

controlled setting. Researchers evaluated ten nonsmoking men who exercised moderately while exposed to 0.12 ppm of ozone over 6.6 hours in a chamber at the agency's laboratories in North Carolina. The subjects exercised for 50 minutes over 3 hours in the morning and again in the afternoon. The adults' FEV₁ dropped significantly, according to results published this year in the *Journal of the Air Pollution Control Association*. The findings were confirmed by a subsequent study of 22 nonsmoking men, according to results presented at a scientific meeting last month sponsored by EPA in Nijmegen, Netherlands.

At this meeting, researchers presented other results that they say raise additional concerns about longer term exposure to low levels of ozone. Various experiments with rodents and primates showed that longer term exposure to ozone concentrations near the ambient range retard the ability of the animals' lungs to clear out toxic particles and cause inflammation of the lining of the animals' lungs. One study indicated that the function of cells that fight off bacterial infection in the lungs of rodents was impaired. Lippmann and others are concerned that these effects might lead to chronic damage.

Lippmann and others have been talking about the possibility that EPA should set a new standard at 0.08 ppm over several hours. The present 1-hour rule translates roughly to 0.10 ppm over 8 hours. Goldstein, who is now at the University of Medicine and Dentistry of New Jersey—Robert Wood Johnson Medical School, says, "I'd like to see EPA commit to a longer term standard," although he declines to specify the concentration or the period of time. The important consideration, Goldstein says, is to revise the rule so that ozone concentrations are controlled over a longer period of time.

Thomas McCurdy of EPA's Office of Air Quality Planning and Standards estimates that if a 0.08 ppm, 8-hour standard were adopted, an additional 9 areas around the country would be out of compliance, including mid-size cities such as Columbus, Ohio, Niagara Falls, and Asheville, North Carolina.

Jordan of EPA says that the new data will be discussed at the next Clean Air science advisory board meeting this fall. He says "the agency has moved on data that's a heck of a lot weaker than this. Data was probably was not as strong in 1979 to support .12 ppm as it is for multiple hour standard."

Paul Lioy of the University of Medicine and Dentistry of New Jersey and a member of the EPA advisory board, remarks, "all the health data coming together say we've got a problem. The present standard is not adequate."

■ MARJORIE SUN

Superfund Program Under Fire

The federal government's multibillion dollar program to clean up hazardous wastes at thousands of sites across the nation is a management disaster, according to the Office of Technology Assessment (OTA). The nonpartisan research arm of Congress reports that although the Environmental Protection Agency (EPA) often spends tens of millions of dollars to clean up a location, it may use less than optimal methods due to poor analyses—or simply to save money.

As a result, says OTA in an unusually critical report, *Are We Cleaning Up?*, many clean-up jobs may have to be redone. "There is no assurance of consistently high quality studies, decisions, and fieldwork, or of active information transfer," says OTA, which describes the Superfund program as a "loose assembly of disparate working parts."

The heart of the problem, says OTA, is the decentralized management of the cleanups. A huge amount of money—some \$5 billion—has been spent on mopping up hazardous wastes since 1980, when Congress created a trust fund, the so-called "Superfund," to pay for fixing contaminated sites. The agency, however, has no firm matrix for determining what cleanup technology is best to use. Nor are there tight controls on what various cleanup strategies should cost.

The weaknesses of EPA's administration of the Superfund program are illustrated in the report with 10 of more than 100 cases that OTA examined. In the case of Pristine, Inc., of Reading, Ohio, the agency chose to spend \$22 million on in situ vitrification, a process that involves heating the ground with electricity, encapsulating some wastes in glass-crystalline structures, and burning off other wastes. OTA says the agency erred in choosing this technology, first because the cost of incineration was grossly exaggerated; and second because it is not clear how effective vitrification is in permanently dealing with hazardous wastes.

If the program continues to be run in the same way, OTA says, public confidence in the program could be lost. To make the program operate better, EPA must do a better job of integrating into agency standards lessons learned in selecting and applying cleanup technologies at sites across the country. Headquarters must also exercise more oversight and control of regions to avoid squandering Superfund money, which is derived from fees imposed on the petroleum and chemical industries.

Among the other problems identified by OTA:

- EPA pushes its staff to complete "record-of-decision" actions that dictate how site cleanups are conducted. But trying to meet year-end deadlines for the sake of complying with bureaucratic goals "can lead to poor cleanup decisions," says OTA.

- EPA's Superfund work force is young, often lacks training, and suffers from high turnover. Contractors working for the agency also lack experience. Heavy work loads and limited funds make it difficult for both EPA staffs and contractors to keep up with developments in cleanup approaches and technologies.

- EPA ignores language in the Superfund Amendments and Reauthorization Act of 1986, which urges the agency to use permanently effective treatment technologies over methods that consolidate and stabilize wastes for a given time.

- EPA may choose an impermanent cleanup approach to a site because of its lower costs. The agency, however, often does not give adequate consideration to the potential for stabilization techniques such as clay caps. OTA observes that decisions to reject a more expensive, but permanent solution may be influenced at times by private parties that are financially responsible for the site's contamination.

The report is a blow to EPA's assistant administrator for solid waste and emergency response, J. Winston Porter, who has led the program since 1985. But Porter defends the agency's performance, stating that the OTA report does not reflect the enormity of the national cleanup task and the difficulties that the agency engineers encounter.

"We strongly object to the tone that Joel Hirschhorn chose to take in this report," said David Cohen, press spokesman for Porter. Cohen said that the ten cases studies cited in the report, which was directed by Hirschhorn, do not accurately portray how the cleanups are being run. "We have a fairly good program," says Cohen, noting that it is not a "management disaster" as the report suggests.

Hirschhorn acknowledges that EPA has a complex program to manage and cites cases where the decision process on site cleanups have been executed well. He told *Science*, however, that the report's tough language was appropriate because the program is headed for trouble unless changes are made.

■ MARK CRAWFORD