Landmark Ozone Treaty Negotiated

United Nations group works out plan to slow the erosion of the ozone layer; further action may be necessary to protect the planet

AFTER a year of negotiations, 23 countries have endorsed a plan to reduce emissions of chlorofluorocarbons (CFCs), man-made compounds that are thought to be destroying the ozone layer in the stratosphere. The proposed treaty, which must be ratified by at least 11 nations before it takes effect, calls for cutting world consumption of CFCs 50% by 1999.

The effort to slash use of CFCs has been driven by concern over continued erosion of the ozone layer, which shields the planet from ultraviolet radiation. Chlorine released by degrading CFC chemicals is thought to be the primary villain. Without controls, the Environmental Protection Agency (EPA) projects that thousands of additional deaths and millions of added cases of skin cancers will occur in the United States in future years (*Science*, 21 November 1986, p. 927).

Major industrial countries, including the Soviet Union, are expected to approve the protocol. Although the treaty falls short of the phaseout initially sought by the United States, the agreement is being hailed by government officials and environmentalists as a diplomatic feat that sets an important precedent. "It demonstrates that there are ways of resolving international environmental problems," says Irving Mintzer of the World Resources Institute.

Chlorofluorocarbon compounds are widely used in developed countries for refrigeration, producing plastic foams, and cleaning electronic components. The United States, Europe, and Japan produce and consume most of the world's CFC chemicals. Under the treaty developed through the United Nations Environment Program (UNEP), most industrialized countries will have to steadily reduce their usage of a number of CFC products.

One exception is the Soviet Union, which will be allowed to proceed with construction of two small CFC plants. Overall Soviet CFC consumption, however, may not exceed 0.5 kilogram per capita. A special provision also has been made for developing countries that now consume only small amounts of these chemicals. They will be able to increase consumption up to 0.3 kilogram per capita. Per capita use in the United States is about 1.1 kilograms.

The treaty is to take effect on 1 January 1989, assuming that at least 11 nations representing a minimum of 67% of global consumption have ratified the treaty. By July 1990, participating countries must freeze domestic consumption of CFCs at 1986 levels and limit production to a maximum of 110% of their 1986 levels. As of June 1994 consumption may not exceed 80% and production is limited to 90% of 1986 levels. CFC usage must drop 50% by 30 June 1999 and production then cannot exceed 60%.

U.S. negotiators originally sought to cut CFC production 20% by 1990 and 50% by 2000. But concessions were made to allow existing industrial producers in the United States, the European Community, and Japan to produce up to 10% more if the incremental production goes to developing countries that do not have the ability to produce CFCs. EPA officials say the compromise was necessary to discourage less developed countries from building their own CFC production plants. Despite assurances that there would be an ample supply of CFC products, negotiators were unable to get developing nations to agree not to construct new CFC plants.

Mark Crawford

Chlorofluorcarbon. *Used in auto air conditioners, CFC 12 is sold in many auto parts stores.*

So far, only 23 of the 51 nations taking part in the UNEP talks have signed the treaty. The participation of developing nations is considered critical to achieve an effective treaty. "The treaty is important because it is sending a message to other nations that these compounds are dangerous and makes it clear that substitutes must be sought," says F. Sherwood Rowland of the University of California at Irvine. He and his colleague Mario Molina first warned in 1974 that the ozone layer was being depleted by chlorine released from CFCs.

While recognizing the importance of the treaty, Rowland says deeper reductions in CFC use are necessary to protect the ozone layer and avoid severe environmental damage. "[The treaty] is not at all adequate. It does not really start cutting down on CFC emissions for another several years and then only slowly." UNEP officials concede that the ozone layer could erode further.

Margaret L. Kripke, chairman of the Department of Immunology at the University of Texas, sides with Rowland. "I would have been happier if they had gone to a 70 to 80% reduction," says Kripke. She notes that since nations appear to be willing to accept some further degradation in the ozone layer, "we are going to have to work very hard to understand what the [environmental] effects will be."

Federal support for research on the health and environmental affects of ultraviolet radiation has been minimal to date, she says. EPA officials estimate federal spending on environmental effects research at $1.5 million annually, while support for related atmospheric R&D is about $40 million.

Du Pont, Allied Signal, Imperial Chemical Industries, and other major producers around the world are testing substitutes for CFC 11 and CFC 12, which are widely used in refrigeration and for making foam rubber and plastic insulating products. At this time, Du Pont and Allied Signal officials are optimistic that shortages of CFCs for air conditioning, refrigeration, and manufacturing can be avoided. The search for substitutes, however, could be drawn out if toxicology studies and other product tests turn up problems. ■ MARK CRAWFORD