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Last Updated: 04/12/2024

[Comments due 10:00 AM
Monday]

Bob

8th lawsuit -
See Vicki's paper

Outline of State Department Presentation to the DPC:
Negotiation of an International Protocol
to Protect the Ozone Layer

1. Background:

- a. Scientific concerns in 1970's
- b. U.S. aerosol ban in 1978
- c. Other country actions/benefits
- d. UNEP negotiations - Vienna Convention of 1985
- e. International Scientific Assessment
- f. U.S. Position: Circular 175 - three key elements
- g. History of current negotiations: progress made
- h. Current situation/next steps

2. Review of Science: Robert Watson, NASA

3. Issues for DPC Guidance:

General guidance sought for next round; will return for more specific direction before concluding round (September).

1. Chemical Coverage

- U.S. objective: Broadest coverage of major depleters on weighted basis, including halons.
- EC, Japan, USSR wanted only 11, 12; now may agree to 113, 114, 115, maybe halons.
- Broad interagency agreement. Subject to DPC guidance, will continue to press for broadest attainable coverage.

2. Stringency and Timing of Controls; Relationship to Periodic Assessments

- Key issues are:
 - o Stringency: initial freeze and subsequent reductions -- What levels in what increments?
 - o Timing: benefits of early action (environmental, impetus for substitutes) vs. need to provide time for adjustment.
 - o Relationship to scheduled reassessments of scientific, technological and economic factors: should we go for (1) scheduled reductions subject to reversal after reassessment by vote of parties or (2) targets to be implemented only by positive vote after reassessment.

- Chairman's text (attached): represents possible emerging international consensus and is convenient vehicle for review. Includes:

- o Freeze at 1986 levels two years after entry into force (EIF).
- o 20% reduction 4 years after EIF (will go into effect unless reversed by parties after scheduled reassessment)
- o Additional 30% reduction, to be implemented after scheduled reassessment either
 - 6 years after entry into force, if positively confirmed by vote of parties, or
 - 8 years after entry into force, unless reversed by vote of parties.
- o Additional steps down to possible eventual elimination to be decided subsequently by parties based on periodic reassessments

ISSUES FOR GUIDANCE:

Questions:

Should U.S. delegation seek agreement along lines of chairman's text, work for greater stringency/earlier impact, or propose some relaxation in terms?

(1) Freeze. Interagency accord, within 1-2 years of EIF.

(2) 20% reduction. General interagency agreement, except OSTP believes implementation should depend on positive vote of parties following reassessment.

(3) Additional 30% reduction. No interagency agreement.

-- Should reduction beyond first 20% be scheduled; if so at what level?

-- Should reduction be 6 years after EIF subject to positive vote, or 8 years after EIF subject to reversal, or either? Other?

(4) Additional steps. Should delegation press for further reductions? If so, at what levels and time frame? Require positive votes or implemented unless reversed?

4. Issues for Future DPC Decision

Following issues not ripe for specific guidance, need further work; will return for direction.

3

Control Formula and Trade Provisions:

(1) Trade Among Parties.

- o Significant differences remain over formula for what is controlled.
- o Options include national ceilings on production, production plus imports combined or separately, adjusted production (U.S. preference - production plus imports less exports to parties less amounts destroyed), or combinations thereof.
- o U.S. objectives include effective control of emissions with accountability, fewest restrictions on flows of trade and capital among parties, most favorable formula for U.S. industry.
- o Subject to DPC guidance, delegation will pursue these objectives and seek DPC approval of specific recommendations.

(2) Trade With Non-Parties.

- o Key elements:
 - Ban on imports of controlled chemicals in bulk from non-parties. Wide international consensus.
 - Possible restrictions on exports of bulk chemicals. No consensus.
 - Possible restrictions on imports of products containing controlled chemicals. No consensus.
 - Consideration of restrictions on products made with controlled chemicals. No consensus.
 - Consideration of restrictions on export of technology. No consensus.

- o U.S. Objectives: to use trade sanctions to encourage adherence to protocol and avoid benefits to non-parties at expense of parties. Implementation timed to minimize dislocation.
- o Subject to DPC guidance, delegation will pursue these objectives and seek DPC approval of specific recommendations.

4.

Ab.

Participation.

- o U.S. Objectives: To encourage widest possible participation by other countries.
- o Problem: Less developed countries need concessions for domestic consumption to encourage adherence; concessions must remain sufficiently limited to avoid undercutting global controls.
- o Most promising option entails exemption from controls for limited period for least consuming countries (LDC's), followed by adherence.
- o Needs more work. Subject to DPC guidance, will refine in negotiations and seek DPC approval of specific recommendations.

4835T 5/14/87

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UNEP/WG.172/CRP.8/Rev.1
30 April 1987

Original: ENGLISH

Chairman's Draft Control Article

Ad Hoc Working Group of Legal and Technical
Experts for the Preparation of a
Protocol on Chlorofluorocarbons to
the Vienna Convention for the
Protection of the Ozone Layer (Vienna Group)

Third Session
Geneva, 27-30 April 1987

() : []

TEXT PREPARED BY A SMALL SUB-WORKING GROUP OF
HEAD OF DELEGATIONS

ARTICLE II: CONTROL MEASURES

Timing

- 88-90 1. Each party, under the jurisdiction of which CFC 11, CFC 12, CFC 113, (CFC 114, CFC 115) are produced shall ensure that within (2) years after the entry into force of this Protocol the (combined annual production and imports) (combined adjusted annual production) of these substances do not exceed their [1986] level.
- 90-92 2. Each party, under the jurisdiction of which substances referred to in paragraph 1 are not produced at the time of the entry into force of this Protocol, shall ensure that within (2) years from the entry into force of this Protocol (its combined annual production and imports) (its combined adjusted annual production) do not exceed the levels of imports in [1986].
- 92-94 3. Each party shall ensure, that within (4) years after the entry into force of this Protocol levels of substances referred to in paragraph 1 attained in accordance with paragraphs 1 and 2 will be reduced by 20 per cent.
- 94-96
96-98 4. Each party shall ensure that within (6) (a), (8) (b) years after the entry into force of this Protocol, the 1986 levels of substances referred to in paragraphs 1 and 2 will be further reduced (by 30 per cent), (a) (if the majority of the parties so decide,) (b) (unless parties by a two-third majority otherwise decide), in the light of assessments referred to in Article III, such decision should be taken not later than (2) (4) ^{*} years after entry into force.
(a) (6)

90-92
92-94

(in ¶ 4 + low ass gets into a and b)

* group considered that the industry deserves at least a 4yr warning.

5. Parties shall decide by (two-third majority) (a majority vote)
- whether substances should be added to or removed from the reduction schedule
 - whether further reductions of 1986 levels should be undertaken (with the objective of eventual elimination of these substances).

These decisions shall be based on the assessments referred to in Article III.

Note: A second paragraph reading as follows has to be added to Article III. Beginning 1990, every four years thereafter the parties shall review the control measures provided for in Article II. At least one year before each of these reviews, the parties shall convene a panel of scientific experts, with composition and terms of reference determined by the parties, to review advances in scientific understanding of modification of the ozone layer, and the potential health, environmental and climatic effects of such modification.

Tolba expects formal comments on + his paper from the Capitals.

Tolba proposes a limited group consultation near end of June (29-30) in Brussels -- with Capitals' contacts by 19 June.

Small legal groups to put protocol in format July 6-8

Diplomatic conference (Montreal)

8-11 Sept for working groups

14-16 Sept for ministerial conference (Plenipotentiary)

DECLASSIFIED

Authority State Waiver 11/6/15

dr NARADATE 11/25/17

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*Vicki - great job!
BR*

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:

Q's in same order as paper

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

The following information has been ~~distilled from several detailed presentations by experts in each area and lengthy discussion by the Working Group.~~

Summarized by The Working Group after discussion of

Legislative/legal

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.

→ To date legislative action has been restrained by strong opponents of domestic regulations [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 a 20 percent reduction, the legislative outcome is less certain though Congress would undoubtedly hold additional

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hearings to determine the need for further domestic reductions. If, on the other hand, the protocol mandated a freeze plus a 50 percent reduction, it seems likely that any pressure for additional regulation domestically 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. ~~Therefore, without their pushing~~ ^{a strong push from these groups,} additional action, congressional action, at least in the near term, would be unlikely.

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.

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.

Such a depletion would lead to a local cooling of about 5 degrees centigrade with uncertain climatic consequences.

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 relationships 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

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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.

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.

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.

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 occurring 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 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

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which were valued and computed.

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 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 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?

There is inter-agency agreement that international emissions control action is preferable to unilateral domestic control

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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.

The Working Group recommends that the U.S. continue to 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);

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.

While there has been much discussion about the specific terms of a potential protocol, there is no 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.

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

There is inter-agency agreement that a freeze on emissions at 1986 levels should cover all of the important ozone depleting chemicals including the Halons.

Any further reductions should exclude the Halons for national security reasons.

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Note: The Departments of Commerce and Energy question the advisability of requiring further reductions for CFC 113 given its importance to the semi-conductor industry and to the nation's defense.

The Working Group recommends that the delegation seek a freeze on all ozone depleting chemicals including the Halons and CFC 113, and that any further reductions include all important ozone depleting chemicals except the Halons and CFC 113.

4. What emissions control provisions should the delegation seek regarding stringency, timing, future study and implementing mechanisms?

Points of Agreement:

A. All agencies support a freeze, at 1986 levels, on production/consumption of CFCs 11, 12, 113, 114, 115, and Halons 1211 and 1301, to take effect one or two years after the protocol enters into force.

B. All agencies support regularly scheduled assessments of scientific, economic, technological and environmental factors, prior to any emissions reductions, to enable to parties to adjust the reduction schedule and add or subtract chemicals.

Remaining Questions:

A. Should the delegation seek an automatic 20 percent reduction (subject to reversal upon 2/3 vote) to take effect four years after entry into force?

Yes -- EPA, Commerce, Justice - Lands Division, Energy, State, NASA, OPD

No -- OSTP

Other agencies?

B. Should the delegation seek an additional 30 percent reduction to take effect 8 to 10 years after entry into force and after a majority vote affirming the reduction at a designated future time?

Yes -- EPA, Commerce, Justice - Lands, Energy, State, NASA, OPD

No -- OSTP

Other agencies?

C. Alternatively, should the delegation seek the additional 30 percent reduction to take effect 8 to 10 years after entry

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into force automatically unless reversed by a 2/3 vote?

Yes -- EPA, State

No -- Commerce, Justice - Lands, Energy, OMB, OSTP,
OPD, USTR

Other

agencies?

D. Should the delegation seek additional scheduled reductions beyond the cumulative 50 percent reduction achieved through the 20 and 30 percent reductions?

Yes -- EPA and State (even if reductions are automatic unless reversed by 2/3 vote)

No -- OSTP

Allow for future consideration -- Commerce, Justice -
(Lands,) Energy, OMB, OPD
→?

The Working Group recommends that the U.S. delegation seek a freeze at 1986 levels; regularly scheduled assessments of scientific, economic, technological and environmental factors for review in future reduction decisions; a 20 percent reduction to take effect four years after entry into force unless reversed by a 2/3 majority vote; an additional 30 percent reduction to take effect 8 to 10 years after entry into force if affirmed by a positive majority vote of the parties; and allowance for further reductions if confirmed by future majority votes of the parties.

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

There is inter-agency agreement 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.

The Working Group recommends that the U.S. delegation continue to pursue this objective.

6. What should be the U.S. objective regarding participation and voting?

There is inter-agency agreement that there should be the widest possible global participation in the protocol. Limited concessions, such as a grace period for developing countries, may be necessary to gain widespread participation.

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There is also inter-agency agreement that the U.S. delegation should seek to include a system of voting which would give due weight to the currently significant producing and consuming countries.

The Working Group recommends that the U.S. delegation continue to negotiate for widespread global participation and a voting system which would credit the major producing and consuming countries.

widespread
global
participation
and a
voting system

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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

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.

To date legislative action has been restrained by strong opponents of unilateral 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, 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 protocol mandated a freeze plus a 50 percent reduction, it seems likely that any pressure for additional regulation domestically 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.

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 relationships 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 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 freeze included in the protocol), 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 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.

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.

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 occurring 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 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.

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 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 multiplication.

The conclusions of the analysis, which are shown in table form in Appendix _____, 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.

QUESTIONS FOR DECISION

DPC guidance is sought on the following issues.

I. PARTICIPATION IN INTERNATIONAL NEGOTIATIONS

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

*Working Group Recommendation: That the U.S. continues to participate.

2. Should the U.S. delegation continue to negotiate pursuant 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);

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:

A. The U.S. delegation has participated in three negotiating sessions pursuant to the Circular 175. It would not be advisable to alter the authority at this stage of the negotiations.

B. 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:

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

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

Discussion:

Diplomatic considerations favor continuing with the existing Circular 175. The U.S. position, as reflected in the Circular 175 and subsequent position papers, has been presented through three formal negotiating sessions since December, 1986, in numerous public appearances including congressional testimony by senior Administration witnesses, and in private consultations with highest level foreign officials by Secretary of State Shultz, EPA Administrator Thomas and others. Due in large part to these representations, numerous foreign countries have re-examined and modified their own positions in these international negotiations. Given the worldwide and domestic public attention to the ozone issue, reversal now of the substance of this position would be a political embarrassment and would damage U.S. credibility in future international negotiations.

Yet the argument in favor of revising the Circular 175 is that the U.S. position has been refined through the negotiations to the point where there are now essential elements of any protocol the U.S. would ratify. Those favoring revision of the 175 believe that such essential components of a future agreement should be specified for the benefit of the U.S. delegation.

II. FUTURE CONTROL ACTIONS

1. Should the U.S. delegation support regularly scheduled assessments of scientific, economic, technological and environmental factors?

✓ *Working Group Recommendation: The U.S. delegation should support such assessments.

2. Should the U.S. delegation support a freeze, at 1986 levels, on the emissions of ozone-depleting chemicals?

Pro's:

A. The benefits outweigh the costs.

B. A protocol freeze would prompt industry to develop substitutes to ozone-depleting agents.

C. A protocol freeze could prevent a judicially forced stratospheric ozone protection program.

✓ D. A protocol freeze could prevent economically disadvantageous ozone control legislation.

Con's:

A. The scientific data may not support a protocol freeze at this time, but rather, may support deferring any control action until after the completion of the major scientific review scheduled for 1990.

B. On the other hand, a protocol freeze may not be desirable because it may not go far enough toward protecting the ozone layer.

C. Legislators may not believe a freeze is sufficient and may pass stricter control laws.

D. EPA's administrative record supports at least a 20% cut beyond a freeze; the court in the pending litigation may therefore find that a protocol freeze is not sufficient to meet the domestic regulatory requirements of the Clean Air Act.

3. If the protocol provides for an emissions freeze at 1986 levels, what chemicals should it cover?

*Working Group Recommendation: That such a freeze cover CFCs 11,

12, 113, 114, 115, and Halons
1201 and 1311.

OJTP 4. Should the results of the major science review scheduled for 1990 be reviewed prior to a decision on any future control actions beyond a freeze?

Pro's:

A. Future control action decisions would be made with greater scientific certainty than currently exists. This may be advisable given the existing uncertainties and the costs of controls beyond a freeze.

Con's:

A. The same con's apply here as in issue number 4.

B. In addition, the science review in 1990 is not likely to resolve fully the existing uncertainties.

5. Should the U.S. delegation seek an automatic emissions reduction (beyond a freeze)?

Pro's:

A. An automatic reduction beyond a freeze would spur industry to develop substitutes to ozone-depleting chemicals as soon as possible.

B. An automatic reduction beyond a freeze would most likely prevent judicially or legislatively imposed emissions controls.

C. Since a true global freeze is not possible to achieve, additional automatic reductions may be justified as necessary to counter-balance the growth in emissions from non-participants or developing countries.

Con's:

A. There is scientific uncertainty as to the necessity of an automatic reduction beyond a freeze.

B. An automatic reduction beyond a freeze may send too harsh an incentive to industry.

↳ depending on period of time

5-a. If the protocol includes an automatic reduction beyond a freeze, should it be a 20% reduction (as provided for in the Chairman's text)?

Pro's:

A. A 20% reduction could be accomplished under currently available industrial processes.

Con's:

A. The marginal benefits of the additional 20% reduction are not in all cases in excess of the marginal costs.

5-b. If the protocol includes an automatic 20% reduction beyond a freeze, should it take effect 4 years after entry into force (as provided in the Chairman's text)?

5-c. If the protocol includes an automatic reduction beyond a freeze, what chemicals should it cover?

5-c-(1). Should it cover CFCs 11 and 12?
*Working Group Recommendation: CFCs 11 and 12 should be included.

5-c-(2). Should it cover CFC 113?

5-c-(3). Should it cover CFCs 114 and 115?

5-c-(4). Should it cover Halons 1201 and 1311?

6. In addition to the agreed upon scheduled reductions, should the delegation seek a process to be provided as part of the protocol for the parties to agree to subsequent control actions based on the future STEE assessments?

7. Should the U.S. delegation seek a reduction beyond a freeze plus an automatic 20% reduction?

7-a. If so, should it be an additional 30% reduction as

provided in the Chairman's text?

7-b. If so, should it take effect 6-8 years after entry into force as provided in the Chairman's text?

7-c. If so, what chemicals should it cover?

7-d. If so, how should this additional reduction take effect -- automatically unless reversed by a 2/3 vote of the parties, or only upon positive confirmation by a majority vote of the parties occurring at a designated future date?

8. Should the delegation seek any additional reductions beyond the freeze plus 20% and plus 30%? If so, on what terms (stringency, timing, implementational mechanism)?

III. PARTICIPATION AND TRADE PROVISIONS

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

Discussion:

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.

*Working Group Recommendation: That the U.S. delegation continue to negotiate for as broad a level of participation as possible, and for protocol incentives to future

participation.

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

*Working Group Recommendation: 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?

Discussion:

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.

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Authority *Helt Weaver*

DATE *1/25/2017*
NARADATE

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

The following information has been distilled from several detailed presentations by experts in each area and lengthy discussion by the Working Group.

Legislative/legal

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.

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 a 20 percent reduction, the legislative outcome is less certain though Congress would undoubtedly hold additional

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hearings to determine the need for further domestic reductions. If, on the other hand, the protocol mandated a freeze plus a 50 percent reduction, it seems likely that any pressure for additional regulation domestically 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. Therefore, without their pushing additional action, congressional action, at least in the near term, would be unlikely.

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.

In contrast, a true global freeze of the sum of worldwide emissions 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).

Based on epidemiological and ecological studies, dose-response relationships 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

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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.

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.

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.

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 occurring 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 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

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which were valued and computed.

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 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 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?

There is inter-agency agreement that international emissions control action is preferable to unilateral domestic control

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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.

The Working Group recommends that the U.S. continue to 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);

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.

While there has been much discussion about the specific terms of a potential protocol, there is no 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.

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

There is inter-agency agreement that a freeze on emissions at 1986 levels should cover all of the important ozone depleting chemicals including the Halons.

Any further reductions should exclude the Halons for national security reasons.

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Note: The Departments of Commerce and Energy question the advisability of requiring further reductions for CFC 113 given its importance to the semi-conductor industry and to the nation's defense.

The Working Group recommends that the delegation seek a freeze on all ozone depleting chemicals including the Halons and CFC 113, and that any further reductions include all important ozone depleting chemicals except the Halons and CFC 113.

4. What emissions control provisions should the delegation seek regarding stringency, timing, future study and implementing mechanisms?

Points of Agreement:

A. All agencies support a freeze, at 1986 levels, on production/consumption of CFCs 11, 12, 113, 114, 115, and Halons 1211 and 1301, to take effect one or two years after the protocol enters into force.

B. All agencies support regularly scheduled assessments of scientific, economic, technological and environmental factors, prior to any emissions reductions, to enable to parties to adjust the reduction schedule and add or subtract chemicals.

Remaining Questions:

A. Should the delegation seek an automatic 20 percent reduction (subject to reversal upon 2/3 vote) to take effect four years after entry into force?

Yes -- EPA, Commerce, Justice - Lands Division, Energy, State, NASA, OPD

No -- OSTP

Other agencies?

B. Should the delegation seek an additional 30 percent reduction to take effect 8 to 10 years after entry into force and after a majority vote affirming the reduction at a designated future time?

Yes -- EPA, Commerce, Justice - Lands, Energy, State, NASA, OPD

No -- OSTP

Other agencies?

C. Alternatively, should the delegation seek the additional 30 percent reduction to take effect 8 to 10 years after entry

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into force automatically unless reversed by a 2/3 vote?

Yes -- EPA, State

No -- Commerce, Justice - Lands, Energy, OMB, OSTP,
OPD, USTR

Other agencies?

D. Should the delegation seek additional scheduled reductions beyond the cumulative 50 percent reduction achieved through the 20 and 30 percent reductions?

Yes -- EPA and State (even if reductions are automatic unless reversed by 2/3 vote)

No -- OSTP

Allow for future consideration -- Commerce, Justice - Lands, Energy, OMB, OPD

The Working Group recommends that the U.S. delegation seek a freeze at 1986 levels; regularly scheduled assessments of scientific, economic, technological and environmental factors for review in future reduction decisions; a 20 percent reduction to take effect four years after entry into force unless reversed by a 2/3 majority vote; an additional 30 percent reduction to take effect 8 to 10 years after entry into force if affirmed by a positive majority vote of the parties; and allowance for further reductions if confirmed by future majority votes of the parties.

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

There is inter-agency agreement 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.

The Working Group recommends that the U.S. delegation continue to pursue this objective.

6. What should be the U.S. objective regarding participation and voting?

There is inter-agency agreement that there should be the widest possible global participation in the protocol. Limited concessions, such as a grace period for developing countries, may be necessary to gain widespread participation.

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There is also inter-agency agreement that the U.S. delegation should seek to include a system of voting which would give due weight to the currently significant producing and consuming countries.

The Working Group recommends that the U.S. delegation continue to negotiate for widespread global participation and a voting system which would credit the major producing and consuming countries.

widespread
global
participation
and a
voting system

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Vicki - Final

RCB's
6/10
2:00 am!

June 10, 1987

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 protocol restricting ozone depleting chemicals?

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

Climatic and Atmospheric

- o Since 1960 the natural variability of the total global column of ozone has been about 3%.
- o 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 total 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.
- o 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 on emissions of CFCs and Halons (i.e. full international participation and compliance) 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.
- o A true global freeze would limit column ozone depletions to less than the natural variability. A protocol ~~resulting in~~ ^{freeze} less than full compliance among developed countries and ^{with}

allowing for ^{and where} substantial growth in CFC usage, in developing countries, would fall far short of a true global freeze. ✓

- o 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.

o While ^{used to} theoretical models simulate the present atmosphere quite well, they are not perfect, and there is a factor of two to three uncertainty ^{in the} on their predictive abilities. ^{of the}

- o 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 and Ecological Effects

ultraviolet radiation

- o Projected ozone depletion will increase health effects of (UVB).

-- Without ozone depletion, projections show UVB is a serious problem, and will cause:

- 2,977,000 skin cancer deaths of Americans born before 2075,
- 165 million skin cancer cases,
- 426,516,000 cataracts.

-- Without a protocol, an ozone depletion of 2% ^{if the predicted} is expected in 2075. This would increase UVB related health effects by:

- 2 million additional skin cancer deaths,
- 98 million additional skin cancer cases,
- 43 million additional cataracts.

-- A freeze would decrease ^{if stratospheric} ozone depletion to 7.7% and avert ^{of} ^{occurs instead, a} ^{as predicted} UVB damage ^{to result from a} ^{protocol freeze with less than}

- 1.6 million additional American deaths would be averted,
- 79 million additional cases would be averted.
- 32 million cataracts would be averted.

-- A 20% emissions reduction protocol would decrease ^{if} ozone depletion to 6.1% and avert ^{of} ^{occurs additional} ^{stratospheric} additional damage.

- 80,000 American deaths would be averted over a freeze,
- 4 million additional skin cancer cases would be averted over a freeze, ^{additional}
- 2 million cataracts would be averted over a freeze.

-- A 50% global protocol would reduce depletion to 3.2% decreasing damage even more.

stet. →

(as predicted to result from a 20% emissions reductions protocol with less than full participation and limited emissions growth in developing countries.)

(as predicted to result from a protocol freeze with less than full participation and limited emissions growth in developing countries)

-- If stratospheric depletion of 3.2% occurs, (as predicted to result from a 50% protocol emissions reduction, with less than full participation and limited emissions growth in developing countries),

(U.S.)

- 130 thousand additional American deaths would be averted, over a 20% protocol,
- 7 million additional skin cancer cases would be averted, over a 20% protocol,
- 7 million additional cataracts would be averted, over a 20% protocol.

-- Uncertainties include future ozone depletion, the action spectra and estimates of dose-response coefficients.

- the analysis assumes no behavioral changes

- Considering quantifiable uncertainties, there is a 50% chance that the actual damages will be between 50% and 125% of the above estimates.
- There is a 90% chance that the actual damages will be between 20% and 260% of the above estimates.

Laboratory studies link

-- UVB would suppress the immune system.

- Evidence suggests a relationship to infectious disease.
- A relationship has been demonstrated in herpes simplex and the tropical disease, leishmanias.

o Evidence supports the conclusion that ozone depletion would exacerbate existing environmental problems.

-- Photochemical air pollution in places like Los Angeles would probably worsen.

-- The lifetime of outdoor plastics and latex paints would be shortened.

o Evidence supports the conclusion that ozone depletion could seriously influence crops and aquatics.

-- Knowledge is limited, but experimental data indicate crop production may be reduced and ecosystems disturbed.

-- Field experiments have not been done, but laboratory data indicate aquatic organisms are sensitive to higher UVB, especially during critical breeding seasons.

o Higher emissions of CFCs and its indirect effects of vertical ozone re-distribution will raise global temperatures and change climate.

Cost/Benefit

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

o 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.

- o 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.
- o The 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.
- ~~o The analysis assumes increasing noncompliance with protocol over time; it is, however, likely that an effective protocol will encourage the replacement of controlled chemicals with substitutes as they become available.~~

o Conclusions:

-- The economic benefits from a protocol freeze (at 1986 levels with less than full international participation) of CFC emissions are substantially greater than the costs over all plausible assumptions and ranges of uncertainty.

-- The economic benefits of a protocol freeze plus a 20% 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 an additional 30% reduction (beyond the freeze plus 20% reduction) appear in some cases to be greater than the incremental costs, and in other cases to be less. Further scientific, technical, and economic review will be valuable in evaluating benefits and costs before implementing this step.

ISSUES AND DISCUSSION

At the May 20 Council meeting, the status of the international ozone negotiations was provided. It included a review of the November 28, 1986 Circular 175, which was approved by Under Secretary of State Allen Wallis, and which authorized the U.S. delegation to negotiate a protocol. The approval process for the Circular 175 has been criticized by some members of the Working Group, on the basis that numerous departments and agencies had not concurred on the Circular, or that concurrence was by individuals not at policy-making levels. The 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%), 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.

✓ The international negotiations to date have resulted in a Chairman's Text for which negotiating countries have been asked to review and submit views. *respond.*

to a proposed protocol to which
The Working Group recommends that the Council support continuation of negotiations pursuant to the current Circular 175. The Working Group also recommends however, that additional guidance be given to the U.S. negotiators, based on reviews by a wider range of agencies such as those represented on the Council.

The following are issues for which the Working Group feels additional guidance to the negotiators may be appropriate.

A. PARTICIPATION AND TRADE PROVISIONS

There are many complex issues pertaining to fair trade provisions and participation of developing countries in the protocol.

1. What should be the U.S. position regarding international participation in the protocol?

The Working Group feels that the U.S. delegation should seek maximum international participation in the protocol. To many, participation is the key issue, because growth of emissions from non-participating countries would offset the emissions reductions of those who are parties to the protocol, thereby hindering overall attainment of protocol objectives.

✓ Developing countries are an important part of the participation issue. The U.S. and the United Nations Environment Program (UNEP) have expended considerable effort 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 could prevent them from profiting through international trade with protocol parties. *non-parties*

from exporting to other non-parties

if the protocol provided for trade sanctions

✓ A strong protocol, including the major producing and consuming countries, should lead to earlier development of substitute products, and might discourage non-joiners from investing heavily in CFC technology that would not generate trade with parties to the protocol. Further, the very existence of a protocol, as an

Some believe that

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 following options are proposed for the Council's consideration:

- a. Give the U.S. delegation discretion for seeking maximum participation.
- b. Develop criteria for acceptable levels of participation, e.g. minimum participation of countries producing a specified percentage of the total global CFC/Halon production; or a formula requiring minimum participation of countries accounting for a specified portion of the world population.
- c. Wait to reassess the U.S. position after we know the extent of participation by other countries.

To encourage the participation of developing countries, some parties favor granting developing countries a limited grace period from compliance with protocol provisions. Such a grace period would be allowed in recognition of the importance of having global participation in the 21st century, and in recognition of the fact that developing countries have not received the benefits of CFC and Halon use. The length of the grace period and the levels of production/consumption that would be permitted are questions that would need to be resolved.

2. Voting among parties to the protocol.

Also at issue is the voting process for making future decisions under the protocol. This could include decisions on future reductions. The Working Group recommends that the U.S. delegation negotiate for a system of voting which would give due weight to the major producing and consuming countries.

3. The control formula and trade provisions?

The Working Group recommends that the Council direct the U.S. delegation to continue to 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 stimulation of substitutes and innovative emission controls.

(~~but~~ with no greater restraints on U.S. trade than will be adopted and enforced by other nations)

Trade:

The U.S. has pushed for a strong protocol article on trade sanctions to be imposed on parties which have not signed the protocol. This would limit imports not only of the controlled chemicals but also of products containing these chemicals (e.g., air conditioners or foam insulation). The U.S. has pushed for a study of the feasibility of limiting imports of products

manufactured using the controlled chemicals (e.g., electronic equipment). The intent of the trade article would be to provide a "stick" for encouraging others to join and to limit the impact on ozone depletion and the transfer of commercial benefits from parties to the protocol to countries which have not joined.

This would represent a major policy decision, as it could be an important precedent for using trade sanctions to enforce environmental regulations. Also to be decided is whether trade sanctions should be applicable to parties who materially violate their protocol obligations.

Control Formula:

4. Should the U.S. seek protocol provisions for reporting, monitoring, verification and enforcement provisions.

Since it is not possible to measure emissions directly, the negotiators have explored alternative formulas to control emissions which consider production, consumption, imports and destruction. ~~This is only one of the many complex issues~~ relating to enforcement of a protocol. A system of on-site inspections for the presence of new or expanded CFC-producing facilities would be expensive and probably ineffective because of the large land areas involved. *There are*

Some Working Group members believe the U.S. should insist upon strong monitoring and reporting provisions in a protocol. Some favor the U.S. negotiating for strong provisions, and exploring the feasibility and cost effectiveness of establishing ad hoc inspection teams to investigate any alleged violations of protocol requirements. Trade provisions could at least prevent entry of such production into international trade with parties to the protocol.

Because of the enforcement roles of EPA and U.S. environmental groups, our compliance with the protocol is apt to be substantial. Most other nations do not have such enforcement mechanisms. No monitoring or verification system has been identified to date.

The following options are presented for the Council's consideration:

- a. Give the U.S. delegation discretion for seeking such provisions.
 - b. Insist that the protocol include such provisions.
5. Should the U.S. attempt to receive "credit" for its 1978 unilateral voluntary ban on CFC-producing non-essential aerosols?

Some believe that in addition to a freeze, other nations should ban non-essential aerosols as the U.S. did in 1978. Otherwise, many nations might be able to meet their obligation to reduce CFC emissions through the simple expedient of banning such aerosols,

while the U.S. is required to cut back on other products using CFCs. One form of recognition may be to require other countries to ban non-essential aerosols in addition to meeting other protocol requirements.

The U.S. attempted unsuccessfully to get such credit two years ago during the negotiation of the Vienna Convention on the ozone layer, and some believe that if the U.S. were to insist upon such credit as a condition of a protocol, the negotiations would come to a standstill as in 1985. Some argue that even with the aerosol ban, the U.S. remains responsible for most of the long-lived CFCs in the stratosphere, and the U.S. per capita CFC consumption is still the world's highest.

The Working Group recommends that the Council consider and provide guidance for the U.S. delegation as to whether or not we should attempt to gain credit for our previous actions.

B. AN EMISSIONS CONTROL PROTOCOL

The aforementioned Chairman's Text contains proposals related to (1) a freeze on emissions, and (2) emissions reductions beyond a freeze. The Working Group discussed these at length.

1. A Freeze on Emissions. The following are major questions:

a. What chemicals should the freeze cover?

The Chairman's Text provides for a freeze on emissions at 1986 levels which would cover CFCs 11, 12, 113, 114, and 115. Due to a technicality, Halons are not now included.

The Working Group consensus is that the freeze should include all of these CFCs as well as Halons 1201 and 1311. The U.S. delegation will be seeking to expand the protocol to include the Halons.

From a purely scientific perspective all chemicals containing chlorine and bromine, weighted by the ozone depleting potential, should be considered for the protocol, both for the freeze and for potential future reductions. The Chairman's Text is somewhat less than a purely scientific perspective because only the fully halogenated chemicals (CFCs 11, 12, 113, 114 and 115, and Halons 1201 and 1311) are being considered for inclusion. Chemicals such as CFC 22 and methyl chloroform which are only partially halogenated are not being considered as they are believed to be part of the solution and have relatively low ozone depleting potential.

Concern has been raised with regards to reductions in Halons 1201 and 1311 and CFC 113 because of their strategic value to the U.S., and the apparent lack of suitable substitutes. This is a legitimate concern but one that can be handled if controls are on

the sum of the ozone depleting potential of all chemicals, rather than on individual substances. This will allow each individual country the flexibility to live within the internationally agreed protocol with the least interference on how a country wants to implement the protocol.

b. When should a freeze on emissions occur?

The Chairman's Text proposes that the freeze take effect within two years of entry into force. There is uncertainty as to when entry into force will occur, but the best estimate is that it will be in the 1988-90 time period. The Working Group consensus is that a freeze on emissions should go into effect within one to two years after entry into force of the protocol.

2. Reductions Beyond a Freeze

a. What chemicals should the reductions cover?

The Chairman's Text proposes that the additional reductions beyond a freeze include CFCs 11, 12, 113, 114 and 115. The Working Group consensus is that any additional reductions should cover CFCs 11 and 12; however, there are questions about the coverage of CFCs 113, 114, 115, and Halons 1201 and 1311.

National security concerns argue against including the Halons in any reductions. There is also a national defense and security concern with including CFC 113 in any reductions beyond a freeze, especially given 113's importance for certain high-technology electrical applications. The questions regarding coverage of CFCs 114 and 115 concern their potential use as substitutes for controlled chemicals and their present low usage.

b. How much and when?

The Chairman's Text provides for a 20% reduction to take effect 4 years after entry into force (1992-94) and an additional 30% reduction to take effect either 6 years (1994-96) or 8 years (1996-98) after entry into force.

The Working Group identified distinct issues surrounding each potential reduction. With respect to the 20% reduction, some favor it because it can be accomplished with existing industrial processes and because reductions beyond a freeze may be needed to counterbalance less than full participation in a freeze. Yet others note there are uncertainties as to the need for any additional reductions.

Regarding the additional 30% reduction, some favor its inclusion on the basis of judgements about the science and potential adverse health effects. Others emphasize, however, the uncertainties about the need to commit at this time to this additional measure. One or more scientific reviews would be available prior to this reduction going into effect.

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With respect to any future reductions, the Working Group believes

the future assessments of science, technology, economics, and environment will be considered

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The Working Group recommends that the Council discuss and provide guidance on whether the U.S. position is to support:

1. a. A 20% reduction beyond a freeze.
2. b. An additional 30% reduction.
3. c. Additional reductions beyond 50%.

Most believe the future assessments of the science, technology, economics and environment are important to the future reduction decisions.

c. Should the reductions be automatic (subject to reversal by a 2/3 vote) or contingent upon a positive vote of a majority of the parties?

The Chairman's Text proposes an initial 20% reduction to take effect automatically (implicitly reversible by a 2/3 vote).

The Text provides two alternative implementing mechanisms for the next 30% reduction -- 6 years after entry into force if the majority of the parties so decide, or 8 years after entry into force unless reversed by a two-third majority of the parties.

There are strong views in the Working Group on the implementing mechanism for the additional 30% percent reduction. Many do not wish to commit to the reduction at this time unless it is contingent upon a positive vote of a majority of the parties. Others, however, believe the evidence warrants committing to this reduction at this time.

The Working Group recommends that the Council provide guidance on whether the U.S. should support automatic reductions of:

1. a. 20% beyond the freeze.
2. b. an additional 30%.

C. ISSUES FOR LATER CONSIDERATION

The Working Group ^{identified} ~~briefly discussed~~ several related issues that will require further consideration. They include:

1. The relationship between international protocol and domestic regulations. Since the overall objective of the protocol is to avoid or reduce health and environmental risks, compliance with the international protocol will necessarily result in domestic regulation. There is legal precedence for such a linkage between international agreements and subsequent domestic regulations.

2. Non-Regulatory Approaches. There is no reason why the Nation's efforts to achieve the objectives sought in the protocol should be limited to a regulatory approach. The suggestion has been made that if the government imposes such regulatory burdens upon the people and the economy of the U.S., consideration should

also be given to policies which may ease the regulatory burdens, including, but not limited to, possibly rendering unnecessary imposition of regulations beyond those necessary to assure U.S. compliance with the international protocol.

Such a domestic, non-regulatory supplement to the international protocol might, for example, contain elements intended to eliminate government barriers to, or facilitate, the development of: substitutes for covered chemicals, technology to mitigate or eliminate the adverse effects of chemical emissions upon stratospheric ozone, or medical advancements in the understanding and treatment of the problems caused by ozone depletion.

(NOTE: This paper ~~to~~ attempts to portray the ^{gen'l} flavor of the WG discussions on this very complex issue. It was impossible to incl all of the inpt comments contrib'd by ~~partic'g~~ rep's of the partic'g ag's.