

STATEMENT OF  
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NATURAL RESOURCES DEFENSE COUNCIL

I represent the Natural Resources Defense Council, a non-governmental environmental organization in the United States. My colleagues and I are very grateful to be here today as observers to this negotiation on a matter of tremendous importance to public health the environment, and indeed life as we know it.

The public in countries around the world has become alarmed by the threat that continued emissions of certain man-made chemicals pose to the ozone layer and the global climate. As a reflection of this widespread and deeply felt concern, I would like to present to this group a formal written statement of 79 European and American nongovernmental organizations (NGOs), all of whom strongly believe that the unacceptable risks of ozone depletion and climate change from ozone-depleting and heat-absorbing chemicals require immediate action by the governments assembled here to sharply reduce emissions in the immediate future and to phase them down to virtually zero over a decade. This statement is presented on behalf of the European Environmental Bureau, which represents 75 organizations distributed through the European Economic Community; Friends of the Earth International; the Natural Resources Defense Council and the Environmental Defense Fund, which are two U.S. NGOs; and the Swedish Society for the Conservation of Nature. Many other nongovernmental organizations around the world will join in this statement before the next session of these negotiations.

The signatories to this statement have high expectations that an agreement to protect the ozone layer and the earth's climate will emerge from these negotiations. However, not merely any agreement

will suffice. The protocol must contain control measures sufficient to stop ozone depletion from these chemicals and to end their contribution to global warming of the climate. No level of ozone depletion or climate modification can be considered acceptable.

Many of the chemicals responsible for ozone depletion -- six chlorofluorocarbons, two bromine-containing halons, and three chlorinated solvents -- survive in the atmosphere for decades, if not centuries. Calculations show that merely to stabilize chlorine concentrations in the upper atmosphere requires immediate reductions in emissions of approximately 85 percent. For these reasons the signatories to today's statement call upon their governments and those of all the nations assembled here to take the following measures:

- a 30% reduction of emissions of these chemicals by the end of 1988. Countries which continue to allow the use of CFCs in aerosol products should make proportionally larger reductions.
- an 85% reduction in emissions of these chemicals by the end of 1992. The CFC-producing industry has made encouraging statements about the ability to make safe alternatives available expeditiously. Governments should encourage the development of safe alternatives by adopting a concrete timetable for a major phasedown of these chemicals.
- a phaseout of all but the most essential uses of these chemicals within ten years.

The signatories to this statement are encouraged by the repeated expression by many delegations that they recognize the seriousness of the danger to the ozone layer, and that they are prepared to be flexible in the pursuit of an agreement. We are disappointed, however, in the formal position of the EEC ministers, which speaks only of the possibility of reducing somewhat the current production capacity ceiling, and only for several CFCs. Real and sharp reductions

in the full range of ozone-depleting substances are necessary.

I stress that these measures are based on the science as it is currently understood. However, new and disturbing information indicating that the situation is even more urgent continues to arrive on a regular basis. Evidence continues to accumulate that the thinning of the ozone layer over Antarctica is linked to chemicals. Satellite data, now under review, suggest that ozone depletion may already have occurred at rates greater than projected by models. If these data are confirmed and linked to chlorine, then governments should be prepared to adopt an even more rapid timetable for curtailing emissions of these dangerous chemicals.

December 2, 1986

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We are encouraged by this morning's announcement that the EEC will consider a freeze on the production of certain ozone depleting chemicals, but far more is necessary before the ozone layer can be considered safe from these compounds.

OZONE DEPLETION AND CLIMATE CHANGE:  
A STATEMENT ON CHLOROFLUOROCARBONS  
AND RELATED COMPOUNDS BY THE  
INTERNATIONAL ENVIRONMENTAL COMMUNITY

The biosphere of the planet is gravely threatened by emissions into the atmosphere of chlorofluorocarbons (CFCs) and other long-lived industrial compounds containing chlorine or bromine. If unchecked, these gases will deplete the protective stratospheric ozone layer and contribute to global temperature increases with disastrous consequences for human health and environment world-wide. Citizens, governments, and industries world-wide are now recognizing the need to control emissions of CFCs and related gases.

The principal compounds of concern include six chlorofluorocarbons (CFC-11, CFC-12, CFC-22, CFC-113, CFC-114, and CFC-115), three chlorinated solvents (carbon tetrachloride, methyl chloroform, and methylene chloride), and two bromine-containing halons (Halon-1211 and Halon-1301).

Under the 1985 Vienna Convention for the Protection of the Ozone Layer, national representatives will begin negotiations in Geneva in December 1986 on an international agreement to limit emissions of these compounds. To focus attention on the need for sharp and rapid emission reductions, the undersigned organizations present this statement on ozone depletion and climate change from CFCs and related compounds. Based on review of the most up-to-date scientific research, we conclude as follows:

1. Continued emissions of CFCs and related compounds gravely imperil human health and critical ecosystems of the planet. The risk of damage to human health and the environment outweighs the benefits of using these compounds.
2. Any level of stratospheric ozone depletion or global warming is undesirable. An experiment of global scale is being conducted on the earth's atmosphere without a full understanding of the consequences. This is unacceptable.
3. In order to stabilize and eventually reduce chlorine and bromine levels reaching the stratosphere, and in order to minimize the extent of global warming, emissions of these compounds must be rapidly terminated.

4. The highest priority must be given to instituting programs of recycling, recovery, and destruction for CFCs and related compounds and to developing and deploying safe substitutes for ozone-depleting and climate-changing chemicals.

To protect human health and the environment world-wide, we call for a rapid phase-out of CFCs and the other compounds listed in this statement. Specifically, we call for:

- o A 30 percent reduction in emissions of the listed compounds within 18 months. This is achievable by terminating the use of CFCs as aerosol propellants or by other equivalent actions. Countries which do not have bans on the use of CFCs as aerosol propellants should make proportionally larger reductions.
- o An 85 percent reduction in emissions of the listed compounds within five years. We expect that this will require an 85% cut in production (which may be partially offset by programs of recovery, recycling, and destruction) and the introduction of substitute compounds. According to Dupont, the world's largest producer of CFCs, it can produce substitute compounds in volume within five years.
- o A near-complete phase-out within ten years, which could be modified in light of developing scientific findings. This period allows for full penetration of alternatives, and for replacement of current equipment which requires the present chemicals.

This timetable would allow an orderly transition to products and processes which do not endanger human health or the global environment.

New scientific findings, however, may require even faster emission reductions:

1. Real rates of ozone depletion may in fact be surpassing all model projections. Satellite data from the U.S. National Aeronautics and Space Administration (NASA), now under careful review, indicate that large global ozone reductions may have occurred over the past several years. The measured ozone losses exceed model projections by as much as eight times.

2. Large losses in ozone have been recorded over Antarctica in springtime for nearly a decade. Scientists investigating the Antarctic ozone losses in October 1986 have reported that proposed explanations related to solar cycles or dynamical processes are unlikely. Chemical processes, possibly involving chlorine, are more likely to be responsible. An ozone hole over the arctic also has been reported.

These global and polar ozone losses may be related to CFCs. They are not predicted by current atmospheric science models. If their relationship to CFCs is confirmed, then drastic, immediate emission reductions will be necessary.

### BACKGROUND

Chlorofluorocarbons and other long-lived chlorine- and bromine-containing compounds have a wide range of industrial and commercial applications, including refrigeration, insulation, aerosol propellants, solvents, and fire extinguishers. In all such applications, the compounds are released into the air, either immediately or on a delayed basis.

Because these compounds are so stable, they can remain unaltered in the atmosphere for as long as 100 years or more. Over time, they migrate into the upper atmosphere (the stratosphere), which contains the earth's protective ozone shield. There these compounds are decomposed by ultraviolet radiation. The chlorine or bromine they contain then catalyzes a chain reaction in which ozone is destroyed.

Ozone depletion allows more ultraviolet radiation to reach ground level, in particular radiation in the wavelengths known as UV-B. This radiation is highly dangerous because life on earth is delicately tuned to the wavelengths and intensity of solar radiation reaching ground levels.

CFCs and related compounds also absorb infrared radiation from the earth's surface, contributing to a warming of the climate through a phenomenon known as the "greenhouse effect." On a molecule-for-molecule basis, CFCs absorb 10,000 times more infrared radiation than carbon dioxide. Global warming induced by these compounds will produce a host of disastrous climatic changes ranging from sharply higher temperatures to world-wide alterations in storm and precipitation patterns.

The health and environmental impacts of these changes may be summarized as follows.

### HUMAN HEALTH EFFECTS

Higher levels of UV-B radiation will sharply increase rates of nonmelanoma skin cancer and probably malignant melanoma as well. Millions of additional cases of skin cancer will result between 1980 and 2025 in the United States alone if CFC emissions continue to grow as projected. Eye damage, including cataracts and retinal damage, will also occur. Immune system responses may also be suppressed, causing increases in rates of herpes, hepatitis, and other diseases.

Increased UV-B radiation will also cause higher levels of ozone "smog" in urban atmospheres. Approximately one person in five is especially sensitive to ozone smog levels already common in urban areas.

Climate change caused by these compounds will also have severe effects upon health. Urban death rates will rise as the number and severity of summertime heat waves increase. Higher sea level and increased storm flooding may cause large losses of life and property.

### AGRICULTURAL AND TERRESTRIAL ECOSYSTEM EFFECTS

Increased UV-B radiation will also have grave consequences for vegetation. Important cereal grains and fiber crops have shown sensitivity to UV-B radiation. Recent field studies have shown a 20% reduction in soybean yield from a simulated 25% ozone depletion. Increased production of ground-level ozone smog will damage plants. Forests and other natural systems will also be damaged.

Climate change will cause marked changes in the distribution of precipitation and frequency of severe weather. Changes in rainfall patterns will have dramatic impacts on crop yields. Economic and social disruption could result from regional shifts in agricultural patterns.

### AQUATIC EFFECTS

Increased UV-B radiation may cause the collapse of complex food chains in aquatic environments. Reduced productivity occurs among phytoplankton, an important early link in the food chain, when exposed to increased UV-B radiation. Many higher-order life forms in aquatic systems are vulnerable in their larval stage. Reductions in commercially valuable fish catches can be expected due to the reduction in food supplies at the bottom of the food chain.

## SEA LEVEL RISE AND PROPERTY DAMAGE

Climate warming will cause sea level to rise dramatically -- approximately one meter by the middle of the next century -- causing enormous economic damage to coastal property. Water would inundate 11.5% of Bangladesh's land area where 8 million people now live. Sea level rise will also cause salt water intrusion into freshwater resources, widespread destruction of wetlands by flooding, accelerated coastal erosion, and increased inland flooding during storms.

UV-B radiation also damages man-made materials. In the U.S. alone, damage to materials made of just one plastic (polyvinyl chloride) has been estimated to range between 10 and 27 million dollars per year if CFC emissions continue to grow as projected.

## BROADER ENVIRONMENTAL EFFECTS

As severe as these consequences are, they do not include damage that will occur to wildlands and wildlife. Forests, wetlands, and wildlife dependent on them have very little ability to adapt to increasingly hostile radiation and climate.

## THE NEED FOR RAPID EMISSION REDUCTIONS

That CFCs and related compounds endanger human health and the environment has been known since 1974, when their role in stratospheric ozone depletion was discovered. Four important findings, however, now demonstrate the need for rapid action to sharply reduce emissions of these compounds.

1. Until this year, nearly all projections of ozone depletion rates were made with one-dimensional atmospheric models. These models give a global average figure for ozone depletion, irrespective of latitude. Newer two-dimensional models, however, project substantially higher ozone depletion rates in northern and southern latitudes away from the equator. For example, under conditions in which "1-D" models project a one or two percent ozone loss on a global average basis, "2-D" models show several times greater levels of depletion at the latitudes of northern Europe and North America (50-60 degrees north). Ozone depletion of this magnitude is regarded as exceptionally dangerous.

2. Vertical redistribution of ozone may be as important as latitudinal changes. Even as ozone is depleted overall, ozone increases may occur at some altitudes. The atmospheric balance of heat and moisture may be markedly changed by such vertical



ozone shifts, and these changes may lead to large-scale climate modification.

3. The concentration of chlorine in the stratosphere will continue to increase -- and so will ozone depletion -- even if CFC emissions do not increase. To rapidly stabilize chlorine concentrations in the stratosphere, current emission rates for CFC-11 and CFC-12 would have to be cut by approximately 85 percent.

4. New attention has been paid to the role of CFCs and related compounds in climate warming. Recent studies indicate that approximately one-sixth of the total man-made atmospheric warming to which our planet is now committed will be due to CFCs. With a total warming of up to six degrees Fahrenheit (approximately three degrees Centigrade) possible by the year 2030, every possible step to limit the build-up of greenhouse gases is necessary.

We recognize that it may be appropriate to treat CFC-22 on a different basis from other compounds listed in this statement, while substitutes are being developed and deployed. While CFC-22 is still an ozone depleter and infrared absorber, it is substantially less potent than the other listed compounds. Because it does deplete ozone, however, CFC-22 should only be used on an interim basis until better substitutes are available.

The undersigned organizations call on the governments negotiating in Geneva to avert a global environmental tragedy by adopting an agreement which accomplishes these objectives.

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