed 10,000.

The events of September 11th constituted an extraordinary event in American history. The triggering event for this environmental emergency was not a routine pollution discharge or industrial accident, but an act of war. One study has referred to the Trade Center attacks and their aftermath as "the most complex emergency response and management challenge ever faced in the nation."¹⁷ Although there were problems on the environmental health front, on the whole, government agencies performed with distinction. The September 11th attacks on the World Trade Center killed nearly 3,000 persons, destroyed two landmark towers, and caused dramatic economic dislocations. Only in that context could the short-term health problems and cleanup woes for thousands of New Yorkers have been treated as secondary concerns.

THE GOVERNMENT'S RESPONSE

In many ways, the response of government agencies and their employees to the events of September 11th was heroic and a testament to the merit of public service, which is too often undervalued. The World Trade Center attacks constituted an act of war with a tragic loss of life, and the exceptional effort to rescue survivors and recover the missing was the most urgent challenge in the first days after the attacks. Moreover, the numerous governmental units involved in responding to the attacks were operating under extraordinarily difficult circumstances, facing a totally unexpected emergency of unprecedented scale.

Despite such adversity, environmental and health agency staff performed many tasks with distinction. U.S. Environmental Protection Agency personnel, for example, arrived at Ground Zero from agency offices around the nation and undertook numerous assignments, including the removal of hazardous wastes from the Ground Zero site, the deployment of HEPA vacuuming trucks for collecting dust particles from city streets and the establishment of a sophisticated air-monitoring network. Some EPA staff, like many others involved in the governmental response to September 11th, were working, at one point, up to 18-hour days, seven days a week.¹⁸ There are many stories of individual loyalty and dedication to mission by environmental and health agency personnel who were involved in the aftermath of the World Trade Center attacks.

But when one closely examines the governmental response to air pollution impacts from the collapse of the Trade Center towers and the subsequent fires, a more complicated picture emerges. Despite much that is praiseworthy, the overall governmental response to the environmental health challenges presented by September 11th fell short in several key areas. While a full-scale analysis of government's performance is not yet possible, NRDC has reached preliminary conclusions regarding four governmental shortcomings, which we describe in the remainder of this chapter. Again, our purpose in presenting this information is not to attack or embarrass government agencies that were operating under extremely difficult circumstances, but to offer constructive criticism so that the lessons of the September 11th attacks can be learned and New York City and our nation can be better prepared for future environmental emergencies.



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GAPS IN COORDINATION AND LEADERSHIP IN ENVIRONMENTAL HEALTH ISSUES

Numerous city, state and federal governmental agencies had some role in responding to the environmental health aspects of the World Trade Center attacks. New York City's Office of Emergency Management directed the city's overall response to the September 11th attacks. The New York City Fire Department controlled Ground Zero rescue and recovery. The city's Department of Design and Construction supervised the four contractors at the site. The city's Department of Environmental Protection was in charge of asbestos issues, among other things, and the city's Department of Health had various duties including reviewing environmental monitoring data. New York State's Department of Environmental Conservation and Department of Health conducted some pollution monitoring and provided other support services to the city agencies. At the federal level, the U.S. Environmental Protection Agency conducted air pollution monitoring, pollution cleanup and related duties, while the Occupational Safety and Health Administration served in a consulting role on worker safety at the Ground Zero site. Thus, not counting other agencies that played ancillary roles (for example, the federal Centers for Disease Control and National Institute of Environmental Health Sciences), no fewer than nine governmental entities had significant involvement with the environmental health issues that arose from the September 11th attacks.

One major problem with this overlapping jurisdiction was that no single agency was in overall charge of the environmental aspects of the response to the September 11th attacks in New York. For example, no agency assumed the lead in communicating environmental information to the public. No agency took on the task of insuring environmental safety for those working at the Ground Zero site. And no agency took charge of environmental cleanup and inspections prior to re-occupancy of residences and office buildings that had been covered with pollution and debris from the Trade Center collapse and the ensuing fires.

As a result of the ambiguous jurisdictional setting, some important governmental functions related to the environmental health emergency following September 11th slipped through the cracks. Information on health risks and safety precautions was not effectively communicated to the public. Environmental health protection for workers at Ground Zero was given lower importance compared to other priorities. Residents and office workers were largely left to fend for themselves when confronting questions of debris cleanup and short-term health symptoms that followed from the September 11th attacks. And while several registries are being launched to aid in systematic tracking of health complaints and illnesses of some Ground Zero workers (for example, firefighters), no comprehensive registry of nearby residents, office workers, and students who experienced health problems related to September 11th was created. (Such a registry is an essential tool for assessing the scope of the environmental health damage.)

It appears at this point as if the bulk of these problems resulted from shortcomings by the Giuliani administration, which handled so many other aspects of the September 11th response magnificently. The city's Office of Emergency Management, which took up the baton in coordinating the city's overall response, apparently placed a variety of other tasks higher on its priority list. Significantly, the New York City Charter carves out a

broad mandate for the city's Department of Environmental Protection (DEP) Commissioner to, among other things, "respond to emergencies caused by releases or threatened releases of hazardous substances" and to "collect and manage information concerning the amount, location and nature of hazardous substances" such as those discharged as a result of the September 11th attacks.¹⁹ The charter further authorizes the city's DEP Commissioner to "implement any response measures deemed to be necessary to protect the public health or welfare or the environment from a release [of hazardous substances into the environment]."²⁰ DEP Commissioner Joel Miele, however, did not fully exercise this authority. The low profile of the Department of Environmental Protection — the 6,000-person department that would seem to be the most logical lead agency on virtually all of these questions — lends support to a growing belief that the department, for whatever reason, did not rise to the challenges posed by the September 11th attacks. And other state and federal agencies, in a time of crisis and with the Giuliani administration in battle mode, seem to have deferred to New York City's lead, or absence of leadership, on such important environmental health matters.

PROBLEMS IN COMMUNICATING ENVIRONMENTAL HEALTH INFORMATION TO THE PUBLIC

New York City's broad communications effort in response to the World Trade Center attacks was on the whole extremely effective. Mayor Giuliani's frequent statements and press conferences, in particular, were inspirational, comforting and universally welcomed by New Yorkers and the American people. At the same time, however, when it came to communicating about environmental health matters, city, state and federal efforts fell short of the mark.

Problems in communicating environmental health information to New Yorkers in the days and weeks after September 11th took several forms. At the most basic level, it appeared as if government officials had no overall strategy or game plan for conveying environmental health information to a concerned populace. Although various officials at the U.S. EPA made statements as to air quality levels, there was apparently no designated spokesperson (or spokespersons) to discuss the full range of environmental health matters. In the weeks and months following September 11th, New Yorkers had numerous unanswered questions ("Is the air in Lower Manhattan safe for me?", "How concerned should I be about my post-9/11 coughing and wheezing?", "How do I know if it's safe to bring my child back to our Lower Manhattan apartment?" etc.). But while some city agency handouts were distributed in the community and placed on the Internet, these efforts failed to reach or inform large numbers of the affected community. Also, during this period there was no coordinated daily or even regular weekly press briefings by environmental health officials. And there was no single place for citizens to turn to for such information (for example, no environmental hotline or apartment cleanup service center); callers to the City DEP's HELP line (718-DEP-HELP) reportedly received frequent busy signals and this low-profile service was simply not adequate for the task at hand.²¹

A second weakness of the post-September 11th communications activities of governmental agencies responsible for protecting environmental health relates to the content of their public pronouncements. In an apparent effort to get things back to some kind of normalcy, government statements on air quality stressed the good news and de-emphasized or omitted reference to possible issues that might further raise public concerns. For example, various U.S. EPA releases and statements repeated the agency's welcome conclusion that there appeared to be no "long-term" health risks from asbestos and other air pollutants that were released during and after the September 11th disaster.²² Putting aside for the moment the question of whether an intense short-term burst of particulates, asbestos and other pollutants can in fact result in health problems decades later, the assurances of no significant long-term risks (which were repeated by officials with other agencies as well) did not address the issue most on the minds of thousands of New Yorkers — "If the air is safe, why am I having health problems?"

Government statements on air quality following the September 11th attacks contained less information than they appeared to. While addressing levels of asbestos, lead, metals and volatile organic compounds, most governmental pronouncements did not report on or explain levels of large particulate matter. Nor did they discuss the toxicity of the simmering Ground Zero fires, the synergistic impacts of the various pollution discharges or the quality of indoor air. Moreover, the government pronouncements, at least as reported by the media, failed to highlight necessary subtleties — for example, the need to distinguish between risks to the general population and sensitive subgroups such as children, the elderly and those with pre-existing respiratory problems. Finally, government pronouncements, at least in the first several months, largely omitted discussion of specialized risks to residents whose apartments received heavy loadings of dust and pollution.

As a result of such shortcomings and consequent media reports that overall air quality levels were within health standards, a significant credibility gap on environmental health issues emerged. Many New Yorkers who work or live in Lower Manhattan found the government's simplified "meets all standards" message hard to believe, given the frequent odors from the Ground Zero fires, reports of firefighters suffering from the "World Trade Center cough" and the respiratory problems that a significant number of Lower Manhattanites were experiencing.

Of course, presenting a full picture of the air quality impacts would not have been easy for government officials. Adequate monitoring equipment was understandably not on the scene in the first days after September 11th, there were unanswered scientific questions and communicating a positive message with appropriate cautions and caveats is a difficult task. To help meet this challenge, city officials could have called upon independent medical experts based at some of New York City's most prestigious hospitals and universities to help explain available data to at-risk subgroups, while reassuring the vast majority of city residents. Unfortunately, government officials apparently did not undertake post-September 11th efforts to reach out to these experts and avail themselves of this valuable, credible communications resource.

OCCUPATIONAL SAFETY SHORTCOMINGS AT GROUND ZERO

The World Trade Center rescue, recovery and site cleanup operations following the September 11th attacks have made remarkable progress under exceptionally difficult circumstances. In addition to their top-priority task of rescuing survivors and recovering the bodies of those who perished, city employees and workers for the four private construction firms that were ultimately hired to remove the debris at the former Trade Center site have already cleared more than 1.2 million tons of steel, glass and other waste products.²³ These operations have been under way on a seven-days-a-week, 24-hours-a-day schedule since September 11th. On-site workers have for the most part managed to balance the competing demands to provide utmost respect for those still missing and at the same time to advance site-cleaning operations as expeditiously as possible.

Nevertheless, environmental health issues at Ground Zero represent an exception to this impressive post-September 11th record of accomplishment. Important environmental workplace safety standards were only loosely applied in the weeks and months following the Trade Center's collapse. A prime example was the failure to require Ground Zero workers to wear appropriate respirators. Indeed, there appeared to be some level of confusion as to the need for respirators for firefighters, other first responders and construction personnel, although such equipment is a standard workplace safety requirement in fire and smoke conditions such as those present at Ground Zero. Only 9 percent of firefighters (who faced the highest levels of potential risks from exposure to air contaminants) reportedly wore respirators during the critical first week after September 11th.²⁴ And even into October, researchers from the National Institute of Environmental Health Sciences found "very few workers wearing even the most basic equipment."²⁵

A factor behind the absent respirators was the weak role of the Occupational Safety and Health Administration at the Ground Zero site. In contrast to other work sites, OSHA's involvement at Ground Zero was limited to a somewhat ineffective consultative role, not a compliance and enforcement function. OSHA inspectors reportedly observed dozens of workplace safety violations daily in late September and early October at Ground Zero, but did not take action to ensure that proper respirators were worn.²⁶ To make matters worse, in some cases, Ground Zero workers who were properly equipped with respirators chose not to wear them at all times.

The problem of lack of enforcement of such worker safety requirements as respirator use was apparently compounded by other gaps in workplace safety training. Although a close look at that issue is beyond the scope of this preliminary analysis, it is worth noting that six weeks after September 11th, the New York City Department of Design and Construction was still "in the process of developing worker training and safety orientation."²⁷ There were other environmental safety issues in the vicinity of the Ground Zero site. For example, trucks hauling debris from the site to Pier 25 along the Hudson River were often observed uncovered, with dust blowing into the air during transfer of the debris to barges.²⁸ Such actions were inconsistent with requirements that waste be wet down on-site and when transported to off-site facilities.²⁹ The New York State Department of Environmental Conservation, which apparently had responsibility for enforcing some of these workplace requirements, did not aggressively take action on this front.³⁰ To be sure, compliance with basic workplace environmental safety rules

improved as the months passed. Nevertheless, because of shortcomings in enforcement and oversight, it appears as if some Ground Zero workers were exposed to significant levels of harmful pollutants.

PROBLEMS IN ASSISTING LOWER MANHATTAN RESIDENTS ON ENVIRONMENTAL SAFETY ISSUES

Approximately 34,000 persons reside in Community Board #1, the district (bounded by Canal Street, Baxter Street and the Brooklyn Bridge) most directly affected by the World Trade Center attacks. While their residences were not all affected in similar fashion, thousands of apartments closest to Ground Zero received significant loadings of debris, dust, soot and pollution fallout from the collapse of the Trade Center towers and the ensuing fires. Unfortunately, while most aspects of the governmental response to the September 11th attacks were handled in impressive fashion, one area that was not was the effort to assist affected residents in dealing with the multiple challenges posed by post-September 11th cleanup problems in their own apartments.

As noted in the previous discussions, one major difficulty was the overall communications flow from city agencies and experts to Lower Manhattan residents (and to some extent to the area's office workers and school populations, as well).

A related difficulty involved failure to provide complete and proper cleanup protocols or procedures for Lower Manhattan apartment dwellers. Instead, materials available on government websites contained largely general, and in some cases misleading, information.³¹ Moreover, many residents received no cleanup information at all. According to a Centers for Disease Control/New York City Department of Health survey, by the end of October 2001 only 59 percent of Lower Manhattan residents reported receiving any information about apartment cleanup.³² That same survey found that only 40 percent of residents in the apartments closest to the Trade Center blast reported that they used both wet mopping of hardwood floors and HEPA vacuums on carpets, although both are standard parts of a complete professional cleanup.³³ And according to Community Board #1 Chairperson Madelyn Wils, there were no official inspections of building air vents or apartments in affected residential buildings to insure that they were properly cleaned prior to re-entry.³⁴

Simply put, no agency took overall responsibility for supervising the cleanup and re-occupancy of apartments. Whereas New York City required that buildings be certified prior to re-entry for such issues as structural integrity, no environmental certification or assessment was needed.³⁵ It was left to building owners to decide when it was safe to reoccupy apartments in terms of possible environmental risk.³⁶ And while building owners might have tested common areas, testing individual apartments was left up to the residents. How many apartments were improperly cleaned may never be able to be determined.

Finally, as to office buildings in the immediate vicinity of Ground Zero, the picture is mixed, although apparently some similar problems were encountered. In large buildings in the financial district, building management took responsibility for cleanup issues, at least in public spaces within the building, and insurance coverage was less of an issue for

occupants than it has been for many residences. But even with respect to these office buildings, tenants concerned about odors or incomplete cleanups received limited assurances, if any, from government agencies. And with government officials directing resources and inspectors elsewhere, it was left almost completely up to building managers to assure safe cleanup not only of lobbies and hallways, but of rooftops and air systems as well.



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CHAPTER III

AIR POLLUTION

The fires and collapse of the World Trade Center that followed the terrorist attacks of September 11th created an unparalleled, high-intensity pollution discharge. As discussed more fully in Chapter I, there were hundreds, if not thousands, of types of contaminants thrown into the air when the towers collapsed. It is estimated that 424,000 tons of concrete and an additional 485,000 tons of “miscellaneous” building contents (computers, office furniture, lighting, mechanical and electrical units, floor finishes etc.) were destroyed, significant amounts of which were released in a huge cloud of debris that engulfed Lower Manhattan on September 11th.³⁷ At Ground Zero, fires continued to burn for months, spewing additional contaminants into the air. One respected environmental commentator concluded that the Trade Center’s destruction probably had greater short-term environmental impacts than any other event in the city’s history.³⁸

As noted in Chapter I, exposures to the initial dust and debris cloud on September 11th and to the ensuing fires seem to have triggered short-term health impacts for at least 10,000 persons. While we may never know precisely what caused these illnesses, health experts surmise that some of the contributors include large concrete and fiberglass particles and acid gases that, along with hundreds of other pollutants, were discharged into the air following the Trade Center attacks. These exposures were apparently responsible for such short-term problems as eye, nose and throat irritation; coughing, wheezing and shortness of breath and sinusitis, bronchitis and exacerbation of existing lung disease. Those at greatest risk included persons who were exposed to the highest-intensity doses (for example, first responders, others caught in the dust cloud following the towers’ collapse and workers at the debris pile) and those who were especially susceptible to respiratory ailments (children, the elderly and people who were predisposed to such conditions). Fortunately, public health experts have observed that the majority of those who suffered ill effects are recovering with medical treatment.³⁹ However, at least some small portion of those who experienced short-term health impacts are likely to develop long-term problems such as the onset of adult asthma.⁴⁰ In addition, there are considerable uncertainties concerning the cumulative long-term air pollution impacts of the Trade Center attacks on the Lower Manhattan community.

There is some good news to report concerning the quality of outdoor air in Lower Manhattan today. To a large degree, the contamination spewed into the air following the World Trade Center’s collapse was short-term. To be sure, there were air quality problems in the days and weeks following the Trade Center attacks.⁴¹ But, based upon a review of available data, NRDC believes that in general outdoor air quality in Lower

Manhattan is now approaching or similar to levels in this area prior to September 11th. Among the reasons for this conclusion are the following:

- Asbestos, while found in a number of air and dust samples in the first weeks after September 11th, is now well below levels deemed safe for children, according to extensive monitoring by the EPA.⁴²
- Regarding particulate matter (PM), while concerns about monitoring and standards are discussed below, reported levels of PM10 and PM2.5 throughout Lower Manhattan have consistently been below the national standard.⁴³
- For volatile organic compounds (VOCs), although monitoring has not been comprehensive, testing by the EPA has not detected benzene (the VOC most commonly found on the Trade Center worksite) outside of Ground Zero since mid-October.⁴⁴
- Polycyclic aromatic hydrocarbons (PAHs), a group of more than 100 chemicals formed during incomplete combustion, have not exceeded OSHA standards (except for a handful of readings at active Ground Zero work sites).⁴⁵
- PCBs, which were contained in Con Edison's two electrical substations (and present in other electrical equipment in the Twin Towers themselves), were monitored in the air by the EPA at ten locations and have not been found even in trace amounts since December.⁴⁶
- For dioxin, while there are concerns over the adequacy of monitoring, available data have all been below the EPA's action guidelines since October.⁴⁷
- As to lead, the national ambient air quality standard for this pollutant (1.5 micrograms per cubic meter of air, averaged over a three-month period) was exceeded on several days in September; but testing by the EPA at 11 locations since October has recorded only trace levels of lead in Lower Manhattan's air.⁴⁸
- Mercury, another worrisome toxin because of its use in circuit boards, computer monitors, fluorescent lights and other products that were in the Trade Center towers, has not been detected in the limited outdoor air samples taken by OSHA at Ground Zero.⁴⁹

These improvements in air quality since September 11th and the first days and weeks thereafter are dramatic. They are likely due to the passage of time since the collapse itself; the recent extinguishing of fires at the Trade Center site; extensive dust cleanup operations on city streets around Ground Zero; the cleansing effect of periodic rainfall; private cleanups in Lower Manhattan buildings and somewhat improved dust suppression at the site, on the debris trucks and at barge-loading areas.

However, even now, there are isolated areas of concern when it comes to outdoor air quality in Lower Manhattan. The most obvious pollution hot spot is, of course, Ground Zero. To be sure, new pollution discharges have declined significantly since the bulk of the fires were extinguished. But on-site pollution risks persist for Ground Zero workers. For example, as recently as February 9th, high levels of VOCs were detected at the worksite on Ground Zero.⁵⁰ Moreover, exposure to particulate matter, asbestos and numerous other toxics continues for Ground Zero workers who are moving and removing debris and may be resuspending already settled contaminated dust. Another continuing

concern for outdoor air quality in the Ground Zero vicinity involves the concentration of diesel-powered trucks and construction equipment, including generators, cranes and front-loaders. While monitoring for diesel particulates at these locations has not been undertaken, the number and concentration of such vehicles and equipment make increased particulate emissions an issue — especially for an area that has already experienced massive short-term pollution discharges from the collapse and fire themselves. A final point of concern for outdoor air is Pier 25, the Hudson River site just north of Ground Zero (directly adjacent to Stuyvesant High School and near other schools and residential buildings), where Trade Center debris is transferred from trucks to barges.

But the most worrisome air pollution problem now facing Lower Manhattan in the aftermath of the September 11th attacks involves indoor pollution threats in some residences and offices that received high doses of debris and dust and whose buildings were not properly cleaned. Comprehensive monitoring data for indoor locations was not undertaken by government agencies, and most privately sponsored monitoring data has not been released. But available information shows that some apartments and offices were indeed engulfed by contaminated dust on and after September 11th.⁵¹ In some instances, these problems have not yet been adequately remedied. For example, recent tests at the Legal Aid Society's offices at 90 Church Street, which were contaminated with asbestos, mercury and other pollutants on September 11th, revealed that environmental conditions have actually deteriorated in recent months; as of early February, the building was reported to be uninhabitable.⁵²

The indoor air pollution problem discussed above does not of course mean that all apartments and offices in Lower Manhattan are in similar condition. Some of these buildings have been properly cleaned by qualified contractors, who completed post-cleanup testing and whose tenants or workers have safely returned. Others were fortunate in that, because of their location and/or quick thinking by building managers who shut down ventilation systems on September 11th, they did not receive heavy dust and pollution loadings in the first place. Not surprisingly, residences, schools and offices with the greatest likelihood of problems are generally those nearest Ground Zero or that otherwise were coated with thick layers of dust throughout their interior. For the most part, these are buildings within a ten-block radius of Ground Zero. Thus, the extent of the remaining indoor pollution is manageable.

There is still much that we do not know about the impacts of the air pollution release that followed the September 11th attacks on the World Trade Center. There is no comparable pollution event in the city's history to look back upon. We do not yet know the full catalogue of pollutants to which New Yorkers were exposed. There are unanswered questions as to the synergistic impacts of simultaneous exposure to hundreds of different contaminants. Also unclear is what the long-term impacts will be from short-term high-intensity exposures that characterized the Trade Center's collapse. And, because there is no comprehensive registry of exposed individuals, it is difficult to assess the full reach of the problem.

Further complicating the task of assessing environmental impacts of the World Trade Center attacks are questions about the city's air quality monitoring network. NRDC will

be taking an in-depth look at this issue as part of our one-year report scheduled for release in September. But several preliminary observations can be made even now. For one thing, there were evident gaps in the pre-September 11th air quality monitoring system for New York. To cite just one example, there was only a single particulate matter (PM 2.5) monitor located anywhere near the World Trade Center on September 11th.⁵³ That monitor was positioned on Canal Street, a significant distance from the Trade Center site. While the U.S. EPA and State Department of Environmental Conservation did bring in additional monitors in the weeks and months that followed, there were still significant gaps (for example, no systematic monitoring for some pollutants suspected of causing short-term effects such as dust particles larger than 10 microns or fiberglass). Because there was insufficient monitoring for all pollutants of concern, especially during the first days and weeks after September 11th, the full extent of the air pollution emergency that began with the attacks on the World Trade Center may never be known.

A final problem in assessing impacts of the September 11th attacks is the adequacy of existing air quality standards. In the weeks and months following September 11th, government officials stressed that air pollution levels in Lower Manhattan were in compliance with existing standards.⁵⁴ While compliance with existing standards, if demonstrated via a comprehensive monitoring network, is indeed reassuring information, it does not tell the full story. For example, the September 11th discharges — the largest single air pollution episode in the City's history — did not result in a single recorded violation of the national ambient air quality standards for particulate matter, according to the New York State Department of Environmental Conservation.⁵⁵ But the existing particulate matter loadings are measured over 24-hour periods, and current standards are not designed to protect against intense, short-term bursts of pollution. However, as the September 11th tragedy reveals, high-intensity particulate storms, even if lasting only several hours, can produce significant adverse health impacts. Additionally, while information is only preliminary, there are concerns that existing air standards did not adequately take into account the greater health effects that could result from the large amounts of very fine particulate matter emitted from the fires.⁵⁶

While the lack of complete information on air quality issues is troubling, it is important to keep the September 11th pollution crisis in perspective. For the vast majority of city residents, air pollution levels today are apparently not different from those on September 10th. Even within Lower Manhattan, there have been significant declines in measurable pollution in the vicinity of Ground Zero compared with the levels of September 11th and the days and weeks following. While significant gaps in government's environmental health system have been exposed, and existing problems remain, the cleanup tasks ahead are manageable, the problems are solvable and the needed reforms are doable.



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CHAPTER IV

WASTE DISPOSAL AND WATER ISSUES

Among its other unprecedented consequences, the collapse of the World Trade Center created a monumental waste disposal and cleanup challenge. In a single day, more than 1.2 million tons of building materials lay in ruin. The wreckage was 100 to 150 feet high in some places and extended seven stories underground. Large chunks of debris were strewn as far as three blocks away from the World Trade Center site and areas up to 10 blocks away were covered with thick dust.⁵⁷ And, as noted above, the composition of the debris was extremely diverse and often toxic, including, among other things, vast amounts of asbestos-contaminated construction waste, tens of thousands of pieces of electrical equipment and as much as 130,000 gallons of PCB-contaminated oils at 7 World Trade Center.⁵⁸

Site cleanup has advanced with great speed. Debris removal at Ground Zero began on September 12th and has continued essentially nonstop since then — seven days a week, 24 hours a day. In the first weeks after the Trade Center's collapse, there were as many as 12,000 rescue and cleanup workers at Ground Zero. Within a month, however, there were roughly 1,000 construction workers at the site and four private contractors had been hired to oversee the massive cleanup project.⁵⁹ Several huge cranes were brought in to remove the largest pieces of debris and the city set up two barge transfer facilities to transport the wastes out of the downtown area — one located on the East River at Pier 6 and the other at Pier 25 on the Hudson River, adjacent to several schools and residential buildings. Two additional marine transfer stations were reopened at 59th Street in Manhattan and Hamilton Avenue in Brooklyn to handle World Trade Center materials. A fleet of diesel-powered trucks has been operating around the clock to carry World Trade Center debris to these transfer stations, or in some cases directly to the Fresh Kills landfill on Staten Island. Officials now project that all debris will be removed by March 15th and that the entire recovery cleanup operation will be finished by the end of May.⁶⁰

City officials wisely targeted steel girders and other metals extracted from the Trade Center site for recycling. Most of the nearly 300,000 tons of structural steel pulled from the site has been trucked or barged to recycling facilities in New Jersey, where it is cut into manageable pieces and shipped to mills as far away as South Korea, Malaysia, China and India. Some reports indicate that a portion of the structural steel may be contaminated with a variety of toxins, including asbestos (which had been sprayed on during the construction of the World Trade Center). (Given this uncertainty, any steel not yet recycled should be tested and, if necessary, decontaminated before processing.) Other metal recovered at the World Trade Center site, including damaged cars, filing

cabinets and ducts, has generally been sent to the Fresh Kills landfill and then to scrap dealers.

The remaining debris removed from the World Trade Center site has been transported by barge or truck to the Fresh Kills landfill. Fresh Kills was the city's last active landfill when it stopped accepting trash last March. Under state law it was scheduled to close on December 31, 2001. But after the terrorist attacks, the landfill was immediately chosen as the place to inspect, sort and bury World Trade Center debris — indeed, the first shipment of waste arrived at Fresh Kills at 2:30 A.M. on September 12th.⁶¹ Under an executive order signed by Governor George Pataki, the city was permitted to dispose of World Trade Center wastes after January 1, 2002.⁶²

At Fresh Kills, hundreds of sanitation workers and law enforcement officials have been on hand to manage the Trade Center debris. In general, cranes have first separated out large objects, such as crushed cars and trucks, which are recycled if possible. The remainder is dumped into piles on the ground, or placed on conveyer belts or sifters, for inspection by police officers and federal agents in full protective gear. Personal effects, human remains and forensic evidence are separated out for appropriate handling. The remaining waste that cannot be recycled — essentially fine debris — is being buried on the 135-acre portion of the landfill reopened after September 11th (the total landfill covers 2,200 acres). It is unclear at this time how much waste from the Trade Center site will be buried at Fresh Kills.

The reopening of the Fresh Kills landfill as a repository for World Trade Center wastes has raised several environmental and public health concerns. One issue involves the safety of the hundreds of workers at the site. According to Sanitation Department employees, some workers were not wearing proper safety gear, including respirators, jumpsuits and boots, during the first several weeks of the Fresh Kills operation.⁶³ A related concern is that contaminated dust emanating from the site's operations may pose health hazards to workers and/or nearby Staten Island residents. EPA air monitoring at the landfill in October and November revealed a number of elevated asbestos readings. (Although there are no federal standards for outdoor air, these readings were above federal guidelines designed by the EPA for indoor air quality at school buildings.)⁶⁴ Following those measurements, however, officials have instituted more comprehensive dust-suppression protocols at Fresh Kills. And since November, the EPA has recorded only two elevated asbestos readings at the landfill.⁶⁵

A final environmental concern over the reopening of Fresh Kills is that certain newly buried wastes may contain asbestos or other hazardous components. Because Fresh Kills was never designed to handle hazardous or toxic materials, there is the potential that contaminants could leach out of the landfill into surrounding lands and waterways. In addition, although officials have taken steps to remove potentially hazardous materials from the debris before it is shipped to Fresh Kills, it does not appear that the debris is being tested for contamination prior to burial.⁶⁶ Thus, at present, it is unclear as to whether the burial of World Trade Center wastes will add significantly to the landfill's existing environmental woes.

One final waste-related topic concerns pollution cleanup at the World Trade Center site itself. At issue is whether cleanup at Ground Zero should be (or should have been)

undertaken pursuant to federal or state Superfund statutes. In brief, these laws provide, among other things, that cleanup operations at highly contaminated properties follow detailed, publicly reviewed procedures and that governmental agencies are able to recover cleanup costs from those entities responsible for the pollution.⁶⁷ Despite many successful cleanups achieved under these statutes, it is not clear that invoking Superfund provisions is necessary for the World Trade Center site. First, as is obvious from the rapid pace of activity at Ground Zero, there is no need to resort to Superfund laws to compel a languishing cleanup — a common reason for invoking these statutes. Second, the need to identify and hold liable parties responsible for site contamination does not appear to be relevant in this situation. Third, although the Superfund laws offer enhanced opportunities for public participation in cleanup decisions, the extraordinary needs for expediting cleanup of the World Trade Center site and the availability of other forums for public review of rebuilding options may outweigh the benefits of invoking the Superfund schemes for the Trade Center cleanup.

Regardless of whether or not the Superfund laws are applied to Ground Zero, one thing is essential — all pollutants must be removed as part of a final cleanup plan to the greatest practicable extent, so as to allay any public concerns over future uses of the site. This approach is especially important at what appears to be the heavily polluted 7 World Trade Center location, where plans for reconstruction are already under way. Lastly, it is critical that government officials ensure that any contamination of nearby residential or commercial buildings be fully addressed.

WATERWAYS

Another environmental concern from the collapse of the Twin Towers is contamination of the Hudson River (which directly abuts the World Trade Center site) and other waterways surrounding Lower Manhattan. Contamination of these waters from the World Trade Center attacks could have occurred via two primary pathways. First, contaminants could have made their way into water bodies from airborne fallout of smoke and debris generated by the burning and collapse of the Trade Center buildings. It is impossible, however, to quantify how much airborne contamination might have been deposited into these water bodies as a result of the destruction of September 11th. Second, contamination could have drained into local waterways through runoff of water used to extinguish the fires at Ground Zero and to clean downtown streets, as well as from rainstorms after September 11th. Some of this runoff has apparently flowed directly into the Hudson River from the World Trade Center site or nearby storm drains. Some additional water from the site may have flowed to New Jersey through the PATH tunnels, where most of it was reportedly pumped directly into the Hudson River.⁶⁸ However, a large amount of runoff was reportedly captured and sent to the Newtown Creek Wastewater Treatment Plant in Brooklyn.

Government officials have conducted some limited testing of the runoff and harbor waters. For example, the EPA collected runoff samples at the foot of Rector Street — the only visible runoff found by the agency — during rainfalls on September 14th and 20th. During this same period, the EPA also took water samples from five locations in the

Hudson River. Additionally, on October 5th, the state's Department of Environmental Conservation collected Hudson River samples from the Battery to the Harlem River. DEC also took sediment samples in September and October at several piers along the East and Hudson Rivers proposed for emergency dredging.

Although some test data are worrisome, at this preliminary stage the extent of environmental harm to the city's waterways from the September 11th attacks is unclear. The EPA runoff samples taken on September 14th revealed high concentrations of dioxins, furans, PCBs and asbestos, as well as mercury and other metals. For example, the levels of dioxins in those samples were more than five times greater than the highest levels detected in previous New York Harbor water quality data.⁶⁹ Levels of PCBs in the runoff were orders of magnitude higher than peak concentrations detected in past harbor samplings. Fortunately, the amount of this toxic runoff appears to have been relatively small. The EPA concluded that "the low flow and rapid dilution of the sampled discharge suggests that the water quality impact is minimal."⁷⁰ In addition, samples taken by the EPA after subsequent storm events reportedly indicated that overall toxicity of the World Trade Center runoff had significantly declined.⁷¹ And the New York State Department of Environmental Conservation has reported that its post-September 11th sediment and Hudson River water tests found no discernible effects on the harbor from the World Trade Center's destruction.⁷²

Despite these encouraging assessments, no definitive conclusion about water quality impacts can be made at this time. To get a full picture of the situation, independent scientists have called for the analysis of sediment samples taken from additional spots in the harbor where historical data are available.⁷³ In addition, experts suggest sediment testing should also take place in those areas of the river closest to Ground Zero, and that fish taken from the harbor be monitored over the next several years for PCBs, dioxins and other toxins that may have originated from the World Trade Center site.⁷⁴

DRINKING WATER SUPPLY

A final environmental concern that has been raised in connection with the World Trade Center disaster is drinking water quality. All of New York City's drinking water is drawn from upstate reservoirs, not underground supplies (except for a small portion of Queens's). Thus, the only potential public health threat would have been either a breach of the water mains or pipes that supply residential and office buildings or airborne contamination of drinking water storage tanks located on the roofs of buildings in Lower Manhattan.

Fortunately, there is no evidence of any drinking water contamination from the September 11th attacks. Although water pressure in Lower Manhattan dipped immediately following the attacks, testing by city and federal officials found no evidence that the water mains or pipes had been contaminated and all samples met federal drinking water standards.⁷⁵ Further, random water samples taken by the New York City Department of Health did not reveal elevated levels of PCBs or asbestos in rooftop storage tanks.⁷⁶ Thus, all available data indicate that the events of the September 11th did not have adverse effects on New York City's drinking water quality.



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CHAPTER V

RECOMMENDATIONS

Senator Hillary Clinton, in a recent U.S. Senate Subcommittee hearing chaired by Senator Joseph Lieberman concerning air quality impacts of the World Trade Center attacks, proposed a five-point plan that offers an excellent first set of recommendations that the federal government could take to address some of the concerns set forth in this report.⁷⁷ Representative Jerrold Nadler and the Ground Zero Elected Officials Task Force have also proposed some worthwhile ideas for tackling these issues.⁷⁸

In this section, NRDC sets forth 12 recommendations, which borrow from and expand upon these earlier efforts.

ADDRESSING URGENT PROBLEMS IN LOWER MANHATTAN NOW

Protecting Ground Zero Workers

As discussed on pages 18-19 above, there are continuing concerns about exposure of construction workers and others to contaminated dust and pollution at the Ground Zero worksite. To date, efforts to enforce occupational safety measures to safeguard the health of first responders, other Ground Zero workers and workers who have been cleaning dust- and debris-filled apartments have been lacking.

Recommendation 1: The Occupational Safety and Health Administration, along with appropriate state and city agencies, should immediately undertake stringent enforcement of workplace safety standards for workers at Ground Zero and workers involved in cleanup of dust- and/or debris-filled offices or residences in the vicinity of the Trade Center site.

Assisting Residents and Office Workers Near the Trade Center Site

As mentioned on pages 19-20 above, some residences and offices in the immediate vicinity of Ground Zero received heavy loadings of dust and pollution from the Trade Center attacks of September 11th. But government efforts to provide affected individuals in these residences and offices with assistance on safety and cleanup issues have not been particularly effective.

Recommendation 2: The U.S. Environmental Protection Agency, the New York City Department of Environmental Protection and other relevant agencies should immediately create a joint task force to address remaining indoor air problems in Lower Manhattan residences and office buildings. Among other things, the task force should conduct door-to-door inspections and indoor sampling within no less than a ten block radius of Ground Zero and should open a local assistance center in the Ground Zero vicinity where the public can go to receive one-stop advice on air testing and inspections, clear guidance on cleanup procedures and resources available to pay for cleanups. (We are pleased that in response to requests from Senator Clinton and others, the EPA has started taking steps in this direction.)

Reducing Diesel Pollution in Lower Manhattan

As discussed on pages 22-23 above, a large concentration of diesel-powered construction equipment and trucks has been operating at and around the Ground Zero site, adding toxic diesel-pollution emissions to a community that is still recovering from the environmental (and other) impacts of the Trade Center attacks. Although various government agencies have discussed requiring the use of low-sulfur fuel and the retrofitting of trucks and construction vehicles with particulate traps to reduce diesel emissions at the site and in the neighboring communities, these programs have not yet been implemented.

Recommendation 3: State and city agencies and the Lower Manhattan Redevelopment Corporation should act without delay to require the use of low-sulfur fuel (that is, no more than 15 parts per million) for all diesel trucks and equipment operating in connection with Trade Center recovery, cleanup, and rebuilding operations. These agencies should also require the retrofitting of these vehicles with filtering technologies to further reduce particulate emissions.

Evaluating the Environmental Health Impacts of the September 11th Attacks

As noted above on page 8, several critical medical studies are getting under way to assess the environmental health impacts of the unprecedented air pollution discharges on various Lower Manhattan subgroups who were exposed. While some funds have been made available from nonprofit foundations and the federal government, additional support is required for this important work.

Recommendation 4: The federal government should provide additional funding to help complete recently initiated health studies of the environmental impacts of the September 11th attacks on the workers and residents of Lower Manhattan.

Tracking the Health of New Yorkers Exposed to World Trade Center-Related Air Pollution

As discussed on page 11-13 above, a comprehensive health registry of those individuals exposed to air contaminants in the aftermath of the September 11th attacks would be an indispensable tool in assessing the health impacts of the Trade Center's collapse and subsequent fires and in learning about the consequences of exposure to short-term, high-intensity pollution bursts. While a registry of some first responders is reportedly being assembled, a wider effort is needed.

Recommendation 5: The federal government should provide funding to the Centers for Disease Control to help establish a comprehensive health registry for workers, residents, schoolchildren and newborns in the Ground Zero vicinity who may have been affected by the attacks on the World Trade Center.

PREPARING FOR FUTURE ENVIRONMENTAL HEALTH EMERGENCIES

Enhancing New York City's Environmental Emergency Response Capabilities

As noted on pages 15-16 above, the government's response to the events of September 11th, while excellent overall, fell short on issues related to environmental health protection. The absence of a single agency that was leading and coordinating the environmental response and the failure to provide and require the use of respirators were two major gaps.

Recommendation 6: New York City Mayor Michael Bloomberg should officially designate the New York City Department of Environmental Protection to lead and coordinate the response of various government agencies to future environmental emergencies in New York City. Mayor Bloomberg should also work with the Fire Department and other first responders to insure that adequate safety equipment for environmental health emergencies is on hand and that all first responders receive full training on the proper use of such equipment.

Improving Environmental Health Communications with New Yorkers

As discussed above on pages 16-18, the September 11th attacks presented a difficult communications challenge to environmental health agencies at the city, state and federal levels. In large measure, these agencies were unable to effectively communicate with New Yorkers on such issues as safety and risks regarding exposure to pollutants in the wake of the Trade Center attacks, and did not make effective use of independent experts at nationally known medical facilities located in New York.

Recommendation 7: Mayor Bloomberg and the New York City Council should advance legislation creating a New York City Committee of Environmental Science and Health

Advisors to work, in conjunction with the Board of Health, with city officials in evaluating information and communicating it to the public during future environmental health emergencies.

Assessing the Performance of Environmental and Health Agencies in Responding to the September 11th Attacks

As noted above on pages 14-20, the response of various environmental and health agencies to the pollution challenges posed by the September 11th attacks fell short in several areas. In an effort to learn from the tragic experience of the Trade Center disaster, the city's fire department is seeking an outside consulting firm to review that department's response so as to be better prepared for future emergencies. No such review of environmental agency's response is under way, although the city could benefit from lessons learned on this front as well.

Recommendation 8: Mayor Bloomberg and the New York City Council should commission an independent assessment of the response of government agencies to the environmental health challenges presented by the September 11th attacks.

Establishing a Permanent Health Monitoring System at Disaster Sites

As noted above on page 14-20, the city and the nation were unprepared to respond to the unprecedented attacks of September 11th in such areas as pollution monitoring and environmental health and safety issues. Senator Hillary Clinton has introduced legislation (S.1621) that would authorize a program "for the protection, assessment, monitoring and study of health and safety of community members, volunteers and workers in a disaster area when there has been exposure to harmful substances."

Recommendation 9: Congress should enact S.1621 to establish a permanent health monitoring system at disaster sites.

Reviewing the Adequacy Of National Health Standards to Address Short-Term Pollution Bursts

As discussed on pages 21-25, the September 11th attacks on the World Trade Center and subsequent fires created the largest single pollution episode in New York City's history. Despite the intense amounts of pollution discharged, including high volumes of particulate matter, there was not a single recorded violation of national health standards for particulate matter. This strongly suggests that a review of the adequacy of existing standards is warranted.

Recommendation 10: The U.S. Environmental Protection Agency should initiate a review of existing national ambient air quality standards with the aims of revising particulate matter standards to account for high-intensity, short-term pollution bursts and

of reviewing whether new standards for other pollutants discharged on September 11th are warranted.

Strengthening New York's Air Quality Monitoring Network

As noted above on pages 24-25, New York's air quality network appeared to be stretched thin on September 11th, with only a single particulate monitor anywhere near the World Trade Center site, to mention one example. A comprehensive air quality monitoring network is always important, but is especially critical in times of environmental health emergencies.

Recommendation 11: The U.S. Environmental Protection Agency, the New York State Department of Environmental Conservation and the New York City Department of Environmental Protection should review New York City's entire air quality monitoring network with the aim of adding stationary and mobile monitors to the existing system, so as to provide comprehensive monitoring information on an ongoing basis and in future environmental emergencies.

Initiating Legislative Action to Reduce the Toxicity of Office and Consumer Products

As noted on pages 10–11, one reason for the wide-ranging contaminants that were dispersed into New York's air was the high levels of toxic constituents in common office products and consumer goods. Although some voluntary efforts by selected industries to reduce the toxicity of their products have been initiated, more comprehensive action is needed.

Recommendation 12: Congress, U.S. the Environmental Protection Agency and the New York State Legislature should develop and advance proposals to minimize the amount of toxic substances that are used in office products and consumer goods.

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¹ Eric Lipton, "A New Count of the Dead, But Little Sense of Relief," *New York Times*, December 2, 2001.

² "The Impact of the September 11 WTC Attack on NYC's Economy and City Revenues," Office of the Comptroller, the City of New York, October 4, 2001, p. iii.

³ In many cases, the consultants with whom we spoke were unable to release such data to us, but were willing to discuss their overall findings.

⁴ The tonnage figures were provided by the New York City Office of Emergency Management. As of February 3, 2002, 1,205,906 tons of debris had been removed from the World Trade Center site.

⁵ Todd Bates, "The Air Down There," <http://www.poynter.org>, viewed on February 6, 2002.

⁶ Toxics Targeting, "Computerized Environmental Report: WTC Complex, New York, NY 10048." September 18, 2001.

⁷ Personal communication with Michael Clendenin, Consolidated Edison, January 28, 2002.

⁸ Dr. Kerry Kelly, chief medical officer for the New York City Fire Department, Testimony before the U.S. Senate Subcommittee on Clean Air, Wetlands and Climate Change, New York, NY, February 11, 2002.

⁹ Editorial, "At Ground Zero, Rescue Workers Put their Health on the Line," *San Jose Mercury News*, February 4, 2002.

¹⁰ Sen. Hillary Clinton, reading testimony of Sen. George Voinovich, before the U.S. Senate Subcommittee on Clean Air, Wetlands and Climate

Change, New York, NY, February 11, 2002.

¹¹ Malcolm Ritter, "Firefighters Who Worked at Ground Zero Face Health Problems and Possible Risk of Cancer," *Associated Press*, January 14, 2002.

¹² "Rapid Assessment of Injuries Among Survivors of the Terrorist Attack on the World Trade Center - New York City," Centers for Disease Control and Prevention, September 2001; *Morbidity and Mortality Weekly Report*, January 11, 2001, Vol. 51, No. 1. p. 2.

¹³ While no registry has been kept, individual physicians are reporting seeing many patients with respiratory problems resulting from air quality problems in Lower Manhattan. Personal communication with Dr. Muthiah Sukumaran, a pulmonary specialist and director of intensive care at NYU Downtown Hospital, who has reported treating as many as 100 patients with respiratory ailments who live or work in Lower Manhattan. January 9, 2002. Personal communication with Dr. Stephen Levin of Mount Sinai Medical Center. He has reported seeing approximately 70 patients with respiratory ailments, some of whom worked at Ground Zero and others who worked in offices as far as four blocks from the site. December 10, 2001.

¹⁴ "A Community Needs Assessment of Lower Manhattan Following the World Trade Center Attack,"

Centers for Disease Control and Prevention, New York City Department of Health, December 2001, p. 8.

¹⁵ Personal communication with Marilena Christodoulou, president, Stuyvesant Parents' Association, January 15, 2002.

¹⁶ Dina V. Montes, "WTC - Area Laborers Not Getting Much Help," *Staten Island Advance*, January 18, 2002.

¹⁷ Donald Elisburg and John Moran, "Response to the World Trade Center (WTC) Disaster: Initial WETP Grantee Response and Preliminary Assessment of Training Needs," National Institute of Environmental Health Sciences Worker Education and Training Program, October 6, 2001, p. 9.

¹⁸ Personal communication with William J. Muszynski, U.S. EPA, Region II, January 19, 2002.

¹⁹ New York City Charter, § 1403.

²⁰ New York City Charter, § 1403(h).

²¹ Personal communication with Madelyn Wils, chair, Community Board 1, January 9, 2002.

²² EPA press releases on September 13, 2001 and September 16, 2001, consistently gave the message that there was no long-term health threat. In a September 18, 2001, press release, EPA Administrator Christie Whitman stated, "I am glad to reassure the people of New York and Washington, D.C. that their air is safe to breath [sic] and their water is safe to drink." http://www.epa.gov/epahome/wtc/headline_091801.htm

²³ See Note 4.

²⁴ "Firefighters at World Trade Center Showing Signs of Asthma, Study Finds," *BNA Labor Report*, December 11, 2001.

²⁵ See Note 17.

²⁶ Eric Lipton and Kirk Johnson, "Safety Becomes Prime Concern at Ground Zero," *New York Times*, November 8, 2001.

²⁷ "Air Quality and Environmental Impacts Due to the World Trade Center Disaster," New York City Council Committee on

Environmental Protection, December 2001, p.10.

²⁸ Ground Zero Elected Officials Task Force press release, November 19, 2001.

²⁹ See 6 NYCRR § 360-114(m)(1): 16RCNY § 8-06(a).

³⁰ See Note 27.

³¹ As an example of "misleading information," see <http://nyc.gov/html/doh/html/alerts/911res.html>.

Information on the DOH website instructs residents to clean with wet mops, while not adequately addressing the dangers posed by large amounts of contaminated dust.

³² See Note 14.

³³ *Ibid.*

³⁴ See Note 21.

³⁵ New York City Department of Health press release, September 22, 2001.

³⁶ Personal communication with Dr. Jessica Leighton, New York City Department of Health, January 2, 2002.

³⁷ Personal communication with Alan Morrison, Port Authority spokesman, January 9, 2002.

³⁸ Michael B. Gerrard, "Environmental Law Implications of the World Trade Center Disaster." *Environmental Law in New York*, 2002.

³⁹ Personal communication with Dr. Muthiah Sukumaran, a pulmonary specialist and director of intensive care at NYU Downtown Hospital, January 9, 2002; Personal Communication with Dr. Stephen Levin of Mount Sinai Medical Center, December 10, 2001.

⁴⁰ *Ibid.*

⁴¹ See, e.g., testimony of Dr. George Thurston in "Air Quality and Environmental Impacts Due to the World Trade Center Disaster," New York City Council Committee on

Environmental Protection, December 2001, p.14-15.

⁴² This Asbestos Hazard Emergency Response Act standard is used by EPA to determine whether it is safe for children to return to schools after the completion of asbestos abatement projects. Asbestos monitoring data can be found at the following: "Asbestos in Air."

<http://www.epa.gov/enviro/nyc/asbestos/>. "Asbestos in Bulk Dust."

<http://www.epa.gov/enviro/nyc/bulkdust/>. "Air Monitoring in Lower Manhattan."

<http://www.ci.nyc.ny.us/html/dep/html/airmonit.html>.

⁴³ "Particulate Matter 10."

<http://www.epa.gov/enviro/nyc/pm10/index.html>. Viewed on February 8, 2002.

"Particulate Matter 2.5."

<http://www.epa.gov/enviro/nyc/pm25/index.html>.

Viewed on February 8, 2002.

⁴⁴ "Benzene in Air."

<http://www.epa.gov/enviro/nyc/benzene/>. Viewed on February 8, 2002.

⁴⁵ "OSHA Sampling Results Summary As of 02/13/02."

<http://www.osha.gov/nyc-disaster/summary.html>.

Viewed on February 13, 2002.

⁴⁶ "PCB Monitoring."

<http://www.epa.gov/enviro/nyc/pcb/>. Viewed on February 8, 2002.

⁴⁷ "Dioxin in Air."

<http://www.epa.gov/enviro/nyc/dioxin/>. Viewed on February 14, 2002.

⁴⁸ "Lead in Air."

<http://www.epa.gov/enviro/nyc/lead/air/>. Viewed on February 8, 2002.

⁴⁹ "OSHA Heavy Metal Sampling Area Map – World Trade Center."

<http://www.osha.gov/nyc-disaster/wtc-metals.html>.

Viewed on February 13, 2002.

⁵⁰ Daily Environmental Monitoring Summary,

Saturday-Monday, February 9-11, 2002,

<http://www.epa.gov/epahome/wtc/epa-osha021102.htm>.

Viewed on February 13, 2002.

⁵¹ See, for example Deborah Baldwin, "It's Going to Take More Than Elbow Grease."

New York Times. September 20, 2001; For data on environmental testing conducted in apartments, see Eric J. Chatfield and John R. Kominsky, "Characterization of Particulate Found in Apartments After the Destruction of the World Trade Center." October 12, 2001.

⁵² Tom Perrotta, "Legal Aid Office Contaminated," *New York Law Journal*, February 4, 2002, p. A1.

⁵³ For a map of PM 2.5 monitors prior to September 11, 2001, see <http://www.dec.state.ny.us/wbsite/dar/baq/nycloc.gif>.

Following the World Trade Center attacks, DEC established several additional PM 2.5 monitors in Lower Manhattan.

⁵⁴ See EPA statement in a press release on September 16, 2001, that "new samples confirm previous reports that ambient air quality meets OSHA standards and consequently is not a cause for public concern."

http://www.epa.gov/epahome/wtc/headline_091601.htm.

⁵⁵ Statement made by Carl Johnson, deputy commissioner, New York Department of Environmental Conservation, during questioning before the New York State Assembly Public Hearing on Air Quality and Other Environmental and Public Health Matters Resulting From the September 11, 2001 Tragedy, November 26, 2001, p. 21.

⁵⁶ Edie Lau and Chris Bowman, "N.Y. Air Hazards

Found: EPA assurances contradicted by UCD scientists," *The Sacramento Bee*, February 12, 2002.

⁵⁷ Statement made by Glenn E. Miltrey, section supervisor, New York Department of Environmental Conservation, Bureau of Solid Waste and Land Management, at 2002 RCRA National Meeting in Washington, D.C., January 18, 2002.

⁵⁸ See Note 7.

⁵⁹ Statement made by Michael R. Taylor, executive director, National Association of Demolition Contractors at 2002 RCRA National Meeting in Washington, D.C., January 18, 2002.

⁶⁰ Ibid.

⁶¹ Michael Mucci, New York City Department of Sanitation, Transcript, NBC Today Show, October 22, 2001.

⁶² N.Y. Executive Order 113.44, "Temporary Suspension and Modification of the Environmental Conservation Law Respecting the Closure of the Fresh Kills Landfill," December 28, 2002.

⁶³ "City Workers Didn't Get Respirators: State Probing Health Practices at Landfill, where workers say the lack of safety equipment early in WTC cleanup has left them with health problems," *Staten Island Advance*, February 4, 2002.

⁶⁴ "Asbestos in Air." <http://www.epa.gov/enviro/nyc/asbestos/staten.html>

Viewed on February 8, 2002.

⁶⁵ Ibid.

⁶⁶ See Note 55, p. 76.

⁶⁷ 42 USC § 9601 et seq: N.Y. Env. Conserv. Law § 27-1301 et seq.

⁶⁸ Personal communication with Dennis McChesney, U.S. EPA, January 2, 2002.

⁶⁹ "New York City/World Trade Center Sampling

Activities, Street Runoff Results," U.S. EPA, September 20, 2001.

⁷⁰ Ibid.

⁷¹ Ibid and see Note 68.

⁷² Carl Johnson, deputy commissioner, New York Department of Environmental Conservation, testimony before the New York State Assembly Public Hearing on Air Quality and Other Environmental and Public Health Matters Resulting From the September 11, 2001 Tragedy, November 26, 2001, p. 5-6.

⁷³ Personal communication with Dr. Dennis Suszkowski, Science Director, Hudson River Foundation. January 22, 2002.

⁷⁴ Sediments: ibid; Fish: personal communication with Dr. Gina Solomon, NRDC, December 26, 2001.

⁷⁵ http://epa.gov/enviro/nyc/drinking_water.html; Personal communication with Dennis McChesney, U.S. EPA, January 2, 2002.

⁷⁶ See Note 69.

⁷⁷ Senator Hillary Clinton, Ground Zero Air Quality Hearing, New York, NY February, 11, 2002.

⁷⁸ Ground Zero Elected Officials Task Force press release, November 19, 2001.