Superfund:
In the Eye of the Storm

Center for Health, Environment & Justice

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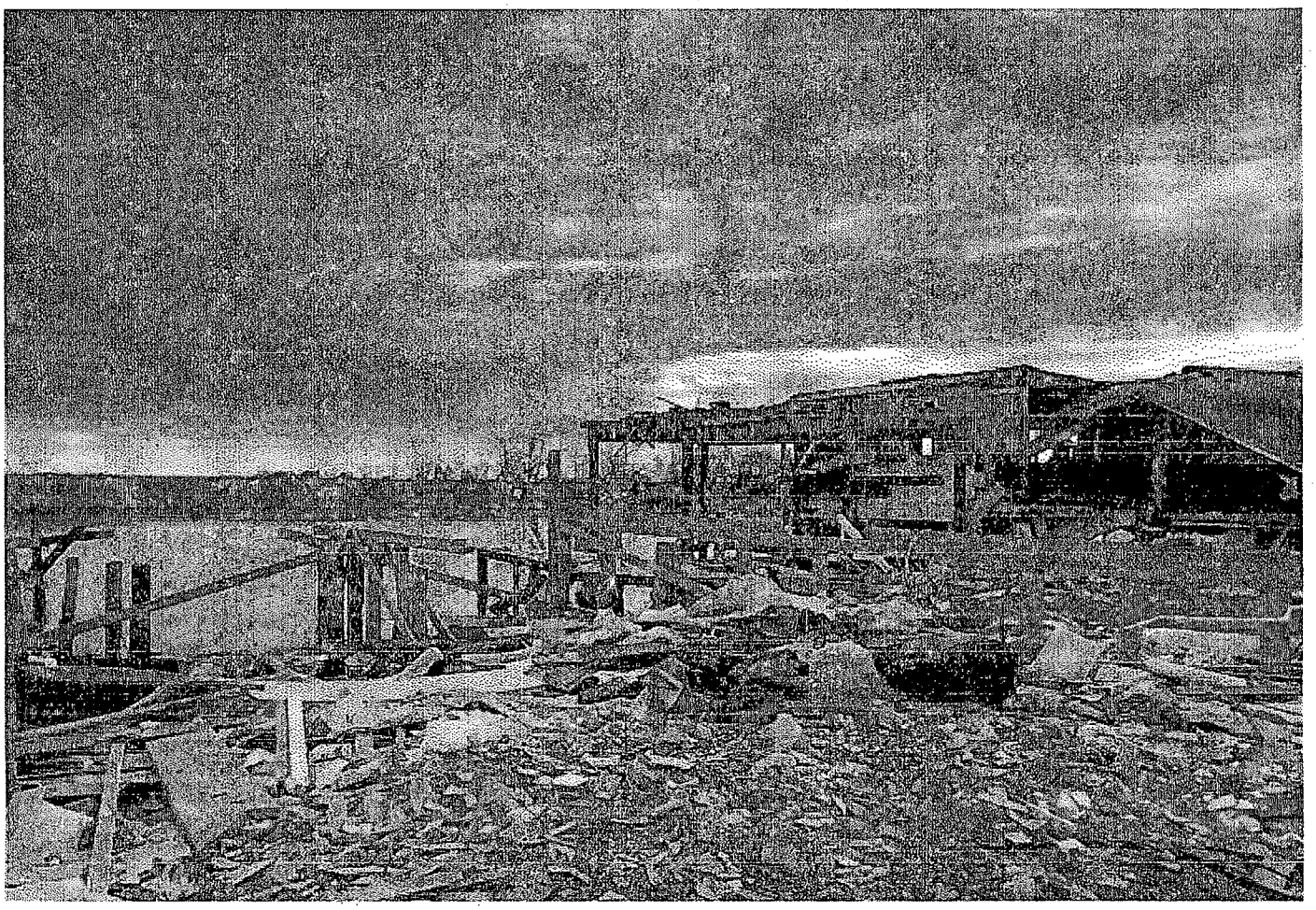

Chapter One

Climate Change: A New Threat to Superfund Sites

Extreme weather events brought on by climate change is a significant threat to Superfund sites, the worst contaminated sites in the country. Hurricanes, tornados and intense heavy rains leading to flooding are occurring more often and with greater intensity and have dispersed toxic contamination at Superfund sites. As these events are becoming more frequent and more intense, climate-change related weather events are posing a significant threat to the future integrity of many Superfund toxic waste sites.

Extreme Weather Conditions

As the climate warms in response to increasing atmospheric greenhouse gases, escalating changes in extreme weather are expected. It has been well established in recent scientific reports that the intensity of these extreme events will increase in the future.[1,2] For instance, the International Panel on Climate Change (IPCC), a preeminent scientific research group on climate change comprised of the world's leading scientists, has issued a series of reports on the increase of climate change-related weather events.[3] The most recent report concluded that "warming of the climate is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea levels."[4] Their reports join many others in demonstrating there is a scientific consensus that the earth is warming primarily as a result of emissions from human activities. This global warming will lead to serious, potentially catastrophic impacts including increased flooding, drought, and hurricane intensity.[5,6]

There is growing scientific evidence that a warming world will be accompanied by changes in the intensity, duration, frequency, and geographic extent of weather and climate extremes.[7] This is expected to lead to an increase in areas affected by drought, more frequent and intense heavy downpours with a higher total rainfall, more frequent heat waves and warm spells, and more intense hurricanes and tornados.[8,9] In recent decades, there is already evidence that extreme rainfall has increased in some regions, leading to an increase in flooding.[10,11] For example, many believe the heavy rain and subsequent flooding in the Midwest in June 2008 was a climate change-related extreme weather event. The flooding there has been compared to intense rain and flooding that occurred in 1993 which were thought to be a once-in-500-years event.[12]

These changes in extreme weather will have a significant impact on all sectors of the economy and the environment—including Superfund toxic contaminated sites—and will impact people's health and well-being. Climate change-related extreme weather conditions cause property damage, injury, loss of life and threaten the existence of some species and ecosystems. From 1980 to 2006, there were 70 weather-related disasters in the United States with overall damages exceeding $1 billion.[13] Such impacts are among the most serious challenges to society in coping with a changing climate. However, it may be that the more insidious impacts are harder to fully

ascertain and may pose much greater risks, such as the long-term impacts of flooding hazardous waste sites and spreading highly toxic chemicals throughout a community.

Despite the growing evidence, it is difficult to fully determine if a specific extreme weather event is due to a specific cause, such as increasing greenhouse gases. There are two reasons for this: 1) extreme weather events usually are caused by a combination of factors; and 2) a wide range of extreme events are a normal occurrence even in an unchanging climate.[14] This is because some factors, such as sea surface temperatures, may be strongly affected by human activities, while others may not. Science is just not able to conclusively detect the influence of a human activity on a specific extreme weather event. Nevertheless, the scientific analysis of global warming over the past century strongly suggests it is likely that extreme weather events, such as heat waves, have increased due to greenhouse warming, while the likelihood of others events, such as frost or extremely cold nights, has decreased.[15]

Atlantic Hurricanes

One example of escalating extreme weather conditions is the increased intensity of hurricanes. An analysis of the latest scientific research by the U.S. Climate Change Science Program, working with the National Oceanic and Atmospheric Administration, drew the following conclusions about hurricanes.

- Since approximately 1970, the Atlantic Ocean tropical storms and hurricane destruction potential has increased substantially. For instance, over the past two decades, there has been an increase in extreme wave height characteristics associated with more frequent and intense hurricanes.

- It is very likely that the greenhouse gas increases linked to human activities have contributed to increased sea surface temperatures in the hurricane formation region. Since there is a strong connection between Atlantic tropical sea surface temperatures and Atlantic hurricane activity, this suggests a human contribution to recent hurricane activity.

- For North Atlantic and North Pacific hurricanes, it is likely that rainfall, wind speeds, and storm surge levels will increase in response to human-caused global warming.[16]

Hurricane activity models under climate change scenarios predict that tropical Atlantic sea surface temperatures will warm dramatically during the 21st century with temperatures in the atmosphere closest to the surface warming even more so.[17] These hurricane models indicate that while Atlantic hurricanes and tropical storms will be substantially reduced in number, they will be stronger with significantly more intense rainfall.[18]