DOI 6/8 **DRAFT**

MEMORANDUM FOR THE DOMESTIC POLICY COUNCIL

FROM: THE ENERGY, NATURAL RESOURCES & ENVIRONMENT WORKING GROUP

SUBJECT: Stratospheric Ozone

On May 20, 1987, the Council met to discuss the international protocol negotiations currently underway to limit emissions of ozone depleting chemicals.

Several questions were raised and the Working Group was asked to provide answers. The questions were:

* What are the legislative and legal impacts of an international ozone protocol?
* What are the most up-to-date scientific data on climatic and health effects of ozone depletion?
* What is the cost/benefit effect of an international treaty restricting ozone depleting chemicals?

Steve = Perhaps, orally b/c sensitivity → Please well understand

The following information has been summarized by the Working Group after discussion of detailed presentations by experts in each area.

Legislative/legal

"NRDC's lawsuit

This is only point

A pending lawsuit against the EPA seeks to compel the Administrator to promulgate regulations governing stratospheric ozone and to schedule such regulation. The court is not likely to force action as long as productive international negotiations continue. If the international negotiations result in a scheduled reduction, the EPA would have sound defenses to any attempt by the plaintiff or the court to impose substantive emissions levels through the lawsuit. However, if there is no international agreement, it will be difficult to continue to argue for no domestic regulation, either in the existing lawsuit or in future litigation. EPA will be hard pressed to ask for more time to study the issue, having initiated study of the issue eight years ago.

Breaux

To date legislative action has been restrained by strong opponents of domestic legislation (such as Congressman Dingell). If the international negotiations for a protocol fail, there will be a strong push for a unilateral domestic reduction on Capitol Hill. Key Senators and Congressmen have been making statements

to this effect for months; recent press attention will only heighten that resolve. If the protocol called for a freeze or a freeze plus an automatic 20 percent reduction with no potential for future reductions, the legislative outcome is less certain; Congress would undoubtedly hold additional hearings to determine the need for further domestic reductions. If, on the other hand, the protcol mandated a freeze plus a 50 percent reduction, it seems likely that any pressure for additional domestic regulation would dissipate. Environmental groups, which were initially backing a 95 percent target, have agreed that a freeze plus 50 percent reduction would be a very positive beginning; some of the active groups would settle for less than 50% but more than 20%. Without a strong push from these groups, additional congressional action, at least in the near term, would be unlikely.

Climatic

Emissions of CFCs and Halons may be depleting the stratospheric ozone layer, reducing the screen against harmful ultraviolet radiation and altering the Earth's climate system. Continued growth of CFC and Halon emissions at 3% per year is predicted to yield a globally averaged column ozone depletion of 6% by the year 2040, and more thereafter, which is much greater than the natural decadal variability and hence significant. In contrast a true global freeze of the sum of all CFCs and Halons at the present rate is predicted to yield a maximum global average ozone depletion of less than 1%. Ozone depletions at high latitudes are predicted to be 2-3 times larger than the global average. Depletions in upper stratospheric ozone greater than 25% are predicted to occur in both cases which would lead to a local cooling greater than natural variability. The consequences of this cooling for the Earth's climate are unclear. While these theories simulate much of the present atmosphere quite well, they are not perfect, which places a factor of 2-3 uncertainty on their predictive abilities.

Observations have shown (1) column ozone increased about 3% from 1960 to 1970, remained constant throughout the 1970's, and has decreased thereafter by about 4%; (2) a decrease of about 7% during the last decade in the upper stratosphere; and (3) a 40% decrease in column ozone over Antarctica in the spring season since the mid-1970's. Whether the recent changes in column and upper stratospheric ozone are due to natural phenomena or in part to CFCs remains an open question.

To limit column and upper stratospheric ozone depletions to less than the decadal natural variability reductions beyond a true global freeze may be required. A protocol that reduces emissions as much as 20-50 percent could fall short of a true global freeze since it will not include all chemicals, compliance in developed countries may be less than 100 percent, and substantial growth in CFC usage may occur in developing countries. If there is environmental damage due to CFCs and Halons their long

atmospheric lifetimes would mean that recovery would take many decades even after complete cessation of emissions.

Health

Depletion of the ozone layer would result in increased penetration of biologically damaging ultraviolet radiation (UV-B) to the earth's surface. Based on the research completed to date, greater exposure to UV-B radiation has been linked to increases in the number of skin cancers and cataracts, suppression of the human immune response system, damage to crops and aquatic organisms, and increased formation of ground-level ozone (smog).

Based on epidemiological and ecological studies, dose-response relationshps were developed and reviewed as part of EPA's risk assessment. The extent of additional cancer deaths will depend on the degree of CFC control. If today's ozone level is maintained, the projected number of skin cancer deaths for White U.S. citizens born before 2075 (a total population of over 600,000,000) would be 3,000,000. If the ozone level is decreased by 26 percent, there would be a projected increase in the number of skin cancer deaths of 1,900,000 over the base of 2,100,000. For an ozone level decrease of 7.7 percent (the likely result of a protocol freeze), there would be an increase in skin cancer deaths of 300,000 over the case in which there was no ozone depletion. For an ozone level decrease of 6.1 percent (the likely result of a 20 percent reduction in emissions), there would be an increase in skin cancer deaths of 200,000 over the base. For an ozone level decrease of 3.2 percent (a 50 percent reduction), there would be an increase in skin cancer deaths of 100,000 over the base. This analysis assumes that exposure to sunlight (e.g., sunbathing) does not increase, that no major improvements in treatment of skin cancer occur, and that ozone depletion does not increase after 2100. The uncertainties in the total estimates of additional cases are due to uncertainties about the action spectra, predicted ozone depletion, and the dose-response co-efficients. There is a 90% probability that the actual cases will be between 20% and 260% of the estimated value, and a fifty percent probability that it will be between 50% and 125% as great.

Recent studies have also shown a strong dose-response relationship between UV-B and the incidence of cataracts. Approximately 12.5 million cases in the U.S. could be averted by a protocol freeze for the 600 million citizens born by 2075. A 50 percent reduction in the major CFCs would result in approximately 16.3 million cases averted. While laboratory studies link UV-B to suppression of the human response system with possible implications for increasing the incidence of herpes simplex and leishmaniasis, research into possible broader implications has not been undertaken and the quantitiative impact is not projected.

Limited studies have examined the effects of increased UV-B radiation on plants and aquatic organisms. Five years of field studies of soy beans provide the most extensive data and suggest potentially large losses in yield for this species. Laboratory studies of UV-B effects on aquatic organisms show changes in community composition and reduced breeding season for phytoplankton and loss of larvae for higher order fish. Potential implications for the aquatic food chain have not been studied.

Cost/Benefit

A cost benefit analysis has been performed for the projected skin cancer deaths, skin cancer non-fatal cases, and cataracts health effects projected from increased UV-B radiation occuring at the projected baseline growth of CFC emissions and at the levels of emissions contemplated by a protocol freeze of emissions, a 20 percent reduction thereof, and a further 30 percent reduction thereof. Such analysis involves substantial economic uncertainties and is not being presented with respect to the benefits derived from reducing the incidence of UV-B on plants, aquatic life, the human immune system, ground level ozone concentrations, polymer degradation, and global temperature because of the lack of sufficient quantitative experimental information. However, the benefits of these non-quantifiably evaluated benefits are acknowledged to exist and to be additive to the other benefits which were estimated.

A range of assumptions was used in the analysis. The key variations in the assumptions were the valuations of lives saved (two million and four million were used) and the discount rates for the costs and the benefits. Four percent and six percent were used for the benefits and the costs were evaluated at the same rate.

Sensitivity analysis was performed with respect to the economic valuation of lives saved and the growth in their value over time.

The uncertainties in the underlying data from which the individual health effects were calculated was not separately estimated. The central values for health effects from the EPA Risk Assessment Analysis were used in the cost benefit analysis. In order to bound the benefit assumptions by the uncertainty in the underlying health effects data, climate models, etc., the calculated benefits should be reduced or multiplied by a significant factor which could be as much as ____ percent.

The conclusions of the analysis are as follows:

--The benefits from a "protocol freeze" of the CFC emissions are substantially more than the costs over all plausible assumptions and ranges of uncertainty.

--The aggregate benefits of a "protocol freeze" plus a 20 percent reduction in CFC emissions are also in almost all plausible cases substantially in excess of the costs.

--However, the marginal benefits of the additional 20 percent reduction beyond the freeze are not in all cases in excess of the marginal costs of the additional 20 percent reduction.

--The marginal costs of a further 30 percent reduction (beyond the freeze plus 20%) appear in some cases to exceed the benefits from a further 30 percent reduction. It is also true that in some cases examined the marginal benefits exceed the marginal costs for this incremental 30% step. Further scientific and economic review will be valuable before making the final decision on this step.

ISSUES AND DISCUSSION

At the May 20, 1987 DPC meeting, the head of the U.S. delegation to the international ozone negotiations provided an overview of the progress and the status of the negotiations. DPC guidance is now sought on the following issues.

A. THE INTERNATIONAL NEGOTIATION PROCESS

Should any changes be made to the Circular 175?

The November 28, 1986 Circular 175 authorized the U.S. delegation to negotiate a protocol providing for:

I. A near-term freeze on the combined emissions of the most ozone-depleting substances;

II. A long-term scheduled reduction of emissions of these chemicals down to the point of eliminating emissions from all but limited uses for which no substitutes are commercially available (such reduction could be as much as 95 percent), subject to III; and

III. Periodic review of the protocol provisions based upon regular assessment of the science. The review could remove or add chemicals, or change the schedule or the emission reduction target.

Pro's:

* Diplomatic considerations favor continuing with the

existing Circular 175. The U.S. position, as reflected in the 175 has been presented in formal negotiating sessions, congressional testimony and public position papers.

* The Circular 175 provides a general framework for a potential protocol and allows for various alternative approaches to the specific provisions of a control protocol.

Con's:

* As the negotiations move toward closure, the Circular 175 could be revised to specify the essential elements of a potential protocol from the U.S. perspective.

* The existing Circular 175 was not reviewed or approved by the highest levels in the inter-agency process.

B. AN EMISSIONS CONTROL PROTOCOL

In accordance with the existing Circular 175, the following questions are under consideration in the ongoing international negotiations. These questions relate to the potential emissions control provisions to be included in a protocol.

The first series of questions relates to the freeze on emissions described in the Circular 175. The questions under consideration with respect to a freeze are:

1. When should a freeze on emissions occur?

The Working Group consensus is that a freeze on emissions should go into effect two years after entry into force of the protocol. The anticipated entry into force is 1988; thus the freeze would go into effect in 1990.

2. What chemicals should the freeze cover?

The Working Group consensus is that the freeze should include CFCs 11, 12, 113, 114, 115, and Halons 1201 and 1311.

The next series of questions pertains to the emissions reductions beyond a freeze. The questions currently under consideration relate to the timing and extent of any such reductions, the chemicals to be included in such reductions, and whether such reductions should occur automatically or be tied to the future

scientific and technological assessments provided for in the Circular 175.

1. How much and when?

The Chairman's text provides for a 20% reduction to take effect 4 years after entry into force (1992) and a 30% reduction to take effect either 6 years (1994) or 8 years (1996) after entry into force.

2. Should the reductions be automatic or tied to future science reviews?

The Chairman's text provides for the initial 20% reduction to take effect automatically. The text provides two alternative implementing mechanisms for the next 30% reduction -- either an automatic reduction 6 years after entry into force, or, a 30% reduction 8 years after entry into force if affirmed by a majority vote of the parties.

3. What chemicals should the reductions cover?

The Working Group consensus is that any additional reductions should cover CFCs 11 and 12. There are questions about the coverage of CFCs 113, 114, 115, and Halons 1201 and 1311. National security concerns favor not including the Halons in any of the reductions beyond a freeze. There is also a national security concern with including CFC 113 in any reductions beyond a freeze, especially given 113's importance to the semi-conductor industry. The questions regarding coverage of CFCs 114 and 115 concern their potential use as substitutes for controlled chemicals.

C. PARTICIPATION AND TRADE PROVISIONS

There remain many complex issues to be addressed in the international negotiations pertaining to fair trade provisions and the participation of developing countries. The following issues are under consideration:

1. Should the U.S. delegation seek maximum participation in the control protocol?

The U.S. and the United Nations Environment Program have expended considerable effort (e.g. through our Embassies and through paying travel costs) to encourage broad participation

by developing countries. However, only relatively few have shown the interest or the expertise to participate. Parties to the protocol would not be able to prevent non-joining countries from producing CFCs for their internal market, but would be able to prevent them from profiting through international trade.

A strong protocol, including the major producing and consuming countries, could lead to earlier development of substitute products. This might discourage non-joiners from investing heavily in capacity in a soon-to-be obsolescent CFC technology. Further, the very existence of a protocol, as an expression of concern by the international community, increases the pressure on non-member countries to join; in essence, if they continue to produce CFCs, they are exposed as behaving irresponsibly on a matter of global import.

The Working Group consensus is that the delegation continue to negotiate for as broad a level of participation as possible.

2. What should be the U.S. objective regarding voting among parties to the protocol?

The Working Group consensus is that the delegation negotiate for a system of voting which would credit the major producing and consuming countries.

3. What should be the U.S. objective regarding the control formula and trade provisions?

It is the consensus of the Working Group that the U.S. delegation seek to include in the protocol an effective formula to control emissions with accountability, the fewest possible restrictions on the flow of trade and capital among parties, the most favorable formula for U.S. industry, and strong monitoring and reporting provisions.

Background

During the 1970's, concerns were expressed by the science community about potentially harmful effects of depletion of the stratospheric ozone layer. It was felt that emissions of certain chemicals were causing this depletion. This led to a 1978 unilateral ban on aerosols in the United States.

In 1985, the United Nations Environment Program sponsored the Vienna Convention for the Protection of the Ozone Layer. The U.S. has been a leader at the three international meetings held over the past seven months to develop a global agreement on the control of the chemicals thought to cause ozone depletion. The next international meeting is scheduled for June 29, 1987.

Legal/Legislative -- There is strong judicial and congressional pressure for action to protect the ozone layer. If an international agreement is not reached, both Congress and the courts are likely to require unilateral domestic reductions of the relevant chemicals. Unilateral U.S. action would not protect the ozone layer and would disadvantage American businesses in world markets.

Science and Health -- Some scientists predict that significant ozone depletion will occur unless international action is taken to control the chemicals believed to cause ozone depletion. They say that depletion of the ozone layer is likely to cause adverse health and environ mental effects including increased skin cancer deaths, cataracts, crop damage and aquatic impacts.

Cost Benefit Analysis -- The economic far benefits from controlling the chemicals believed to deplete ozone outweigh the costs of such controls in the great majority of the cases considered.

V. Ickes

For whatever use it is to you---
this is generally how I would envision
my suggestion yesterday on the inclusion
of the DOI elements would be done.

Ted Williams

Issues and Decision

Major issues for resolution at this meeting appear in sections A and C below. In addition there remain other decision areas or significant considerations to be considered in at least general terms when resolving the issues in section C; these are outlined in section B.

Section A

(My preference would be to write the pros & cons that follow as 1 to 2 paragraphs.)

B. Participation, Trade, Sanctions and Implementing Provisions

In addition to the specific emissions control issues of Section C, following, a number of other protocol elements need to be considered in order to ~~full~~ fully define the specific aspects of the control provisions proposed for the protocol. Several of these elements are not sufficiently developed to provide a specific discussion of probable alternatives to the DPC. Follow-on papers are likely following the next round of negotiations, occurring between June 27 - July 8.

~~I~~

Clarifying issues are:

- Sanctions against countries not joining the protocol: Trade sanctions on imports and on export of bulk CFC would prohibit trade with countries not signing the protocol. Specifics on these sanctions are not complete.
- Sanctions against Parties not meeting the protocol: This is less well defined now. Enforcement of requirements are primarily hortatory. However, each Party has a right to withdraw from the protocol or to seek to amend the protocol to provide specific sanctions against offenders
- Reporting, Monitoring and Verification: Each country would report domestic implementation plans and achieved progress annually. Monitoring would be primarily from existing records; independent verification is likely to be incomplete and anecdotal.
- US domestic implementation: Probable US regulations, with or without an international control agreement, have not been proposed but are likely to be market oriented rather than the traditionally used command-and-control regulations. It is quite possible that domestic regulation would be more stringent than the protocol.
- Credit for prior CFC regulation or for efficient use in products: It is unlikely that special provision for past practices, such as US and Nordic country bans of CFC propellants in aerosols will be provided in the protocol. Some agencies, due

to past negotiation on these points, believe to aggressively seek such provisions, could cause the negotiations to collapse. A strong case can be made that US may have specialized regulation but this is offset by intensive use in other products where substitutes were available.

- ~~Special~~ Special provisions for large-population LDC: While near term (10-20 year) use of CFC/halons in LDC such as China or African nations is likely to be small but rapidly growing on a per capita basis, there is a potential for these countries usage of CFC in the long term to overwhelm the controls used by present major producer/user countries. Hence special provisions to allow some, but controlled added use for LDC is being considered in order to convince them to sign-on. These provisions continue to be negotiated.
- Formula used for calculating annual emissions: There are several proposals still under discussion in the negotiations. While the alternatives generally appear to ~~have~~ have little differential impact on US use and command, the selections may have significant impact on willingness of smaller users, including LDC, to join the protocol. As interests appear to be to set a formula to maximize participation.
- Voting Among protocol parties: US should negotiate a system of voting that is weighted to credit major producer and user countries

C THE PROTOCOL PROVISIONS FOR EMISSIONS CONTROL

similar to present B

in B1 EIF is likely to be 1988-1990; then the freeze would ~~begin~~ start into effect from 1990 to 1992.

On the reductions - I feel strongly that 20% should be separated from 50%. I'd organize as

First Reduction
- should it be 20% & scheduled
- how soon
- what chemical coverage
- how can it be modified

Second Reduction
- should it be scheduled or should a process to be used subsequent to 1990 review be set
- should it be added 30%
- how soon
- if scheduled now, should it be
  - -- affirmed before going into force
  - -- rejected by date certain, otherwise go into force.

ATMOSPHERIC OZONE AND CLIMATE

- Since 1960 the natural variability of the total global column of ozone has been about 3%.

- Emissions of CFCs and Halons may be depleting the Earth's ozone layer thus reducing the screen against harmful ultraviolet radiation.

- Continued growth of CFC and Halon emissions at 3% per year is predicted to yield a globally averaged ozone depletion of 6% by the year 2040, and more thereafter, which would be greater than natural variability. In contrast a true global freeze of the sum of all CFCs and Halons at the present rate is predicted to yield a maximum global average column ozone depletion of less than 1%. Ozone depletions at high latitudes are predicted to be 2-3 times larger than the global average.

- While the theoretical models simulate much of the present atmosphere quite well, they are not perfect, and a factor of two to three uncertainty is placed on their predictive abilities.

- Ozone depletions in the upper part of the stratosphere greater than 25% are predicted to occur even in the case of a true global freeze. This would lead to a local cooling greater than natural variability. The consequences of this cooling for the earth's climate cannot be predicted at this time.

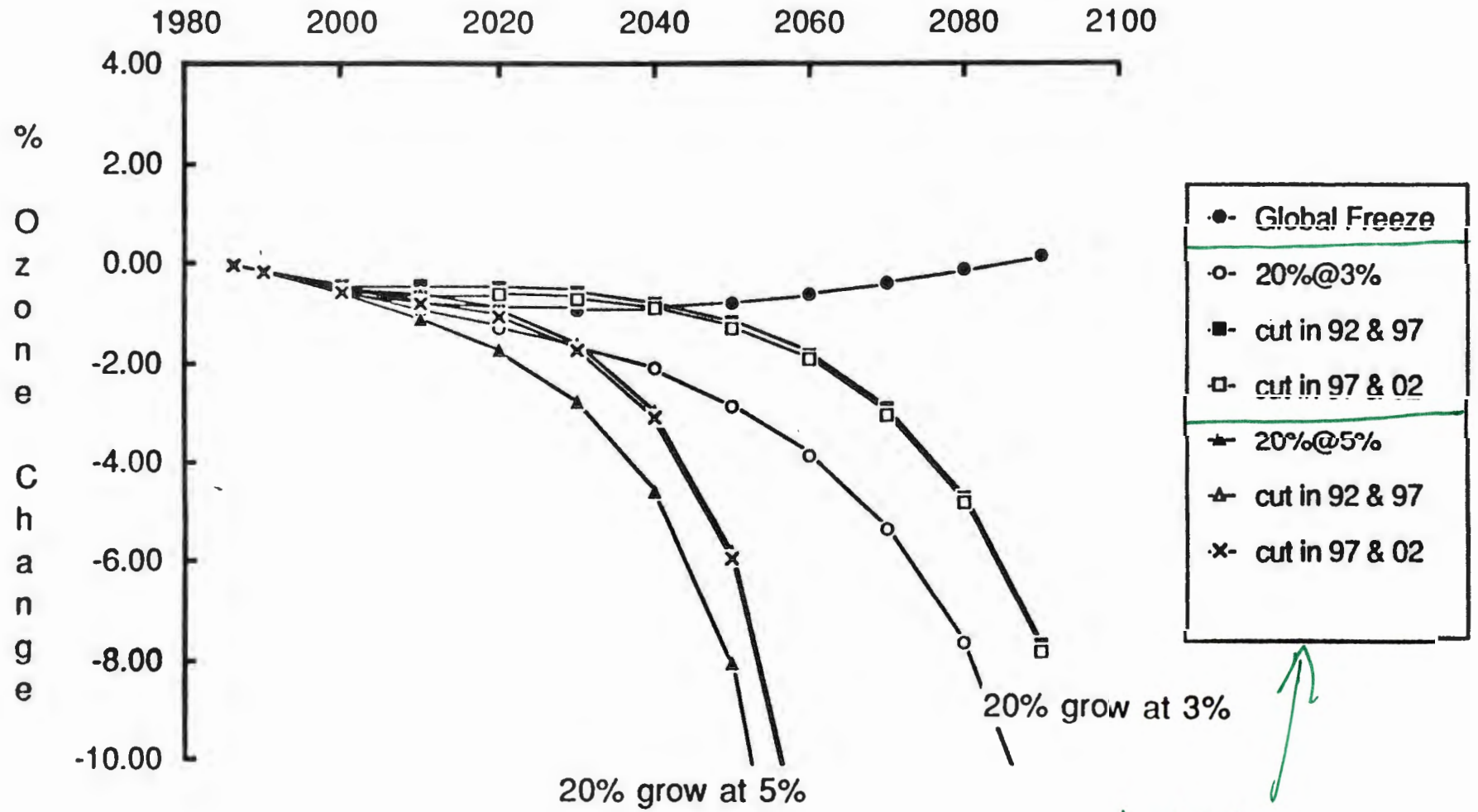
- Observations have shown (1) a decrease in ozone of about 7% during the last decade in the upper part of the stratosphere: and (2) a 40% decrease in column ozone over Antarctica in the spring season since the mid 1970's. Whether the recent changes in column and upper stratospheric ozone are due to natural phenomena or in part to CFCs remains an open question.

- A true global freeze would limit column ozone depletions to less than the natural variability. A protocol which results in compliance in developed countries of less than 100%, and where substantial growth in CFC usage occurs in developing countries, would fall far short of a true global freeze.

- The attached figure, which assumes only 80% compliance, shows that in order to minimize the decrease in column ozone it is essential to minimize the CFC and Halon growth rate in non-complying countries, and the fraction of non-compliers, at the earliest possible date. A 5-year delay in reductions beyond the freeze among compliers has no significant direct impact on ozone. However, if early reductions lead to substitutes at an earlier date, and reduce the CFC growth rate in non-compliers, that indirect effect would be significant.

- If there is environmental damage due to CFCs and Halons their long atmospheric lifetimes would mean that recovery would take many decades even after complete cessation of emissions.

Effects of CFC Reductions



~~budget~~
Legend will be improved!

JUNE 3

Jan

DRAFT

by developing countries. However, only relatively few have shown the interest or the expertise to participate. Parties to the protocol would not be able to prevent non-joining countries from producing CFCs for their internal market, but would be able to prevent them from profiting through international trade.

A strong protocol, including the major producing and consuming countries, could lead to earlier development of substitute products. This might discourage non-joiners from investing heavily in capacity in a soon-to-be obsolescent CFC technology. Further, the very existence of a protocol, as an expression of concern by the international community, increases the pressure on non-member countries to join; in essence, if they continue to produce CFCs, they are exposed as behaving irresponsibly on a matter of global import.

The Working Group consensus is that the delegation continue to negotiate for as broad a level of participation as possible.

2. What should be the U.S. objective regarding voting among parties to the protocol?

The Working Group consensus is that the delegation negotiate for a system of voting which would credit the major producing and consuming countries.

3. What should be the U.S. objective regarding the control formula and trade provisions?

It is the consensus of the Working Group that the U.S. delegation seek to include in the protocol an effective formula to control emissions with accountability, the fewest possible restrictions on the flow of trade and capital among parties, the most favorable formula for U.S. industry, and strong monitoring and reporting provisions. BUT WITH NO GREATER RESTRICTIONS IMPOSED ON TRADE INVOLVING THE US THAN WILL BE ADOPTED AND ENFORCED BY OTHER COUNTRIES

CEA 6/9

done

Benefit/Cost

- Benefit/cost analysis has been carried out for known health effects (skin cancer deaths, non-fatal skin cancers, cataracts) based on EPA's Risk Assessment.

- Potential effects of ozone depletion on plants, aquatic life, the human immune system, ground-level ozone concentrations, polymer degradation, and sea level rise were not quantified.

- A range of assumptions were used in the analysis to reflect economic uncertainties and lack of inter-agency consensus on the values of key parameters. In particular:

  -- Discount rates of 4% and 6% were used.
  -- Monetary values of $2 million and $4 million were assigned to lives saved at the present time.
  -- These values were allowed to increase over time, and alternatively were held constant.

- Conclusions:

  -- The economic benefits from a "protocol freeze" of CFC emissions are substantially greater than the costs over all plausible assumptions and ranges of uncertainty.
  -- The benefits of a "protocol freeze" plus a 20 percent reduction in CFC emissions are also in almost all cases substantially in excess of the costs.
  -- The incremental benefits of the additional 20% reduction beyond the freeze are in most cases in excess of the incremental costs of the cut.
  -- The benefits of of an additional 30% reduction (beyond the freeze + 20% cut) appear in some cases to be greater than the incremental costs, and in others less. Further scientific, technical, and economic review will be valuable in evaluating benefits and costs before implementing this step.

DOI:-The foregoing analysis is based on EPA models which attempt to project health impacts through year 2165 and assume no changes in technology, medicine or human behavior.

This cost/benefit analysis assumes increasing noncompliance with protocol over time, when it is likely that ~~because~~ economic incentives to replace covered chemicals with substitutes as they become available.

SCOPE OF CHEMICALS: FROM A SCIENTIFIC PERSPECTIVE

- From a purely scientific perspective ALL chlorine and bromine containing chemicals, weighted by their "Ozone Depleting Potential" (ODP), should be considered for the protocol. This should be the case BOTH for the freeze and for potential future reductions.

- Controls should not be on individual substances but on the sum of the ODP of all chemicals. This allows each individual country the maximum flexibility to live within the internationally agreed protocol with the least interference on how each country wants to implement the protocol.

- If a country wants to continue production of Halons and CFC-113, at today's levels or HIGHER, it can do this even with an international freeze and/or future reductions, as long as greater reductions are taken in the other chemicals, e.g. CFC-11 and CFC-12.

Commerce
+ NASA

SCOPE OF CHEMICALS: FROM A SCIENTIFIC PERSPECTIVE

From a purely scientific perspective ALL chlorine and bromine containing chemicals, weighted by their "Ozone Depleting Potential" (ODP), should be considered for the protocol. This should be the case BOTH for the freeze and for potential future reductions. The proposed protocol is already less than logical because only fully halogenated chemicals, i.e. CFC-11, CFC-12, CFC-113, CFC-114, CFC-115, Halon 1211, and Halon 1301, are being considered for inclusion in the protocol. Chemicals such as CFC-22 and methyl chloroform (CH3CCl3), which are only partially halogenated, are not being considered as EPA correctly believes them to be part of the solution as they have relatively low ODP values.

Concern has been raised with regards to reductions in Halons and CFC-113 because of their strategic value to the USG, and the apparent lack of suitable substitutes. This is a legitimate concern but can easily be taken care of if controls are not on individual substances but on the sum of the ODP of all chemicals. This allows each individual country the maximum flexibility to live within the internationally agreed protocol with the least interference on how each country wants to implement the protocol.

If a country wants to continue production of Halons and CFC-113, at today's levels or HIGHER, it can do this even with an international freeze and/or future reductions, as long as greater reductions are taken in the other chemicals, e.g. CFC-11 and CFC-12.

The DPC should clearly take the approach which protects the ozone layer and yet preserves the maximum flexibility for the USG consistent with scientific understanding and policy considerations. The approach of seperating the Halons and CFC-113 from CFC-11, CFC-12, CFC-114, and CFC-115 may not best serve the iterests of the USG.

OZONE

COMMERCE COMMENTS

Question 2.

- Add sentence to last paragraph: Each production reduction would be contingent upon the findings of the periodic review group, as reflected in a positive majority vote of the protocol signatories to proceed with the scheduled production reduction.

- Add new option: The working group should provide tne DPC with a draft protocol containing the "bottom line" conditions acceptable to the United States.

Question 3.

- Change Conclusion: The working group recommends the delegation seek a freeze on CFC 11, 12, 113, 114, 115, and Halons 1211 and 1301.

- Add: Scientific data from NOAA indicates that a true global freeze on CFC 11 and 12 would maintain stratospheric ozone levels within historical natural levels. Over the next decade, the chemicals included in a true global freeze, in addition to CFC 11 and 12, would not contribute significantly to reducing ozone depletion. This presumes a production freeze on all CFCs at 1986 production level.

MJ.K

- Add: The draft protocol text brought back from the third negotiating session states "Each party shall ensure, that within [4] years after entry into force of this Protocol levels of substances ... will be reduced by 20 percent. Each party shall ensure that within [6] (a), [8](b) years after tne entry into force of this Protocol, the 1986 levels of substances ... will be further reduced [by 30 percent].

  To effect these provisions, decisions to reduce production must be made in the second, and fourth or sixth year after entry into force. CFC producers would have to break longterm supply contracts to comply. The tenuous relationship between periodic scientific, economic and technological review bearing upon a vote to proceed with reduction cutbacks comes into question, for

the industry decision to reduce production and the periodic review would occur in the same year (if entry into force occurs in 1990 and the 20 percent reduction is subject to a positive vote).

Commerce advises that production reductions contemplated at four, and six or eight, years after entry into force, presume ideal conditions for development of a "drop-in substitute, no toxicity testing problems, and no problems with reengineering and production of new design equipment.

DOE proposed text

DRAFT

MEMORANDUM FOR THE DOMESTIC POLICY COUNCIL

FROM: THE ENERGY, NATURAL RESOURCES & ENVIRONMENT WORKING GROUP

SUBJECT: Stratospheric Ozone

On May 20, 1987, the Council met to discuss the international protocol negotiations currently underway to limit emissions of ozone depleting chemicals.

Several questions were raised and the Working Group was asked to provide answers. The questions were:

* What are the legislative and legal impacts of an international ozone protocol?

* What are the most up-to-date scientific data on climatic and health effects of ozone depletion?

* What is the cost/benefit effect of an international treaty restricting ozone depleting chemicals?

The following information has been summarized by the Working Group after discussion of detailed presentations by experts in each area.

Legislative/legal

productive

OK

A pending lawsuit against the EPA seeks to compel the Administrator to promulgate regulations governing stratospheric ozone and to schedule such regulation. The court is not likely to ~~act~~ as long as international negotiations continue. If the international negotiations result in a scheduled reduction, the EPA would have sound defenses to any attempt by the plaintiff or the court to impose substantive emissions levels through the lawsuit. However, if there is no international agreement, it will be difficult to continue to argue for no domestic regulation, either in the existing lawsuit or in future litigation. EPA will be hard pressed to ask for more time to study the issue, having initiated study of the issue eight years ago.

force action

To date legislative action has been restrained by strong opponents of domestic legislation (such as Congressman Dingell). If the international negotiations for a protocol fail, there will be a strong push for a unilateral domestic reduction on Capitol Hill. Key Senators and Congressmen have been making statements

with no ~~further~~ potential for future reductions,

to this effect for months; recent press attention will ~~only~~ heighten that resolve. If the protocol called for a freeze or a freeze plus a 20 percent reduction, the legislative outcome is less certain; ~~though~~ Congress would undoubtedly hold additional hearings to determine the need for further domestic reductions. If, on the other hand, the protcol mandated a freeze plus a 50 percent reduction, it seems likely that any pressure for additional regulation domestic~~ally~~ would dissipate. Environmental groups, which were initially backing a 95 percent target, have agreed that a freeze plus 50 percent reduction would be a very positive beginning. Without a strong push from these groups, additional ~~action,~~ congressional action, at least in the near term, would be unlikely.

OK

; some of the active groups would settle for less than 50% but more than 20%.

Climatic

Both satellite and ground-based observations have shown that ozone has decreased in the upper stratosphere by about seven percent during the last decade. Total column ozone has decreased by about 4 percent since 1980. It is not known whether natural phenomena or CFC and Halon emissions have caused these decreases.

Continued growth of CFC and Halon emissions at three percent per year (as consistent with economic projections) is predicted to yield, by the year 2040, a globally averaged overhead-column ozone depletion of about 6 percent and a stratospheric ozone depletion of about 50 percent. These depletion levels are much larger than natural variability and are, therefore, significant.

replaced

In contrast, a true global freeze of the sum of worldwide emissions of chlorine and bromine containing chemicals at the present rates is predicted to yield a maximum globally averaged column depletion of less than 0.5 percent by the year 2015 and a stratospheric depletion of 25 percent in the next 100 years. This stratospheric depletion would be much larger than natural variability and would, therefore, be significant. (Note that a "true global freeze" is not realistically attainable given expected compliance problems and the anticipated concessions to developing countries.) The theories and models upon which these predictions are based have uncertainty factors of two to three.

Health

Depletion of the ozone layer would result in increased penetration of biologically damaging ultraviolet radiation (UV-B) to the earth's surface. Based on the research completed to date, greater exposure to UV-B radiation has been linked to increases in the number of skin cancers and cataracts, suppression of the human immune response system, damage to crops and aquatic organisms, and increased formation of ground-level ozone (smog).

(a total population of over 600,000,000)

Based on epidemiological and ecological studies, dose-response relationshps were developed and reviewed as part of EPA's risk assessment. The extent of additional cancer deaths will depend on the degree of CFC control. If today's ozone level is maintained, the projected number of skin cancer deaths for White U.S. citizens born before 2075 would be 2,100,000. If the ozone level is decreased by 26 percent, there would be a projected increase in the number of skin cancer deaths of 1,200,000 over the base of 2,100,000. For an ozone level decrease of 7.7 percent (the likely result of a freeze ~~included in the~~ protocol), there would be an increase in skin cancer deaths of 253,000 over the case in which there was no ozone depletion. For an ozone level decrease of 6.1 percent (the likely result of a 20 percent reduction in emissions), there would be an increase in skin cancer deaths of 168,000 over the base. For an ozone level decrease of 3.2 percent (a 50 percent reduction), there would be an increase in skin cancer deaths of 89,000 over the base. This analysis assumes that the average age of the population remains constant, that exposure to sunlight (e.g., sunbathing) does not increase, and that no major improvements in treatment of skin cancer occur.

stet

(56%)

not sure since #s chg'd

(12%)

(60%)

(32%)

the 600 million citizens

Give total number of cases if no ozone depletion

Recent studies have also shown a strong dose-response relationship between UV-B and the incidence of cataracts. Approximately 12.5 million cases in the U.S. could be averted by a protocol freeze for ~~cohorts~~ born by 2075. A 50 percent reduction in the major CFCs would result in approximately 16.3 million cases averted. While laboratory studies link UV-B to suppression of the human response system with possible implications for increasing the incidence of herpes simplex and leishmaniasis, research into possible broader implications has not been undertaken and the quantitative impact is not projected.

a

Limited studies have examined the effects of increased UV-B radiation on plants and aquatic organisms. Five years of field studies of soy beans provide the most extensive data and suggest potentially large losses in yield. Laboratory studies of UV-B effects on aquatic organisms show changes in community composition and reduced breeding season for phytoplankton and loss of larvae for higher order fish. Potential implications for the aquatic food chain have not been studied.

for this species

Cost/Benefit

A cost benefit analysis has been performed for the projected skin cancer deaths, skin cancer non-fatal cases, and cataracts health effects projected from increased UV-B radiation occuring at the projected baseline growth of CFC emissions and at the levels of emissions contemplated by a protocol freeze of emissions, a 20 percent reduction thereof, and a further 30 percent reduction thereof. Such analysis involves economic uncertainties and is not being presented with respect to the benefits derived from

substantial

reducing the incidence of UV-B on plants, aquatic life, the human immune system, ground level ozone concentrations, polymer degradation, and global temperature because of the lack of sufficient quantitative experimental information. However, the benefits of these non-quantifiably-evaluated benefits are acknowledged to exist and to be additive to the other benefits which were ~~valued and computed.~~ estimated.

A range of assumptions was used in the analysis. The key variations in the assumptions were the valuations of lives saved (two million and four million were used) and the discount rates for the costs and the benefits. Four percent and six percent were used for the benefits and the costs were evaluated at the same rate.

Sensitivity analysis was performed with respect to the economic valuation of lives saved and the growth in their value over time.

The uncertainty in the underlying data from which the individual health effects were calculated ~~was~~ were not separately estimated. The central values for health effects from the EPA Risk Assessment Analysis were used in the cost benefit analysis. In order to bound the benefit assumptions by the uncertainty in the underlying health effects data, climate models, etc., the calculated benefits should be reduced or multiplied by a significant factor which could be as much as ____ percent. ~~reduction of a _____ fold multiplation.~~

The conclusions of the analysis, which are shown in table form in Appendix _____, are as follows:

--The benefits from a "protcol freeze" of the CFC emissions are substantially more than the costs over all plausible assumptions and ranges of uncertainty.

--The aggregate benefits of a "protocol freeze" plus a 20 percent reduction in CFC emissions are also in almost all plausible cases substantially in excess of the costs.

--However, the benefits of the 20 percent reduction alone are not in all cases in excess of the costs of the 20 percent reduction alone.

--The costs of the further 30 percent reduction appear in many, but not ~~the majority of~~ cases to exceed the benefits from the further 30 percent reduction.

QUESTIONS FOR DECISION

DPC guidance is sought on the following ~~six~~ issues involved in the stratospheric ozone negotiations.

1. Should the U.S. continue to participate in international negotiations toward a protocol to control emissions of ozone depleting chemicals?

All agencies agree
~~There is inter-agency agreement~~ that international emissions control action is preferable to unilateral domestic control action for environmental ~~and economic~~ reasons. Unilateral domestic emissions controls are not likely to protect the ozone layer from depletion if other countries continue to emit ozone-depleting substances. In addition, unilateral domestic action would disadvantage U.S. industry in world markets. ~~Moreover, it appears that legislative and judicial pressure may result in unilateral domestic emissions controls in the event negotiations toward an international control protocol fail.~~ (clause to shorten, it was discussed earlier)

The Working Group recommends that the U.S. continue to aggressively participate in international negotiations toward a control protocol.

2. Should the U.S. delegation continue to negotiate pursuant to the Circular 175?

The November 28, 1986 Circular 175 ~~(approved by inter-agency review)~~ authorizes the U.S. delegation to negotiate a protocol providing for:

I. A near-term freeze on the combined emissions of the most ozone-depleting substances;

II. A long-term scheduled reduction of emissions of these chemicals down to the point of eliminating emissions from all but limited uses for which no substitutes are commercially available (such reduction could be as much as 95 percent); and (, subject to III,

III. Periodic review of the protocol provisions based upon regular assessment of the science. The review could remove or add chemicals, or change the schedule or the emission reduction target.

Vickie, also see the exact wording here

While there has been much discussion about the specific terms of a potential protocol, there is no interagency disagreement with the general framework set out in the Circular 175. The Circular 175, however, allows for various approaches to a control protocol. The remaining issues address the desirability of these various approaches.

The Working Group recommends that the U.S. delegation continue to negotiate pursuant to the Circular 175. The subsequent discussion is to provide specific details as to acceptable outcomes within this general authorization

3. ~~What chemicals should the U.S. seek to include in the control protocol?~~

3. Should the delegation continue to seek a freeze of emissions at 1986 use levels?

Pro: ◦ All analysis using current information supports at least a current, globally enforced freeze is needed to assure only minor levels of ozone layer depletion
◦ Analysis done for the OPC supports this action is the single most effective step that can be taken to contain the potential global risk

Sub elements:
◦ What chemicals should be included in the freeze?
a) CFC-11, -12 and -113 b) a. plus halons c) b. plus CFC-114, -115
◦ When should action be taken (related to when the protocol enters-into-force (EIF))
a) 2 years after EIF b) as soon as possible after a new science review (1991-1992)

4. Should there be regularly scheduled assessments of scientific, economic, technological and environmental factors to support subsequent decisions of the parties to the protocol?

Pro: All agencies support this, however one agency proposes future decisions affecting the U.S. should also be based on a U.S. assessment, as well.

5. Should the delegation seek an additional (first) reduction of emissions?

Pro: ◦ a freeze, as in 3 above, is not likely to provide sufficient international coverage to provide a "global" emissions freeze
◦ a reduction step would provide a strong signal to user/producer industries to develop acceptable substitutes and effective emissions capture technologies.

Subelements

- What chemicals should be included in this and subsequent reductions?
  a) CFC-11, -12 b) a. plus CFC-113, c) the 5 CFCs listed above, but not halons
- ~~What precat reduction~~ Should the reduction be 20% from freeze levels, as given ~~%~~ in the present draft text?
- When should the reduction begin?
  a) 2 years after freeze b) 4 year after freeze c) 8 years after freeze
- Should this reduction be automatic, i.e, changed only if the protocol is amended and ratified by the parties.

6. Should the delegations seek a subsequent reduction step to be detailed in the protocol now?

PRO
- some agencies believe that the signal for innovation requires more than 20% reduction; others do not.
- recent publicity, discussed ~~in the~~ earlier, leads some agencies to believe that more aggressive US domestic controls will be forced by the Congress or by interest groups if less than 50% reductions are scheduled; others believe that this will not happen

CON
- Cost-benefit analysis strongly supports the freeze and 20% reduction, but is not clear on this step
- Many agencies believe that a more reasoned next step of reduction should follow after subsequent domestic and/or international assessments (first in 1990.)

Subelements

- Should the reduction be 50% from freeze levels, as given in brackets in the present draft text?
- When should the reduction take place
  a) 6 years after freeze b) 8 years after freeze
- By what mechanism should the parameters of the reduction be changed
  a) not enforced at stated levels unless a majority of Parties vote

to affirm level within 4 years of EIF of the protocol

6) the reduction automatically EIF unless 2/3 of parties vote to reject the reduction within 4 years of EIF of the protocol

7. Should the delegation seek additional reductions, with the schedule and conditions for changing the reduction being agreed to now?

CON: ◦ Agreement for reduction steps would be to enter into force after year 2000 without any benefit from using the assessments results occurring in 1990, 1994 and 1998 in the first setting of limits

◦ In US, there are few cases of environmental control agreements being modified to be less restrictive after one set.

~~8. If item 7 is not agreed to, then~~

new paragraph

If items 5, 6 or 7 are not agreed to, then ~~the~~ item 8 should be considered as the next question for decision.

8 Should the delegation seek to include in the protocol a process for, in subsequent meetings, consideration and approval of further emission reductions based on subsequent international ~~review~~ assessments.

PRO: ◦ It is quite possible that subsequent information would call for additional reductions more ~~clear~~ conclusively ~~that~~ than the present information does.

◦ A net process could provide a mechanism that is more timely than negotiating a new protocol or amending this proposed protocol.

Subelement:

- Should the process be routinely scheduled, eg, one year following ~~each~~ completion of each new STEC assessment (1991, 1995, 1999, etc)?
- Should the process allow for entry into force of the new reduction without ~~ratification of the~~ ratification by the Parties of ~~the~~ amendments to the protocol?

E. Shykind, ITA/DOC 6/8/87 TechFile S.

DPC Ozone Issues
Department of Commerce
Additions/Recommendations

Page 1.

We suggest that Dr. Watson's two charts from the small handout be included, along with his short conclusions, as an appendix to the DPC.

Legislative/Legal

First paragraph, last three lines. EPA has not had an active continuous program on stratospheric ozone for the past eight years. Rather than leave the DPC with the impression that this phenomenon was under EPA scrutiny we suggest that the line be deleted. Considering the frenetic effort underway for the protocol negotiations, the questions could be asked by DPC, as to why EPA's data and the negotiations are still, to some, in a speculative state.

Page 2.

Climatic

The natural periodic variations in total ozone stratospheric ozone concentration follow an irregular (so far as our limited continuous data permit us to conclude) pattern. The present stratospheric ozone concentration is similar to the 1960 concentration, and Dr. Watson's charts show this variation in annual ozone concentration. We suggest that the first paragraph be augmented by adding to the last sentence:...."since the current level is within the range of natural variation in stratospheric ozone concentration". The intent is to show that an alarmist view of the present measurements need not be the only interpretation of the data.

Pages 3-4.

Health-Cost/Benefit

We suggest that a paragraph on the health effects/risk-benefit analysis include the marginal cost data that Dr. Decanio presented relative to the initial freeze plus the suggested 20% to 50% reductions. This will give the DPC substantive information on how much additional cutbacks will cost the country. The summary on page four is a likely place to add the cost data.

We agree with Agriculture on the statistical weakness of the effect of UV-B on plant life base on the analysis of one plant family. The question of the effect UV-B on aquatic life cannot be answered through present laboratory experiments. The need for a substantial amount of additional research on all other effects needs to be made known to the DPC. Our recommendation would be to encourage the DPC to consider special funding allocations for directed research on this issue.

Page 5.

2. Circular 175.

The critical issue to ITA/Commerce is that the DPC instruct the delegation that the wording of the (III) Periodic Review be changed such that scientific evidence indicating that CFC or Chlorine loading be increased if so indicated by continuing measurements and model improvements. Although we agree with NOAA in terms of the freeze indicated by the present one and two dimensional models, we would like to express to the delegation, through the DPC, that continuous monitoring/modeling is critical, not only for the CFC and Global Warming issues but for real-time changes in any direction if so indicated by the scientific reviews.

3. Chemicals for inclusion - Pages 5 and 6.

From a commercial and critical use standpoint F-113 and the Halons present special problems.

We believe that F-113 could be omitted, if the negotiations were blocked, and the omission used as a bargaining chip perhaps for timing. This would mean that the U.S. would probably have to lead the way in emissions control for F-113. Although the use of regulatory controls is not a usual Commerce position, we could visualize, in a number of CFC uses, where EPA regulations, under the Clean Air Act could tighten up emissions and keep within the ultimate protocol reduction schedule. Our goal would be to keep F-113, a critical product with no substitute on the horizon, as an available product to U.S. industry. This is the rationale for the Commerce position on the freeze for F-11 and F-12 only.

Similarly, if we limit the use of Halon extinguishers to industrial/military use, such as we have with the critical aerosol exemptions, we can cut down Halon emissions from the perhaps millions of Halon extinguishers being sold to the public and thus substantially reduce the ODP of this chemical until something less harmful is developed.

Page 6.

Question of what EPA regulation(s) might look like.

There are a number of emissions-saving mechanisms which EPA could bring into play. Commerce has been examining what measures could be taken to reduce the release of CFC's. Under a potential freeze and reduction plan, such measures would increase costs to industry and the consumer. However, the additional reserve created would lessen the impact on those industries totally dependent on CFC's until complete substitution occurred.

Reduction of CFC Emissions from Automotive A/C.

1. Ban the production and use of 14 oz. A/C refills (probably would have to set a minimum limit of 25 pounds as an economic block for occasional users) for noncommercial purposes. This would force the automotive repair into authorized dealerships or garages with the proper recovery equipment.

2. Limit the repair of automotive A/C to certified garages and shops, with approved recovery equipment for servicing and recover of F-12.

The above actions would raise the cost of A/C repair but would probably cut the emission rate of 90 million pounds (probably even higher) of F-12 lost through car A/C failure and repair procedures to about 50%. The credit for this emission reduction could be placed into other ODP materials, such as F-113 or F-12 for insulation purposes.

Emission Controls for F-113 degreasing and semiconductor/circuit board production equipment.

1. EPA could regulate the efficiency of recovery/recycling for F-113 uses (where practicable). If the loss rate were dropped from 1% to somewhere less than 0.5% there could be considerable savings in the emissions rate and the cost of maintaining F-113 in the production bank. This becomes an attractive alternative as the cost of F-113 rises as reductions raise the general price level of CFC's.

The "Freeze" as a technology forcing action

With the present growth of CFC uses rising at an annual rate of about 3-4%, a freeze at 1986 production would essentially be a production cut of about 20% at the initiation of the protocol. Industry has pointed out that such a reduction is a sufficient action, along with the implementation of the protocol itself, to assure them of markets for substitutes. Thus, just the freeze is a technology forcing function. The 20% reduction in four years is essentially a 40% cut from the 1990 "in-force" year.

The reason for Industry asking for a freeze year in 1986 is to limit the explosive growth of CFC production facilities in other countries if the freeze date was the same as the initiation of the protocol. There are other alternatives to this, such as the freeze being at the average production level for some 5 year period such as 1985-1989. This would give a somewhat higher level of worldwide emissions, but at pointed out by Dr. Watson, this would resolve itself if a cut came into effect within 5 years or so. The argument could be made that this would dampen the required technology-forcing character of the freeze. Commerce believes that once the protocol is signed, industry cannot afford to wait since user pressure for substitutes will manifest itself, particularly from the medium to smaller users.

Triggers for Further Reduction

Commerce is strongly in favor of positive triggers for all stages past the first 20% reduction. We would be more favorably inclined toward automatic triggers if the scientific evidence was clearly established that further cuts are necessary and that an adequate range of substitutes was clearly in reach within the next 10 years. Thus, our concern for continuous monitoring and reporting on the state of the atmosphere for all ODP's before additional cuts are automatically enforced.

This philosophy follows through all subsequent portions of the paper, particularly at the 50% or better levels.

Page 7.

5.Trade Control.

The DPC should be made aware of the protocol provisions and the existing U.S. regulations which would protect U.S. industry in the event that a nonparticipating country tried to use their CFC production and use advantage in international trade. Perhaps a statement along these lines might serve as a guide for the DPC:

"At present, it is anticipated that the majority of producing countries will join in the protocol. Trade provisions in the protocol provide for the immediate control of trade in bulk CFC's with additional controls contemplated for products containing or products made with CFC's. In the unlikely event that some of our major trading partners do not sign the protocol and evidence is presented that they are using CFC's outside of the protocol, EPA has the authority to ban these products and the Department of Commerce has authority to ban the export of CFC technologies to non-signatory countries. Considering the magnitude of trade with the signatory countries, it is unlikely that the opportunity to use these mechanisms would occur."

DOI 6/8

Background

In 1978 the U.S. took unilateral action to limit the use of CFC's in an aerosol propellant. This unilateral U.S. action was followed by action in only a handful of other nations. Many of our major trading partners failed to initiate any voluntary measure to reduce aerosol.

Recent scientific information, including the discovery of a hole in the Antarctic, has prompted a renewed call for reductions in the use of CFC's. These calls are based on modeled projections and hypothesis of the role of chlorine ~~and ?~~

The science shows that any steps taken by either the U.S. unilaterally or the developed nations in unison will in the long run be negated unless the less developed nations (LDN) (such as China and India) or the newly industrialized countries (NIC) (such as Taiwan, Hong Kong and Republic of Korea), also comply with the protocol. Similarly, the science shows that all the fully halogenated CFC's and halons should be covered by the protocol and not merely CFC's 11,12 and 113.

Status of Negotiations

31 countries were represented at the last negotiation session. (See Attachment A). Notably, LDN's and NIC's were underrepresented. That X resulted in a Chairman's text (Attachment B) which called for:

1. A freeze on CFC 11,12 and possibly 113 at 1986 levels. CFC 114,115 were bracketed.

2. An additional 20% reduction in 2-4 years after entry in force (EIF)

3. A further 30% reduction in 6-8 years after (EIF)

DRAFT

OPTIONS CONCERNING PROTECTION OF STRATOSPHERIC OZONE

ISSUE I. GENERAL U.S. POSITION ON INTERNATIONAL PROTOCOL

Ideally, the United States should seek a protocol agreed to by all nations which provides for a true global freeze on covered chemicals. Such an international agreement is not obtainable at this time. The President should decide which of the following options is in the best interests of the United States.

Option 1:

Continue negotiations pursuant to State Department Circular 175, with U.S. delegation authorized to use its discretion on all issues, including: chemical coverage; acceptable level of country participation; when and to what extent freeze and further reductions up to 95% should occur; whether reductions should be automatic (subject to reversal by 2/3 vote) or require affirmative vote of majority; whether voting system should give weight to major producing and consuming nations; whether to seek, in addition to freeze, a ban by other nations of non-essential aerosols as the U.S. did in 1978; and whether to seek verification provisions.

Option 2:

Continue negotiations, with U.S. delegation instructed to make every effort to achieve (or merely to seek where indicated) a protocol containing provisions for:

(a) Freeze the most ozone-depleting chemicals (CFCs 11, 12, 113, 114 and 115 and Halons 1201 and 1311) at 1986 production level within two years after entry into force.

  (1) Entry into force when sufficient number of countries, determined by formula, sign and ratify. Formula, premised on need for maximum global participation, would require participation by countries which, in the aggregate, currently account for very substantial, specified percentages of (i) total global production of covered chemicals and (ii) world population.

  (2) To encourage participation by current non-producers (such as developing nations, whose participation is essential), but to avoid excessive emissions, permit current non-producers to meet their own needs with their own production and imports without restriction until 2000.

  (3) Seek other participants' agreement that, in addition to freeze, they will ban use of non-essential aerosols, as United States did in 1978.

(b) Twenty percent reduction by participants (subject to (a)(2), above) when:

  (1) Approved by majority vote of participants not in material breach of freeze (with weighted voting to take into account countries' production and consumption levels of covered

chemicals) following a major international scientific, technological, health and economic review which takes into account the effects of the freeze; and

(2) At time of vote, participation still exists by countries per formula in (a)(1) applied on basis of data as of year-end before the vote.

(c) Meaningful reporting and verification provisions.

Aside from the protocol, the President commits to seek through appropriate international agreement further reductions, which may be more or less than a cumulative 50% reduction below freeze level, within five years after a 20% reduction becomes effective, if:

(i) President is satisfied that further reduction is appropriate in light of major international scientific, technological, health and economic review completed following three years after 20% reduction has occurred; and

(ii) At time of Presidential decision, protocol participation still exists by countries per formula in (a)(1) applied on basis of then-current data, and President is satisfied with participants' compliance.

Option 3:

Continue negotiations, with U.S. delegation instructed to insist upon (or merely to seek where indicated) a protocol containing provisions set forth in Option 2, Paragraphs (a) and (c).

ISSUE II. PROTOCOL TRADE SANCTIONS

Should the U.S. delegation insist upon provisions in the protocol which require (automatically or pursuant to vote) that participants impose trade sanctions against countries which: (i) have not become parties to the protocol; and/or (ii) are in material breach of their protocol obligations?

Should such trade sanctions ban or limit imports by participants of: (i) controlled chemicals in bulk; (ii) products containing such chemicals (e.g., air conditioners and foam insulation); and/or (iii) products whose manufacture involves use of controlled chemicals (e.g., electronic equipment)?

ISSUE III. DOMESTIC NON-REGULATORY PROGRAM TO SUPPLEMENT PROTOCOL

Should the Domestic Policy Council immediately commence development of program options whereby the United States would engage in a major, accelerated, urgent national research program (alone and in cooperation with other countries) to supplement the protocol? Objective would be to seek development of: better knowledge concerning effect of covered chemicals upon stratospheric ozone and consequences of stratospheric ozone depletion upon health and the environment; safe and technologically feasible substitutes for covered chemicals; technology to mitigate effects of covered chemical emissions on stratospheric ozone; and technology, medical procedures and treatment to mitigate adverse effects of excessive exposure to ultra-violet radiation.

REPORT OF THE TRADE WORKING GROUP ON OZONE/CFC ISSUES

Formula for Calculating Emissions

The Trade Group has reached general consensus on how to approach the definition of "emissions" of ozone-depleting chemicals in the protocol, i.e., the formula affecting trade among parties to the protocol. The Group still believes the initial U.S. position in favor of apparent consumption ("adjusted production," defined as production plus imports minus exports) represents the best formula in terms of meeting U.S. objectives (widest acceptability, least trade distortion, least impact on U.S. economy). However, since the EC position on including specific limits on production is adamant, the Group believes combining consumption limits with production limits (as proposed by Sweden in the April meeting in Geneva) may be acceptable. Because agreement to production limits would be a major concession to the EC, the U.S. negotiators should seek appropriate concessions from the EC on other points desired by the U.S. In the event of failure to reach consensus on either apparent consumption or combined consumption/production limits, the Group recommends U.S. negotiators consider other alternatives, either a production limit plus principles for "free trade" in CFCs or a "managed trade" approach similar to our current short-supply export controls.

Developing Country Issue

The consensus of the Trade Group is that the developing country problem can be handled by a 7 to 10 year "grace period" during which those countries with low 1986 CFC consumption would be allowed to increase their domestic consumption. At the end of this period or when their annual per capita consumption reached the level established in the protocol (whichever occurred first), these countries would be subject to the same schedule of freeze and reduction of their production and/or consumption as developed countries. To discourage the construction of new production capacity in these countries, existing producers would be allowed to export CFCs to these countries using existing CFC capacity without being subject to production limits otherwise imposed. The developing countries, in turn, would have to use the supply made available under this temporary exception only for domestic consumption and not for increasing their exports above 1986 levels. The Group believes, based on analysis of projected ozone depletion under various assumptions, that the additional emissions associated with developing country growth under this temporary grace period would not have a significant effect on overall ozone depletion as long as these countries were subject to the protocol limits following this period. The Group is still considering what the appropriate per capita consumption level should be and how specific countries would be affected.

Trade with Non-Parties

In view of the "carrot" represented by the special treatment for developing countries which the Trade Group believes the U.S. can support, the Group feels the U.S. should continue to press for a strong "stick" in the form of a protocol article authorizing trade sanctions against CFC and related imports from countries which do not join or comply with the protocol provisions. Such sanctions would be consistent with GATT Article XX:(b) and XX:(g) and would be necessary from both an environmental and an economic point of view. If non-parties were able to increase their CFC emissions without constraint by selling either bulk chemicals or products containing or made using these chemicals to the large markets of the protocol countries, this could undermine the protocol objective of protecting the stratospheric ozone layer. In addition, these non-parties would benefit commercially from taking over a portion of the protocol country markets thus made attractive by the limits imposed on protocol member industries. The Group is aware that there are serious administrative (and possibly foreign policy) problems associated with actual implementation of such sanctions and therefore feels the U.S. should not commit to implementation of sanctions beyond bulk chemical imports without an opportunity to consider these implications. On the other hand, the Group also feels that the protocol should send a strong signal to other countries that they will not be permitted to benefit commercially through trade with parties by not joining the protocol.

Negotiating Strategy

The Trade Group recognizes that different countries will be coming to the next round of negotiations with various points of view and strategies for obtaining their objectives. The positions outlined above represent the Group's recommendations regarding U.S. "bottom-line" positions which the negotiators should seek to achieve by the end of the session. In the course of the negotiations, the Group anticipates that the U.S. team may need to take certain interim "hard-line" positions in order to counter opposing positions by other countries. In doing so, the negotiators should seek appropriate concessions from other countries before agreeing to some of the compromise positions described above.

OMB fact sheet w/ May 18 memo.

5/18 memo to OPC

BACKGROUND FACTS OZONE ISSUE

THE DEPLETION MECHANISM

Man-made chlorofluorocarbons (CFC's) and halons are compounds widely used in industrial economies. Their lifetimes in the atmosphere are expected to be 75 - 100 years. Eventually, they are transported into the stratosphere and broken apart, by ultraviolet light (UV), into oxides of chlorine and bromine. These act as catalysts, each molecule breaking apart thousands of ozone molecules. The reduction of ozone transmits more UV to the surface.

NUMERICAL PREDICTIONS OF DEPLETION

Chart 1 shows projected depletions for a range of CFC emissions.

Even when predicted changes in total ozone in the column are small and little change occurs in UV reaching the surface, major changes in the vertical distribution of the ozone are still predicted with a potential net warming effect on the climate.

HOW GOOD ARE THE NUMERICAL MODELS

The models are in some conflict with empirical measurements. Measured ozone abundances above 35 km. exceed modeled abundances by as much as 30-50 percent. There are also errors in predicted temperatures, in distributions of odd nitrogen species and other atmospheric chemicals and in model sensitivity to chlorine.

On the other hand, all of the models predicted, within acceptable limits, similar ozone depletions for given CFC scenarios.

ACTUAL TRENDS IN OZONE

Monitoring efforts to measure actual trends in global ozone have produced inconsistent and inconclusive results. Ground-based "Dobson" instruments, in use since 1960 at dozens of stations, show no trend in ozone abundance. A much smaller number of "Umkehr" stations, in use since 1970, and satellite data taken since 1978 show significant decreasing trends in the total ozone column, largely since 1981. Whether the apparent trends are due to satellite sensor-drift, the El Chichon eruption, the 1982 El Nino, changes in solar radiation, or manmade CFC's is not certain. A detailed re-evaluation of these sources of data will be available in late fall, 1987.

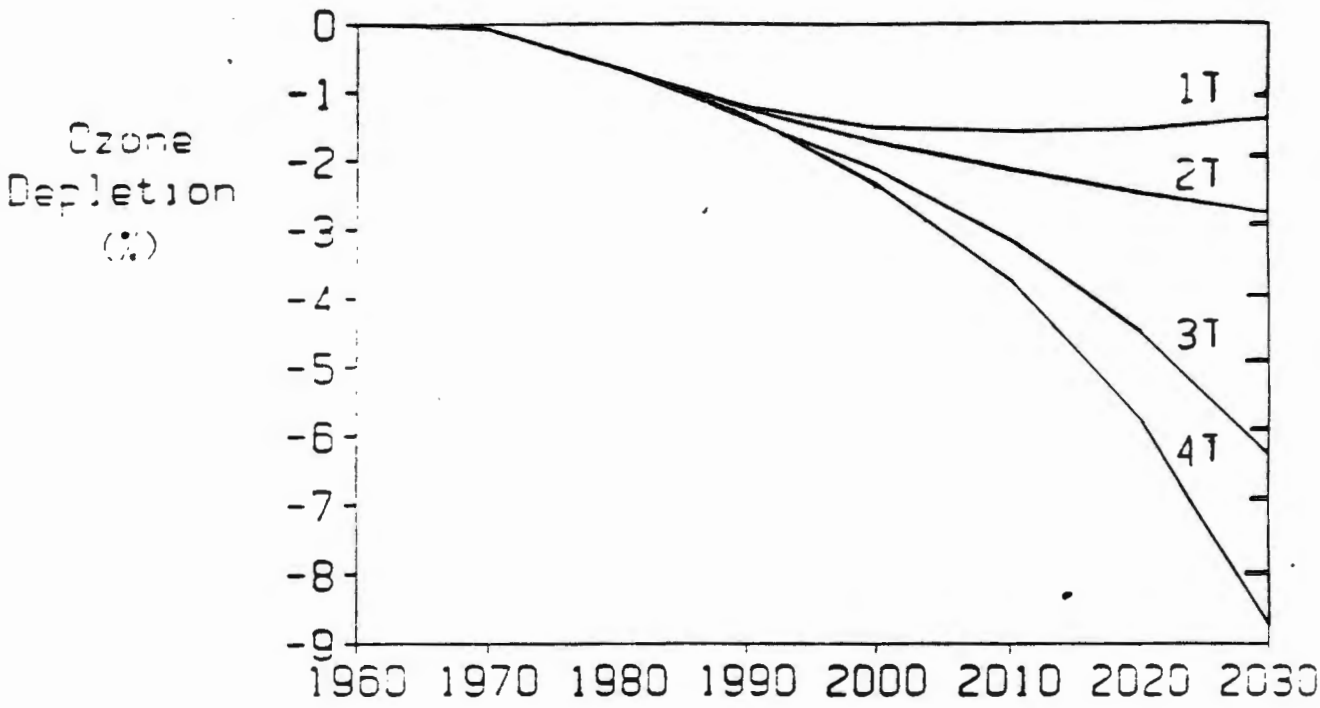
In short, interpretations of the existing satellite and ground-based data on ozone trends range from:

-- No obvious human-caused trends, to

-- Marked downward trends, 2-3X larger than predicted by theory.

Chart 1

Time Dependent Globablly and Seasonally Averaged Changes in Ozone for Coupled Perturbations (IS 2-D Model)



Results show for four scenarios of trace gas growth:

Scenario	CFC-11 and CFC-12
1T	1980 levels
2T	1.2% growth
3T	3.0% growth
4T	3.8% growth

Assumptions for other trace gases are the same in each scenario: constant emissions of CFC-113, CCl4, and CH3CCl3, zero emissions of halons, one percent growth per year in CH4, and 0.25 percent growth per year in N2O. CO2 concentrations grow at 0.5 percent.

Source: Stordal and Isaksen, (1986).

THE ANTARCTIC OZONE "HOLE"

It was discovered in 1985 that, since about 1965, in the Antarctic spring, and only in the spring, overhead ozone has increased in a ring around, and decreased directly above Antarctica. This seasonally temporary depletion has been more and more each year and now amounts to 40-50 percent of the ozone, approximately offset by the build-up in the ring. It was totally unanticipated by the existing science and models.

The global implications, if any, of the "hole" are currently unknown since the cause is not established. The existing observations could be consistent with but are not proof of the man-made chlorine hypothesis.

EFFECTS OF OZONE DEPLETION

Ozone depletion has a number of potential adverse impacts as follows. Except possibly for skin cancer, the level of depletion needed to cause significant adverse effects is unknown.

Skin Cancer Effects. Prolonged sun exposure is considered to be the dominant risk factor for non-melanoma skin tumors. However, uncertainty exists in the actual doses received by populations and in the changes in response which would result from changes in dose. Changes in behavior have tended to increase skin cancer incidence and mortality, which, therefore, could be reduced by changes in behavior.

In the U.S. there are more than 400,000 non-melanoma skin cancer cases each year with about 4000 deaths. Table 1 shows the range of estimates of increase from a 2 percent depletion for San Francisco. Worldwide growth of CFC emission of 1 percent annually is estimated to cause a 2 percent depletion by about the year 2010.

Table 1.

Type	Current Cases, %	Current Deaths, %	Increase in Incidence, % Male	Female
Basal Cell	71	20-25	2.1 - 7.2	0.7 - 5.0
Squamous Cell	29	75-80	3.2 - 11.7	3.1 - 13.3

The non-melanoma skin cancer effects of ozone depletion are not likely to be given great weight in developing countries wishing to use CFC's -- skin pigmentation is a protective barrier that reduces the incidence of such tumors.

Much circumstantial evidence implicates solar radiation as one of the causes of cutaneous malignant melanoma (CMM), with 25,000 cases and 5,000 deaths in the U. S. in 1985. On the other hand, some studies find no correlation between incidence and latitude, and outdoor workers have lower CMM rates than indoor workers.

EPA's estimate is that each 1 percent ozone depletion would increase incidence by 1-2 percent and deaths by 0.8-1.5 percent.

Immune System Effects. Solar radiation has been found to have a detrimental effect on the immune system of both humans and animals. Although the mechanisms are not fully understood, it is clear that the UV part of the spectrum, which is screened out by ozone, is responsible.

Plant Life Effects. Existing knowledge of the risks to crops and terrestrial ecosystems from ozone depletion is extremely limited.

Data for crop species, although incomplete and often not from field studies, suggest that large variations exist within species for response to UV. For example, in 3/4 of soybean cultivars tested, levels of UV simulating 16-25 percent ozone depletion reduced yields by up to 25 percent with quality reductions.

Little or no data exists for trees, woody shrubs, vines, or lower vascular plants. Increased UV could alter competition in natural ecosystems unpredictably.

Aquatic Life Effects. Experiments show that UV causes damage to fish larvae and juveniles, shrimp and crab larvae, and to plants essential to the aquatic food web. Enhanced UV would probably change the composition of marine plant communities and could cause unpredictable changes to aquatic ecosystems.

Current data is very incomplete and limited. Understanding of aquatic organism lifecycles and of aquatic ecosystems is very limited. Great uncertainty exists about effects because UV attenuation in the water column is variable and organism behavior can affect dosage.

Climate Changing Effects. CFC's, like CO2, are greenhouse gases, but more powerful by a factor of 10,000. Increasing concentrations contribute to global warming.

CFC's IN U. S. INDUSTRY

Use of CFC's in the U. S. is spread among seven use categories and a large number of applications.

Table 2

Use Category	1985 Use (Metric Tons)	Percentage of Ozone Depleting Potential
Solvents	41,369	14
Refrigeration	78,987	28
Foam Blowing	70,430	28
Fire Extinguishing	6,250	20
Sterilization	12,133	4
Aerosol Propellants	8,000	3
Other Miscellaneous	7,083	3

COSTS OF EMISSION REDUCTION

EPA has done a preliminary analysis of possible actions to reduce CFC compound use in the short (shown below), medium, and long term:

Table 3

Cost/Kilogram Reduced	Percent Reduction in Use (Weighted by Ozone Depleting Potential)
Short-term:	
<$0.15	30
$0.15 to <$2.30	5
$2.30 and more	16
Short-term total	61

CHEMICAL SUBSTITUTES FOR CURRENTLY USED CFC's

The industry is looking at several possible compounds which could be sustituted for current CFC's. The minimum time frame to introduce such susbstitute products into commercial use would be 5-10 years. For the following reasons, it is likely to be closer to 10:

- -- Publicly known production processes are low in yield with large waste streams that are partly toxic and partly recyclable. Long-term (3-4 years) toxicology tests will probably not be done until the process that will be used is defined and optimized.
- -- Potential producers may not commit to a process until they are reasonably sure that better ones don't exist.
- -- Commercial users may insist upon completion of toxicology testing before adopting new compounds.
- -- Users would also need a period for product compatibility/performance testing and for any product and process redesign.
- -- Producers would need time to design and build full scale plants.

Dupont has published estimates that substitutes are likely to have a cost that is 2-5 times that of current CFC's. However, for most uses, the cost of CFC's is a very small part of the total cost of the final product. Dupont estimates that 5-6 years would be needed to bring substitute compounds to the commercial market place, not including time for customers to shift to the new products.

One industry estimate of future U. S. CFC consumption estimates that a freeze would cause a real price increase of 2-3 times within the first 3 years and 4 times beyond 7 years. EPA and others argue that a freeze would not bring in substitute compounds in the short-term, because alternatives would prevent a sufficient price increase unless a 50 percent or greater reduction in use were imposed.

CFR CONTROL MUST BE GLOBAL

U. S. use of CFC's is 27 percent or world use and is not large enough that U. S. action alone can significantly affect long term emissions. Under the Clean Air Act, EPA must consider unilateral action even though it would not be as effective as global action.

CONTROL IN U.S. IS MORE DIFFICULT - AEROSOLS ALREADY BANNED

Patterns of use in the U.S. and in other non-communist reporting countries are significantly different. Other country use is 2 times U.S., Canada, and Sweden banned non-essential aerosol use in 1975, using available substitutes.

Some observers have argued that the U. S. position should be for equal percentage reductions in use after the elimination of non-essential aerosol use. Others argue that approach is very unlikely to be acceptable to countries with unrestricted aerosol use.

COSTS AND BENEFITS

CEA believes that given the projections of ozone depletion and estimates of the health consequences assuming no behavorial changes, it is possible to asess the economic benefits of the CFC control protocol presently under discussion. EPA's risk assessment indicates that the freeze + 20 percent cutback will avoid approximately 992,900 deaths in the U.S. from skin cancer among people alive today and those born through 2075. An additional 30 percent cutback will save an additional 78,700 lives. The economic benefit of saving these lives, under standard assumptions for valuation of statistical lives saved and discounting of future values, is very large, on the order of hundreds of billions.

These benefits, which do not include non-health benefits or benefits from avoidance of non-fatal skin cancers and cataracts, are much larger than the costs of control estimated by industry or EPA. Industry has estimated that the cost of a freeze to the U.S. would be about $1 billion cumulatively between now and the year 2000. EPA has estimated that the cost of a 30 percent reduction in the controlled substances would be about $3-$4 billion cumulatively between now and the year 2000.

February 20, 1987

Patricia Hines

Patricia,

As short as I can make it, here's where I see the ozone issue.

- Administration policy has been led by EPA and State, and I have serious doubts that what they're leading us to is either good politics or good policy.

- By asking for a 95% phase-down in CFCs at the Vienna talks, the U.S. is going far beyond what most other countries want. Both the EEC and Japan will have to be arm-twisted just to get them to accept a freeze.

- Let's assume we get only a freeze at Vienna or at one of the future negotiating sessions. Then we are still under a court order to write domestic regulations.

- At that stage, we're in trouble. If EPA doesn't write stiff enough domestic regulations, then both the Democrats in Congress and the environmentalists will bang us over the head, citing our own request for a phase-down in Vienna as evidence that tough regulations mandating a phase-down are necessary.

- On the other hand, if we mandate a phase-down ourselves, then we penalize our own industry and raise pressure to ban the import of products containing CFCs.

- The economic impact would be tremendous, since CFCs are ubiquitous. And, at least so far, no one in the Administration has done a study of just how much any kind of regulation would cost either CFC consumers or producers.

- A key issue, it seems to me, is whether the Administration has ever decided that the science linking CFCs with ozone depletion justifies a phase-down. The scientists themselves say they can't tell how much "insurance" -- that is, CFC regulation -- is required. They say that's a policy judgment, yet so far that policy judgment is being made without any assessment of its costs.

- At this late stage, it may be impossible to change the Administration's negotiating position at the international talks. But one thing the DPC might be able to do is to tell our negotiating team to accept a freeze. Right now, Benedick and the negotiating team won't do that, so they're trying to raise the domestic political pressure in Europe and Japan so the governments will support a phase-down. In other words, the Reagan Administration finds itself in the unusual position of being allied with Germany's Green Party!

- In any case, this issue of freeze v. phase-down is important, and may require DPC attention. Today's Working Group meeting was at least a start at trying to get some more sober voices -- Justice and Interior, in particular -- into the policy process.

Hope this helps.

Paul Gigot