NYC AIR TESTS

Study's answers blowing in wind

Scientists plan to release a benign gas in efforts to better understand spread of airborne toxins

BY EARL LANE
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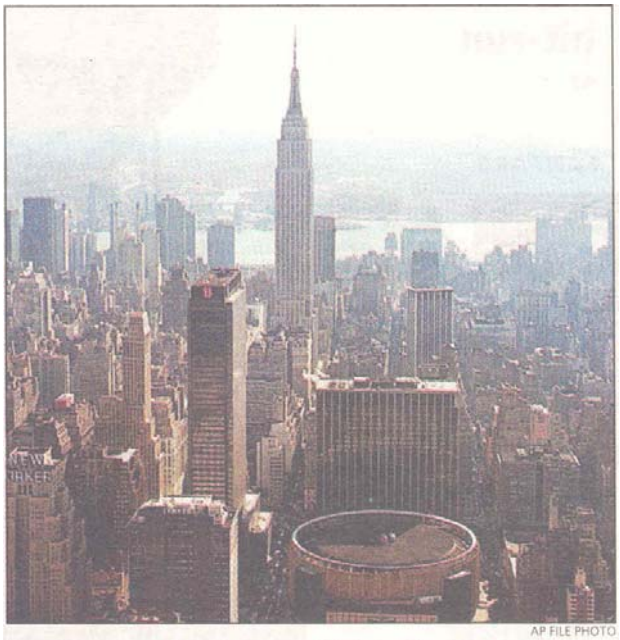
AP FILE PHOTO
Madison Square Garden area a likely testing site.

WASHINGTON - Researchers are making plans to release a benign gas in the urban canyons of Manhattan, perhaps in the vicinity of Madison Square Garden, to simulate how toxins might disperse in a terrorist attack.

The exercise, part of an effort to better understand air flow past tall buildings, will build on a recently completed pilot study on wind patterns in a nine-block area of Manhattan's West Village.

No tracer gases were released during that study, which was initiated early last year and completed in March, according to project leader R. Michael Reynolds, an atmospheric scientist at Brookhaven National Laboratory.

Ultimately, scientists want to develop better methods for tracking and predicting the spread of airborne toxins and to produce computer visualizations that could quickly show emergency responders where people would be at highest risk of coming in contact with a hazardous plume of toxins or radioactive materials.

Feds take the reins

Dispersion studies have become common in recent years and there are many computer models, some of them developed by industry, for predicting the spread of airborne contaminants.

But trying to predict dispersal over many blocks in an area with hundreds of tall buildings remains a daunting challenge, specialists said. Reynolds and his colleagues, including computer specialists from

Stony Brook University, had proposed doing a follow-up to the West Village study this summer by dispersing an inert trace gas called perfluorocarbon in the Madison Square Garden area.

As many as 50 sensors deployed throughout midtown would track the dispersion of the plume. Similar dispersion studies, with a tracer gas called sulfur hexafluoride, were done in Oklahoma City last year and in Salt Lake City in 2000.

Within the past several months, the proposed New York study was merged into a broader effort being coordinated by the Department of Homeland Security. Jerry Allwine, a specialist on dispersal studies for the Pacific Northwest National Laboratory in Richland, Wash., is the scientific director of the study. He said in a telephone interview that a science team will be assembled within a month or so. Allwine said it is too soon to say whether the new study will be carried out in the Madison Square Garden area, as Reynolds and his team had been planning, or elsewhere in Manhattan. Nor is it clear when the data collection will begin.

Donald Tighe, a spokesman for the Department of Homeland Security, said the study will be a multi-year effort, at a cost not yet determined. The Pentagon's Defense Threat Reduction Agency also will be a major contributor. In the recently completed West Village study, the researchers placed instruments for measuring air turbulence on a 12-story building at the corner of Varick and Houston streets that houses the federal Environmental Measurements Laboratory, an arm of the Department of Homeland Security. Sensors were deployed on the roof, on the exterior of the eighth and 12th floors, and at ground level.

The team was particularly interested in the behavior of air currents along the King Street corridor, adjacent to the building. They found that the measured wind direction on the eighth floor can be directly opposite readings on the 12th floor. Updrafts between two tall buildings can also create a chimney effect that can quickly transport a plume of contaminants from the site of release.

Convention delays testing

The Brookhaven-led team initially had hoped to do a follow-up midtown dispersion study by July, then pushed the date to November. Reynolds said city officials asked for the delay, given the logistical demands of preparing for the Republican National Convention at Madison Square Garden from Aug. 30 to Sept. 2.

"They felt they couldn't give proper attention to supporting a scientific study at the same time," Reynolds said. The issue of timing became moot when the Department of Homeland Security assumed the lead role in the project and asked for additional proposals on how to proceed. A spokesman for the city's Office of Emergency Management declined to comment on the dispersion study and referred inquiries to the Department of Homeland Security.

In the proposed study in the Madison Square Garden area, Reynolds said, researchers planned to deploy several dozen sensors on buildings and at street level. They also wanted to enlist perhaps 20 volunteers to wear small pen-sized devices on their lapels to collect information on the exposures people might experience at various distances from the release site.

"We have to simulate the kind of contact that emergency responders would have with the release," said Paul Lioy, deputy director of the Environmental and Occupational Health Sciences Institute in Piscataway, N.J. The institute, jointly funded by Rutgers University and the Robert Wood Johnson Medical School, is working with the federal Environmental Protection Agency to deploy small, mobile

exposure sensors in the planned New York dispersion study.

Arie Kaufman, chairman of the computer science department at Stony Brook University, said the vortices that form in urban canyons are "very, very complex phenomena." He said one proposed study area in midtown has more than 800 multi-story buildings, including the Empire State Building and numerous office towers. His team has been developing a computer model that can predict flows past and into buildings in high-rise neighborhoods. The results are not always what might be expected, he said.

Winds blowing from the southwest across Manhattan might be expected to spread a toxic release from midtown toward Long Island City, he said. Instead, the computer simulation shows the plume going northward, up the avenues. Stony Brook researchers are developing computation methods to deal with wind flow through deep building canyons and around curved objects, as well as accounting for the effects of moving traffic.

Computer simulations, informed by results of dispersion studies such as the one planned, can provide a range of possible outcomes for what happens when a chemical or biological agent is released or a "dirty bomb" laced with radioactive material is exploded.

Given adequate real-time data from weather instruments and toxin sensors, Kaufman said, advanced computer simulations also should be able to "catch up" with a developing situation and predict with greater accuracy where a plume will move. Emergency personnel would be able to call up visual depictions of the likely spread path, helping to inform their plans to evacuate people or order them to stay indoors.

Bruce Hicks, director of the National Oceanic and Atmospheric Administration's Air Resources Laboratory, said a dedicated array of meteorological sensors, called DCNet, already is being deployed in the nation's capital to provide quicker, more accurate data in the event of a release of hazardous gases. He said there is "a very healthy competition" by researchers helping cities better prepare for terrorist threats borne on the wind.

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