

WHO LOST THE OZONE?

How the world waited too long to rescue the shield that protects earth from the sun's dangerous UV rays

By EUGENE LINDEN

IT IS HAILED AS THE GREATEST SUCCESS yet in the defense of Planet Earth. Many a President and Prime Minister present themselves as the saviors of the ozone layer—the leaders who rescued the fragile atmospheric shield that protects all living things from the sun's dangerous ultraviolet rays. This airbrushed view of history starts in 1985, when scientists realized that an ozone hole had opened over the South Pole—the result of an atmospheric assault by man-made chemicals called chlorofluorocarbons, which are commonly used in refrigerators and air conditioners. Soon after this disturbing surprise, the diplomats of the world were at the negotiating table. By 1987 they had reached a preliminary agreement to phase out production of CFCs, and by 1990 they had set 2000 as the target year for a total ban. Now most countries expect to beat that deadline by many years because substitutes for CFCs are coming on line more rapidly than expected. The central player in the drama—the unwitting villain turned hero—was Du Pont, the American chemical company that invented CFCs, dominated global production and eventually led the way in developing substitutes. In 1990 the U.S. Environmental Protection Agency gave Du Pont an award for stratospheric ozone protection.

There is only one problem with this fabled success story: the rescuers may have arrived too late. No matter how quickly manufacturers halt the production of CFCs, billions of pounds of the chemicals already produced will continue to seep into the atmosphere and rise inexorably to attack the ozone layer. Worse, measurement after measurement since the mid-1980s has shown that ozone loss has been greater and more rapid than scientists predicted. Last month in *Science* magazine, researchers disclosed new satellite readings showing that in 1992 the average concentration of ozone in the upper atmosphere around the globe was 2% to 3% lower than any previous reading and 1.5% below what computer models predicted. That news came just a week after the World Meteorological Organization reported that ozone levels over some north-



ern parts of Europe and Canada fell as much as 20% this winter.

The amount of CFCs in the atmosphere will keep rising until at least the year 2000; after that it may slowly fall, but ozone destruction will continue for several decades in the 21st century. Some optimistic scientists predict that the impact on the heavily populated middle latitudes will be tolerable: at worst, a 6% ozone loss during the summer months, which could cause a 12% increase in ultraviolet radiation. But these forecasts are based on the same computer models that have consistently underestimated the problem. Given the volatile and poorly understood chemistry of the upper atmosphere, no one can predict how severe the ozone depletion will be. Even a modest rise in the level of UV radiation could increase the risk of getting skin cancer or cataracts, damage crops and other plant life, and possibly affect climate patterns.

Did the world really act as fast as possible to meet the threat? The answer, unfortunately, is no. The eventual rescue operation was the last chapter in a long saga of confusion, wishful thinking, indecision and delay. For nearly a decade before the 1987 ozone treaty, nations were warned of the danger but did nothing. In the U.S. those who had the power to take action instead engaged in self-delusion: the Reagan Administration at first dismissed the ozone threat as a non-issue, while Du Pont and other manufacturers underestimated future sales of CFCs, making the hazard seem minimal.

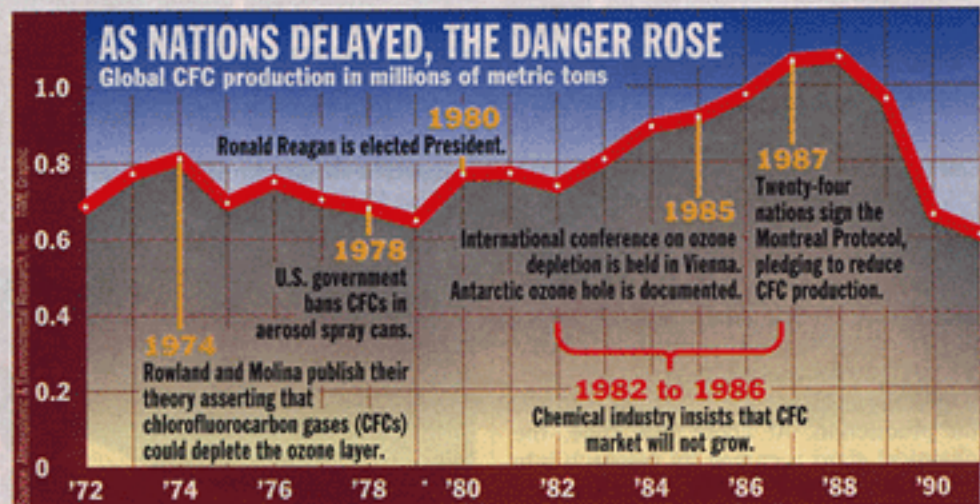
The story is more than a matter of historical interest; the world may pay dearly for the delay. What happened with ozone is a cautionary tale that is relevant to how countries deal with other global environmental issues, such as the scientific forecasts of global warming. So far, leaders have put off dealing with that danger, just as they did with the ozone problem.

The alarm first sounded back in 1974, when Sherwood Rowland and Mario Molina of the University of California at Irvine warned about the destructive impact that CFCs could have on the atmosphere. Before banning these important industrial chemicals, however, scientists had to confirm that CFCs did in fact attack ozone and that society produced enough of the chemicals to create a problem. Within a few years, most scientists accepted that CFCs were a real threat, though uncertainties remained. In 1978 the U.S. banned the use of CFCs in aerosol sprays and began pushing for international controls.

The election of Ronald Reagan, abruptly interrupted these American efforts. The EPA was taken over by a pro-business team that did not like regulations and distrusted international agreements. Anne Burford, who headed the EPA in the early 1980s, regarded ozone depletion as an unsubstantiated scare story. Many demoralized professionals resigned, leaving the

agency with few people who had any background on the issue.

Du Pont, which poured \$15 million into developing substitutes during the late 1970s, all but halted its research shortly after Reagan's election because no further regulation was on the horizon. Earlier, Du Pont had publicly committed itself to stop production of CFCs if "reputable evidence" showed they posed a hazard to the ozone layer. The company, however, set a tough standard for what constituted "reputable evidence." Du Pont challenged Rowland at every turn in the 1970s, and he believes the company's aggressiveness sent a chilling message to other scientists in the field.



One of the crucial questions for policymakers was whether CFCs would remain in the atmosphere for a long time. Asked today when it was proved that CFCs could hang around for many decades, Du Pont scientists readily acknowledge that the issue was largely put to rest in the '70s. As late as 1982, however, a Du Pont scientist was still arguing in print that CFCs were short-lived.

IN WHAT TURNED OUT TO BE A MASTERSTROKE of lobbying, Du Pont took the lead in organizing the Alliance for Responsible CFC Policy in 1980. It was an unusual trade organization, since it brought together both producers and users of a product, groups that usually have opposing agendas. The manufacturers realized that representatives from small American businesses spread through every congressional district would have far more impact on lawmakers than a few giant chemical companies. "I remember a parade of CFC users coming through," says U.S. Senator John H. Chafee of Rhode Island, "telling me what I was going to do to their refrigeration business if they were denied these marvelous CFCs." Partly because of the alliance's lobbying, support for additional U.S. limits on production dried up in Congress.

Despite the antiregulatory mood, there is little doubt that the U.S. and other governments would have taken action if poli-

cymakers had received unambiguous scientific signals on the dangers of CFCs. But soon after the Reagan Administration came into power, some scientists began to question how serious the problem would be. One section of a 1983 National Academy of Sciences update on ozone suggested that if CFC production remained flat, total ozone loss might not be as severe as previously expected.

Du Pont and the alliance immediately seized on the no-growth scenario. Influential atmospheric specialists, such as Robert Watson, who recently moved to the White House staff from NASA, were persuaded that the CFC industry would not be

expanding. Watson recalls that Du Pont spokesmen appeared at meeting after meeting arguing that the CFC market was "mature." With these reassurances, some scientists felt less immediate need for further regulations.

The industry vociferously countered opponents' suggestions that the CFC market was, in fact, growing. When Ralph Cicerone, an atmospheric chemist at U.C. Irvine, gave a talk at Columbia University in 1984, his assertion that the CFC market was expanding drew what he remembers as a heated "personal attack" from Du Pont manager Donald Strobach, who served as science adviser to the alliance. Cicerone had data from the EPA and the Rand Corp., but Strobach said that his figures were scandalously wrong and that Cicerone was being irresponsible.

Actually, Cicerone was correct. After a sharp drop in world production during the deep recession of 1982, output resumed a climb that had begun in the late 1970s. In March 1983 the *Chemical Marketing Reporter* predicted 4% to 5% growth each year in CFCs through 1987. Actual production outpaced predictions: output increased roughly 7% a year.

Du Pont officials insist they did not know the market for CFCs was going to grow until 1986. In March of that year, frustrated EPA officials arranged a showdown that participant Alan Miller, then an attorney with the Natural Resources De-

fense Council, described as "analysts at the O.K. Corral," and confronted the industry with three independently produced studies showing that without regulation, CFC production would grow. Says F. Anthony Vogelsberg, a Du Pont environmental manager: "You have to understand what we were looking at. If you smoothed the data between 1980 and 1983, you had a flat market . . ." Du Pont argued that the market in the developed world was mature, but it is farfetched to suggest that the world's largest manufacturer of CFCs did not realize there was tremendous untapped demand for refrigeration among the huge populations in the developing world. Moreover, the market for CFC113 (used to clean electronic circuit boards) was exploding.

The dispute over the potential of the CFC business eventually hurt Du Pont's credibility. Watson, who earlier believed industry assertions, now says bitterly, "We listened when they said this was a mature business, but we now know that they were stating lies."

In September 1986 Du Pont suddenly broke ranks with other manufacturers and reversed its position. It admitted that the CFC market was growing and acknowledged the need for international controls on production. At about this time, the chemical giant resumed its research into CFC substitutes. Once the company changed its mind, it moved quickly. In 1988 Du Pont pledged to get out of the business by 2000. But humanity may pay a price for the years of delay; between 1978 and 1988, nearly 19 billion lbs. of CFCs were produced worldwide.

At a time when environmental policymakers are being accused of wasting resources on exaggerated threats, such as dioxin contamination, the ozone story shows what can happen when the world underestimates problems. It also underscores the difficulty of imposing environmental regulations that clash with economic interests, especially in the face of scientific uncertainty. If policymakers wait until there is unarguable evidence of danger before they act, it may be too late to prevent serious environmental damage.

This dilemma is now being faced on a related issue, that of carbon dioxide emissions and the global warming they could cause. Even though scientists are still debating how bad the warming trend might be, President Clinton has pledged that the U.S. will draw up a plan to get emissions of carbon dioxide and other greenhouse gases back to 1990 levels by the year 2000. But will the plan, which may be opposed by utilities, automakers and a host of other business interests, make it through Congress? Corporate forces have already come up with their own version of the CFC alliance, called the Global Climate Coalition. One of the founding members: Du Pont. ■