NORTHERN EXPOSURE

The perils of ozone loss hit home in America as a potential new hole is found over the Arctic

If the ozone hole over Antarctica has always seemed a little too exotic and a lot too remote to be really worrisome, start worrying. In early February, NASA and National Oceanographic and Atmospheric Administration scientists announced the discovery of a new source of concern about the ozone—the shield of molecules that protects the earth from the sun's damaging ultraviolet rays—much closer to home than the South Pole. Record high levels of chlorine monoxide indicate that a potential second ozone hole over the Arctic is imminent. This one could imperil millions of people in Canada, Russia, Europe and northern New England. Eventually, the entire U.S. may be exposed to dangerous levels of ultraviolet rays.

The news came as grim confirmation of the warning sounded in 1974 by F. Sherwood Rowland, professor of chemistry at the University of California at Irvine. Rowland and his research associate, Mario Molina, had discovered that chlorofluorocarbons (CFCs)—chemicals used in air-conditioning, refrigeration, polyurethane foam and, at the time, as propellants in aerosol cans—were being released into the atmosphere and destroying ozone. Only in 1985 did NASA satellite images confirm the existence of a hole over Antarctica. Correspondent Stan Young talked with Rowland recently about the implications of the second ozone hole.

IN HIS WORDS

Were you surprised by these new findings?

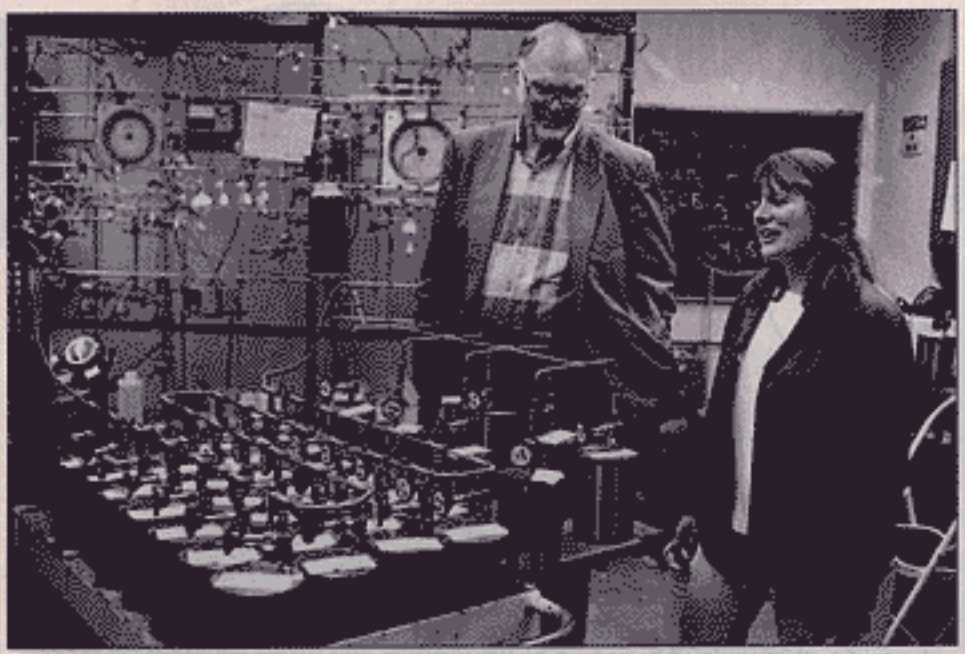
Everybody was surprised by the extent of the depletion. Until now, we thought the major ozone loss was confined to an area over Antarctica. But in February we found levels of ozone-destroying chlorine monoxide over the northeastern United States and southern Canada in higher concentrations than have *ever* been observed over Antarctica.

Why do ozone holes concentrate over polar regions?

During the winter, wind patterns called polar vortices hold cold air above the poles. Tiny ice crystals form in the air, which help convert chlorine from CFCs into molecular chlorine. In early spring, sunlight decomposes chlorine, setting off a chemical chain reaction. Each chlo-

▲ F. Sherwood Rowland warned 18 years ago of ozone depletion that eventually resulted in the Antarctic hole (projected above).

Photographs by Steve Schapiro/Gamma-Liaison



A In his Irvine, Calif., lab, Rowland and associate Nicola Blake check air samples for CFCs.

rine atom can destroy an average of 100,000 molecules of ozone. In Antarctica you see regions at an altitude of nine miles where there's no ozone left. That's the hole we talk about.

Why do we need an ozone layer?

For millions of years, ozone—a form of oxygen—has been protecting the surface of the earth by absorbing ultraviolet radiation from the sun.

And UV radiation is bad?

In increased amounts it can be harmful to humans in two ways: It can make the lens of the eye cloud up with cataracts. And it can accelerate the risk of skin cancer. (Most forms are not serious; the rarely occurring malignant melanoma is fatal but in only 20 percent of the cases.) Some doctors are advising sunscreen protection factors of 15 to 30.

Can exposure to ultraviolet radiation harm plants and animals?

Yes. Right now, the lowest levels of life are being hardest hit. In Antarctica, scientists have observed reduced productivity in phytoplankton, a single-celled ocean creature that is important to global ecology because it's at the bottom of the food chain. That's the first concrete biological effect that can be attributed to ozone loss caused by man. Scientists think UV radiation can impair animals' immunity to infectious diseases. Other experiments show that yields of about half the world's crops decline when they absorb UV-B, the most dangerous ultraviolet radiation.

How do we get rid of CFCs?

First we have to stop manufacturing and using them. In 1987 the U.S. and other major CFC producing countries agreed to the Montreal Protocol, pledging to cut CFC production 50 percent by 1999. As evidence of ozone loss increased, those countries decided to phase out all CFCs by 2000. After the recent NASA and NOAA report, President Bush announced a U.S. plan to speed up the timetable to Dec. 31, 1995.

Will that halt ozone depletion?

No. For most of the 1970s and 1980s, the world was releasing 1 million tons of CFCs into the atmosphere every year. Despite the halt in production, CFC releases will still go on. Maximum concentrations in the lower atmosphere will occur in the late 1990s. Because it takes time for CFCs to reach the stratosphere, maximum ozone depletion will follow a few years later. Ozone replenishes itself naturally, but it will take the entire 21st century to return to pre-CFC levels.

Do you feel vindicated?

I'm not in a position to tell countries what to do. We've warned the world. But people don't always do what's best. At least now we're placing a cap on the potential damage to ozone. ■