March 1, 2002

SUBMISSION ON BEHALF OF
THE ALLIANCE FOR RESPONSIBLE ATMOSPHERIC POLICY

IN RESPONSE TO A REQUEST TO UPDATE FURTHER THE INFORMATION
ON AVAILABLE AND POTENTIAL WAYS AND MEANS OF
LIMITING EMISSIONS OF HFCs,
INCLUDING THEIR REPLACEMENTS FOR OZONE DEPLETING SUBSTANCES

Introduction:

The Alliance for Responsible Atmospheric Policy is an industry coalition, including many multinational companies, that was organized in 1980 to address the issue of stratospheric ozone depletion. It is presently composed of nearly 200 manufacturers and businesses which rely on substitutes for ozone-depleting compounds such as HFCs. Today, the Alliance is a leading international industry voice that coordinates industry participation in the development of reasonable government policies regarding ozone protection and global climate change.

Substitution of CFCs by HFCs:

In an address by Bert Metz, Co-Chairman of the Intergovernmental Panel on Climate Change (IPCC) Working Group on Mitigation, on behalf of the IPCC at the Opening Session of the Third International Symposium on Non-CO2 Greenhouse Gases, Maastricht, 21 January 2002, Metz stated,

> "Hydrofluorocarbon (HFC) emissions will be doubling over the next 10 years due to phasing out of Ozone Depleting Substances under the Montreal Protocol agreements, after having doubled since 1990. This increase is much smaller than could have been the case. For about 80% of the applications of CFCs and HCFCs other (non-fluorocarbon) technologies and practices were adopted. The main sources are refrigeration, air conditioning and insulating foams. When considering reducing emissions from these sources there are often trade-offs to be made since use of HFCs in refrigeration and insulation might affect the energy efficiency of the equipment with subsequent effects on CO2 emissions. So an integrated analysis is called for. One important issue in considering alternatives for HFC in refrigeration and air conditioning is the use of alternative cooling fluids such as hydrocarbons. In Europe currently more than 50% of refrigerators uses hydrocarbons, but in other parts of the world this alternative is not widely used because of safety concerns. A special appendix of the IPCC TAR was devoted to the issues of replacements of ozone depleting substances and the integrated analysis of alternatives."

Industry has worked diligently to find non-fluorocarbon alternatives in many of the applications that used CFCs. In addition, charges are reduced, systems are tighter, venting is curtailed, and recovery, recycling, and reclamation are widely practiced so that the compounds are reused.

Reduced Emissions of HFCs:

In 1993 the U.S. manufacturers of HCFC-22, through the Alliance for Responsible Atmospheric Policy, committed to the U.S Environmental Protection Agency (EPA) "to reduce HFC-23 emissions by 1.5 million kg., or 4.05 MMTCE" from 1990 levels by 2000. The 4.05 MMTCE figure appears to be based on the GWP of 9,900 in the 1994 *Scientific Assessment of Ozone Depletion*.. Using the GWP of 11,7000 in the IPCC *Second Assessment Report*, 1.5 million kg. equates to 4.79 MMTCE, according to EPA.

The following EPA table shows the collective emissions and reductions of the HCFC-22 manufacturers between 1990 and 2000 in both gigagrams (Gg, or millions kg.) and MMTCE. MMTCE are calculated using a GWP of 11,7000 for HFC-23. Reductions are shown compared to two baselines: (1) the absolute quantity of emissions in 1990, and (2) the emissions that would have occurred at each year's level of HCFC-22 production if manufacturers had continued to emit HFC-23 at the 1990 emission rate of 2.15% (BAU or "Business-as-Usual" emissions). It shows that between 1990 and 2000, the collective emission factor declined from 2.15% to 1.36%, a decline of 37%, according to EPA.

Year	Emissions		Reductions from 1990		Reductions from BAU		Emission Rate (23/22)
	Gg HFC-23	MMTCE	Gg HFC-23	MMTCE	Gg HFC-23	MMTCE	
1990	2.99	9.54	0	0	0	0	2.15%
1991	2.63	8.39	0.36	1.15	0.44	1.41	1.84%
1992	2.98	9.51	0.01	0.03	0.24	0.77	1.99%
1993	2.72	8.68	0.27	0.86	0.13	0.42	2.05%
1994	2.70	8.62	0.29	0.93	0.46	1.47	1.84%
1995	2.31	7.37	0.68	2.17	1.02	3.26	1.49%
1996	2.66	8.49	0.33	1.05	0.92	2.92	1.60%
1997	2.56	8.17	0.43	1.37	0.98	3.13	1.56%
1998	3.43	10.95	-0.44	-1.40	0.51	1.61	1.88%
1999	2.60	8.30	0.39	1.24	0.96	3.07	1.57%
2000	2.55	8.12	0.44	1.42	1.48	4.71	1.36%

In Metz' 2002 Maastricht address, he stated,

> "HFC emissions from HCFC production (as a by-product) are likely to be reduced in the near future given the Kyoto Protocol requirements and technological progress being made by manufacturers. This compensates the growth in emissions from replacing ozone-depleting substances, keeping total HFC emissions a relatively small contributor in terms of carbon equivalent emissions."

Value and Importance of HFCs:

The Alliance seeks attention in recognizing the value and importance of HFCs to society. As reported previously, recent decisions by the Parties to the Framework Convention on Climate Change in 1998 in Buenos Aires, and in 1999 in Bonn noted the relevance of HFCs. In addition, the Technical and Economic Assessment Panel (TEAP) of the Montreal Protocol on Substances that Deplete the Ozone Layer reported in 1999 that HFCs are important to the safe and cost-effective phaseout of CFCs in developing countries, and are essential substitutes for highly important uses of ozone-depleting substances. HFCs are also technically and economically necessary for the phaseout of HCFCs in developed and developing countries. The Technical Options Committees of

the TEAP also reported in 1999 that HFCs are necessary and beneficial in many HFC applications.

In addition, the Joint Intergovernmental Panel on Climate Change (IPCC)/TEAP Expert Meeting on Options for the Limitation of Emissions of HFCs and PFCs concluded that alternatives to HFCs may not be technically and economically feasible for some current uses. The Intergovernmental Panel on Climate Change (IPCC) has estimated that HFCs are only 2-3% of the greenhouse gas emissions.

HFCs are part of the overall Kyoto Protocol basket of six greenhouse gases; and they should not be singled out for regulation or restriction. HFC emissions should be addressed only as part of a comprehensive climate change plan which fully considers collective emissions reductions of all greenhouse gases, and all relevant environmental, safety, energy efficiency and associated emissions of carbon dioxide equivalent, and economic factors of the HFC-containing product as a whole.

HFCs are a key to the operation of energy efficient refrigeration and air conditioning equipment, and the production of energy saving foam insulation. Because of their energy efficiency, HFCs have a positive role to play in actually reducing greenhouse gas emissions. The more energy efficient a system is, the less carbon dioxide is emitted by the generation of the power used to run the system. HFC systems often have a lower overall global warming impact than flammable refrigerant or foam insulation systems.

Emissions can be minimized in the manufacture and routine servicing of products important to society such as metered dose inhalers, air conditioning, refrigeration, foam insulation, electronic components, technical aerosols, and fire extinguishers. HFCs are important to solving both the problems of ozone depletion and global climate change. They are energy efficient, cost effective, and can be used safely. Society relies heavily on HFCs in many areas.

Industrialized nations have made significant progress toward recovery of the ozone layer under the Montreal Protocol through the use of HFCs and HCFCs. In fact, the Montreal Protocol has created the impetus for industry to use these compounds. While developing countries are in the early stages of this transition, they are allowed to produce and import CFCs until 2010. Such CFCs have a global warming potential (GWP) five to 10 times higher than the GWPs of the HFCs. Restrictions on HFCs discourage the transition from CFCs in developing countries. Such discouragement is disadvantageous to both the ozone and the climate. Controls on HFCs will lead to a delay in the transition away from ozone-depleting compounds, especially in developing countries.

HFC emissions management is occurring through non-regulatory means, voluntary measures, and industry-government partnerships. Industry and government are jointly engaging in research, communication and other activities to find new technologies, designs and processes to manage HFC emissions and enhance overall

product energy efficiency, considering, among other relevant criteria, the cost-effectiveness of these investments in other climate protection options. Unilateral government restrictions on HFCs create barriers to free trade and cause inappropriate product selection relative to cost, safety and performance.

The Clean Air Act of 1990 mandated the recovery and recycling of CFCs, HCFCs, and alternatives such as HFCs. It is presently illegal to vent HFCs in the service and maintenance of air conditioning and refrigeration equipment. Preventing these emissions is one of the most practical steps toward limiting emissions.

Responsible Use Principles for HFCs:

The Alliance has adopted the following "Responsible Use Principles for HFCs" and is establishing a partnership with the U.S Environmental Protection Agency to gather government and industry endorsers to sign on to the following principles:

RESPONSIBLE USE PRINCIPLES FOR HFCs

HFCs are necessary for an orderly phase out of ozone depleting substances under the Montreal Protocol.

HFCs are included in the basket of greenhouse gases under the Kyoto Protocol.

In many applications, HFCs provide superior energy efficiency, and are low in toxicity, cost-effective, and safe to use.

HFCs are used in important applications in both developed and developing countries including metered dose inhalers, foam insulation, refrigeration, air conditioning, technical aerosols, solvent and fire extinguishants.

Without responsible use by 2050, HFC emissions are projected to be up to 2% of potential future global emissions of all greenhouse gases included in the Kyoto Protocol.*

It is resolved that HFC-producing and HFC-using industries apply Responsible Use Principles worldwide:

- **Select HFCs for applications where they provide health, safety, or environmental, technical or economic advantages, or unique societal benefits**
- **Minimize HFC emissions to the lowest practical level during manufacture of the chemical, and during use and disposal of equipment using cost-effective technology**
- **Design and operate HFC-producing plants with the goal of achieving zero HFC emissions**

- **Engineer, operate and maintain HFC-using systems to minimize emissions and maximize energy efficiency**
- **Recover, recycle, reclaim and/or destroy used HFCs where technically and economically feasible**
- **Promote comprehensive technician training in HFC handling to assure compliance with regulations and stewardship practices**
- **Meet all appropriate regulatory standards governing HFC equipment installation and maintenance, HFC transport and storage, and where applicable exceed such standards with voluntary initiatives**
- **Accurately report HFC production and promote models, that accurately estimate emissions**

* Based on Wigley, T.M.L., Holt, T. and Raper, S.C.B., 1991: STUGE (an Interactive Greenhouse Model): User's Manual, Climatic Research Unit, Norwich, U.K., 44pp.

HFCs represent Balanced Solutions for Society:

- A basket of six greenhouse gases, including HFCs, is internationally controlled by the Kyoto Protocol. Each country has national flexibility in the use and emission of each gas satisfy its agreed emissions target. HFCs should be included in comprehensive national climate change plans fully considering relevant environmental, safety, energy efficiency, and economic factors.

- Life Cycle Climate Performance (LCCP) should be used to evaluate applications for refrigeration, air conditioning and insulation.

- HFC emissions reductions are already occurring through voluntary actions and industry-government partnerships. Such partnerships are also jointly engaged in research, communication and other activities to find new technologies, designs and processes to enhance overall product viability, including energy efficiency, cost effectively.

- The Technology and Economic Assessment Panel (TEAP) of the Montreal Protocol on Substances that Deplete the Ozone Layer has concluded that HFCs are currently important to the safe and cost-effective phase out of CFCs in developing countries. They are essential substitutes for highly important uses of ozone-depleting substances and are also technically and economically necessary for phase out of HCFCs in developed and developing countries.

- The Intergovernmental Panel on Climate Change (IPCC) documented options for reducing emissions of HFCs, and concluded that alternatives to some HFCs are not technically and economically feasible.

- The European Union's July 1999 submission to the United Nations Framework Convention on Climate Change, July 1999, stated, "Action taken to reduce HFC emissions should not undermine the efforts to phase out ozone-depleting substances."

- A 20002 report by Arthur D. Little entitled “Global Comparative Analysis of HFC and Alternative Technologies…” stated that HFCs are the preferred alternative to replace ozone-depleting substances where they provide superior overall technical, environmental, and safety.

Sector Specific Principles:

Air Conditioning and Refrigeration
• Contain refrigerants in tight systems and containers minimizing atmospheric releases
• Monitor frequently after installation to eliminate direct refrigerant emissions
• Train all personnel in proper refrigerant handling
• Comply with applicable standards on refrigerant safety, proper installation and maintenance (e.g., ASHRAE-15 and ISO- 5149)
• Size equipment to match the specific need to minimize the refrigerant amount
• Design, install and operate to optimize energy efficiency
• Recover, recycle and reclaim refrigerants
• Continue gains in energy efficiency

Fire Suppression
• Provide fire suppression products with high reliability and a goal of zero emissions except against fire
• Endorse rigorous standards in fire suppression system design, installation, commissioning, inspection and maintenance
• Provide advanced fire detection and extinguishing systems that minimize discharges
• Minimize emissions from testing and training
• Recover, recycle, and reclaim fire extinguishants

Foam Insulation
• Provide safe and energy efficient insulation products to meet societal needs for energy conservation and to minimize CO2 emissions
• Where technically and economically feasible, minimize end of life emissions
• Minimize foam insulation manufacturing emissions

Producing HFCs
• Ensure worker and community safety
• Ensure product safety during transport and storage
• Target zero fugitive emissions in plant design
• Minimize coproduct emissions where technically and economically feasible
• Promote recovery, recycling, and destruction
• Market HFCs to applications that provide health, safety, environmental, technical, or economic benefit, or unique societal benefits
• Publish fluorocarbon production and sales data to support global modeling of atmospheric concentration profiles

Propellants
• Use HFC propellants where they promote health, environmental, technical, or economical advantage
• Handle by well-trained personnel
• Minimize losses during filling of containers

Solvents
• Use HFC solvents where environmental impact is offset by societal benefit
• Achieve the lowest economically practical emission levels
• Use enclosed systems with frequent monitoring
• Recover, recycle and reclaim solvents
• Train all personnel involved in handing

Vehicle Air Conditioning
• Contain air conditioning refrigerants in tightened systems to minimize atmospheric releases
• Recover, recycle and reclaim all refrigerants
• Train service personnel in proper handling of air conditioning refrigerant
• Design equipment to minimize refrigerant amount
• Design, install and operate to maximize energy efficiency
• Minimize leakage of refrigerant during initial filling of vehicle air conditioners
• Continue research, development and evaluation of all alternatives
• Encourage recovery and recycling where the air conditioning system must be opened

Conclusion:

The HFC-producing and using industries have determined that HFCs are viable and proven global long-term solutions to the problems addressed by the Montreal Protocol and Kyoto Protocol processes. They are energy efficient, low-in-toxicity, cost-

effective, and can be used safely. Governments and industry support the global use of HFCs in applications which meet important environmental and societal needs.

Supporting Documentation:

The Alliance has published several documents, which are attached, that contain evidence supporting the use of HFCs as viable and proven global long-term solutions to the problems addressed by the Montreal Protocol and Kyoto Protocol processes. They are energy efficient, low-in-toxicity, cost-effective, and can be used safely. These factual documents provide information needed by policymakers to understand the benefits of HFCs and the disadvantages of phasing out the use of such beneficial compounds.

If the Alliance can provide any additional information or answer your questions, please contact Dave Stirpe in Arlington, Virginia at 703-243-0344, or at alliance98@aol.com.