United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520
February 12, 1987

MEMORANDUM

TO: U.S. Members of BACG

OES - Ambassador Negroponte
OES/E - Mr. Benedick
DOA - Dr. Philpot
DOE - Ms. Walker
DOE - Mr. Wampler
DOE - Mr. Bauer
DOE - Mr. Williams
DOI - Mr. Smith
EPA - Mr. Green
EPA - Mr. Potter
EPA - Mr. Kleveno
DPC - Mr. Harris
NAPAP - Dr. Kulp
OMB - Mr. Gibbons
NSC - Mr. Cobb
NOAA - Mr. Spradley
DOJ- Mr. Hookano
CEQ - Ms. Schafer
EUR - Mr. Bodde
EUR/CAN - Mr. Riley
L/OES - Ms. Kennedy
OES/ENH - Mr. Fitzgerald

FROM: OES/ENH: John H. Rouse

SUBJECT: U.S.-Canada Bilateral Advisory and Consultative Group on Transboundary Air Pollution (BACG)

Attached is a copy of the U.S. draft of the joint BACG report to principals which it was agreed would be completed before the April 5-6 summit. This is a working draft representing the combined efforts of DOE, EPA and OES. We plan to exchange drafts with Canada in the next few days.

If you have any comments, please let me know ASAP. The draft does not reflect the policy review currently underway, as this would be premature. Although several areas will need updating, we believe drafts should be exchanged now to facilitate coordination. Note that the text is factual, without conclusions or recommendations, and coverage is limited essentially to progress in implementation of the Envoys' recommendations. It was thought that this approach would be most appropriate and useful.

Discussion of the report will be a central item on the agenda of the next BACG meeting with Canada. We also plan to give to the Canadians at that time EPA's study of U.S. clean air legislation mandated by the Envoys, and receive their report. A full agenda for the meeting will be distributed shortly.

The BACG will meet in Ottawa on February 25. If you plan to participate, please let me know immediately so we can make hotel reservations and complete the delegation. Recommended air transportation is as follows:

Tuesday, February 24

6:50 p.m. depart National on Peidmont 921 (city pair carrier)

9:14 p.m. arrive Ottawa (via Syracuse)

Wednesday, February 25

3:40 p.m. depart Ottawa on Piedmont 920

6:14 p.m. arrive National Airport

As Ambassador Negroponte will be away from the office February 19-23, a meeting of the U.S. delegation has been scheduled for 10:00 a.m. on Tuesday, February 24 in the Department in Room 4825. Please telephone to confirm your attendance.

Attachments as stated.
Wang No. 2757T

Report of the Canada - U.S. Bilateral Advisory and Consultative Group on Transboundary Air Pollution

[Date]

N.B.: THIS IS A WORKING DRAFT WHICH IS NEITHER COMPLETE NOR FULLY CURRENT. ADDITIONS AND REVISIONS ARE TO BE EXPECTED. THE DRAFT IS BEING CIRCULATED AT THIS TIME IN ITS PRESENT FORM TO AVOID DELAY AND FACILITATE PROGRESS AS FAR AS IS PRACTICABLE.

For Canada:

Donald J. Campbell
Assistant Deputy Minister
United States Branch
Department of External Affairs

For the United States:

John D. Negroponte
Assistant Secretary
Bureau of Oceans and
International Environmental
and Scientific Affairs

Table of Contents

I. INTRODUCTION

This report to governments by the Canada-U.S. Bilateral Advisory and Consultative Group (BACG) summarizes the work of the BACG and relevant developments and activities in both countries regarding implementation of the recommendations of their Special Envoys on acid rain during the period March 1986-March 1987. The report is submitted to provide information which may be of assistance in discussion of the issue of transboundary acid deposition in connection with the annual summit meeting between President Ronald Reagan and Prime Minister Brian Mulroney scheduled to take place in Ottawa, April 5-6, 1987.

A. Origin and Objectives of the BACG

On March 17, 1985, the President and Prime Minister appointed Special Envoys to assess the international environmental problems associated with transboundary air pollution and to recommend actions that would help solve them. On March 19, 1986, the President and Prime Minister fully endorsed the Envoys' Report and agreed to keep the acid rain issue on the agenda of their annual summit meetings.

In their report, the Special Envoys recommended that

> "Our two governments should establish a bilateral advisory and consultative group on transboundary air pollution. Such a group, comprising both diplomatic and environmental management officials, should provide the forum for discussions and first-level consultations on issues related to transboundary pollution. It should also provide advice to the directors of each country's environmental programs and to the Secretary of State and Secretary of State for External Affairs."

The Bilateral Advisory and Consultative Group (BACG) was established pursuant to this recommendation.

The two governments agreed that the BACG would be chaired by officials of their foreign affairs departments and include representatives of government entities in each country with acid rain responsibilities. The U.S. section of the BACG was established under the chairmanship of the Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs. Members of the U.S. section include representatives of the Departments of Agriculture, Energy, Interior, Justice and State and the Council on Environmental Quality, the Domestic Policy Council, the Environmental

Protection Agency, The National Acid Precipitation Assessment Program, National Oceans and Atmospheric Administration, National Security Council and Office of Management and Budget. The Canadian section was organized under the chairmanship of the Assistant Deputy Minister, United States Branch, Department of External Affairs and includes representatives from the Departments of External Affairs and Energy, Mines and Resources, Environment Canada and the Provinces of Ontario and Quebec.

B. First Year Work Program

The BAGC has met three times: first in Ottawa on June 18, 1986, second in Washington on December 17 and third in Ottawa on February 25, 1987. During this period, the BAGC has concentrated its efforts on monitoring and facilitating implementation of the Envoys' Report as the agreed framework for bilateral acid rain cooperation. The meetings have reviewed progress in each area recommended by the Special Envoys and have provided the forum for the two sides to air concerns, address differences and resolve problems. Between the meetings of the BACG the chairmen have maintained contact to monitor progress, and active interchanges initiated or underway between counterpart agencies in the two countries have been maintained. Aspects of the acid rain issue have also been discussed and been the subject of correspondence on several occasions at the political level and between the respective Secretaries of State and heads of environmental agencies. Succeeding sections of this report review the status of each of the Envoys' recommendations in more detail.

II. IMPLEMENTATION OF THE ENVOYS' RECOMMENDATIONS

A. Innovative Control Technologies

1. United States Activities

a. Technology Demonstration Program.

The Special Envoys concluded that: "If the menu of control options were expanded, and if the new options were significantly cheaper yet highly efficient, it would be easier to formulate an acid rain control plan that would have broader public appeal." They recommended:

> "Therefore, the U.S. government should implement a five-year, five-billion-dollar control technology commercial demonstration program. The federal government should provide half the funding - 2.5 billion dollars - for projects which industry recommends, and for which industry is prepared to contribute the other half of the funding.

Because this technology demonstration program is meant to be part of a long-term response to the transboundary acid rain problem, prospective projects should be evaluated according to several specific criteria. The federal government should co-fund projects that have the potential for the largest emission reductions, measured as a percentage of SO_2 or NO_x removed. Among projects with similar potential, government funding should go to those that reduce emissions at the cheapest cost per ton. More consideration should be given to projects that demonstrate retrofit technologies applicable to the largest number of existing sources, especially existing sources that, because of their size and location, contribute to transboundary air pollution. In short, although the primary purpose of the research program is to demonstrate the kinds of technologies that would be needed for any future acid rain control program, it should also result in some near-term reductions in U.S. air emissions that affect Canadian ecosystems.

Furthermore, special consideration should be given to technologies that can be applied to facilities currently dependent on the use of high-sulfur coal. Because the scrubbers currently available to clean high-sulfur coal are very expensive, there is an economic incentive for sources to switch to low-sulfur coal as a method of reducing emissions. However, switching imposes significant socio-economic costs on high-sulfur coal-miners, their families, and their communities. The commercial demonstration of innovative technologies that clean high-sulfur coal will help to reduce the economic consequences of any future acid rain control program."

As the White House statement of March 19, 1986 endorsing the Envoys' Report emphasized, the Envoys' recommendation for a jointly funded U.S. commercial demonstration program was made in the context of the very extensive clean coal technology program (CCTP) already underway. The U.S. side judged that until the selection of demonstration projects under the $400 million first phase of the CCTP had been made and an inventory of the many related federal, state and private research and demonstration efforts underway or in planning had been completed, it would be premature and potentially wasteful to embark upon new federal demonstration efforts. Consequently during this initial period, U.S. implementing actions have focussed on identifying and advancing existing efforts which support the technology demonstration recommendation.

The U.S. programs that are currently underway in FY-86 or planned to be initiated by FY-90 and that contribute to research, development and demonstration (RD&D) of control

technologies to reduce SO_2 and NO_x were surveyed. Table 1 provides a compilation of these U.S. programs. Of the total of $6.8 billion anticipated to be applied from FY-86 to FY-92 over $2.0 billion are associated with projects or programs that have been identified since the Envoys' Report was released.* The U.S. government's contribution to the $6.8 total is $2.6 billion ($2.3 federal and $.3 from the states). Projects that are planned to demonstrate technical and economic attributes of control technologies that appear ready for commercial deployment during this period comprise the larger fraction of the identified funds, $5.5 billion.

The major federal demonstration programs have been compared to the project criteria proposed by the Envoys. A number of the projects were selected (or were in the selection process) prior to acceptance of the Report. Further, the Congress in appropriating funds, has included project selection criteria. Hence, few of the programs exactly match the scope and emphasis of criteria proposed by the Envoys. However, the thrust of all of the programs considered in the table is:

- o improved reduction and cost-effectiveness of sulfur dioxide and/or nitrogen oxides emissions for in stationary emission sources;
- o application to a wide range of coal ranks, including high sulfur coals;
- o application to existing facilities by retrofitting or repowering (many also have application for controlling emissions of future plants);
- o application to all sizes of emissions sources.

In addition to phase 1 of the Clean Coal Technology Program supported by Federal appropriations made at about the time of the Envoys' Report, the U.S. government has since added three new initiatives: the FY-87 acid-rain-related Control Technologies R&D budget, the FY-88 acid-rain-related Control Technologies R&D budget, and Phases 2 and 3 of the CCTP (CCTP-2 and CCTP-3) proposed in January 1987. These follow-on CCTP programs call for expenditure of $350 million in federal funds to be at least matched by funds from other sources. In response to a solicitation of interest in November 1986 to determine the level of interest and the technologies that potential private groups would support for a commercial demonstration of systems to retrofit, repower and modernize existing coal-using facilities, 137 project proposals have

*[The totals cited in this section and the attached table are those discussed with Canadian officials in January 1987. Some of these figures will require adjustment based on additional information received, but for purposes of draft review and reconciliation it was thought that changing totals would only create confusion.]

been submitted by the private sector and states. These proposals are currently being analyzed. The results of this solicitation will guide the specifications of CCTP-2 and CCTP-3 subject, of course, to appropriations by the Congress.

Other new initiatives for expanding the menu of practical control technologies have been established by state governments, industry associations and private groups. Within the $6.8 million dollar tabulation, five states have programs. These programs are Illinois, (established in 198__), Kentucky ( ), New York ( ), Ohio (1986) and Pennsylvania ( ), cooperating with CCTP and private endeavors. Because many of these initiatives are in early stages, the full amount of funding cannot be identified. Generally, private funds appear to be considerably greater than the state funds.

Appropriate projects in both R&D and demonstration projects are carried out by industry research institutes such as the Electric Power Research Institute (EPRI) and the Gas Research Institute (GRI). EPRI is involved in several of the demonstrations that also receive federal support and also five demonstrations or demonstration test facilities that include no federal funds. Both institutes are carrying on multi-year R&D programs.

The inventory of relevant clean air research demonstration projects has been reviewed by officials of the Government of Canada. Their initial appraisal is that about $5.3 billion of the projected expenditures meet one or more of the Envoys' criteria and approximately $1.7 billion of the expenditures appear to meet most of the Special Envoys' technical criteria. Project information is still being developed by the U.S. side, and consultations concerning the program are continuing.

Table 1

1986-1992

U.S. Programs Related to the Innovative Controls Initiative *

Projects With Federal Funds	$MM	FY	Remarks
DOE and EPA Research	690	86-92	
DOE CCTP-1	995	86-88	9 projects in negotiation.
DOE CCTP-2	300 (min)	88-89	proposed in FY-88 budget
DOE CCTP-3	400 (min)	90-92	projected in FY-88 budget
Other DOE Demos	436	86	Kilngas and TVA AFB
EPA Demos	61	86-88	LIMB
Other TVA Demos	43	86 ?	
Dept. of Treasury	1098	86 ?	Coolwater and Dow
TOTAL	4023		
Projects with No Federal Funds			
Other State Programs	272 (+)	86-?	IL, IN, NY, OH, PA
EPRI Research	289	86-89	
GRI REsearch	40	86-89	
Other EPRI Demos	353	86-?	5 projects
Other Private Demos	1853	86-?	
TOTAL	2820 (+)		
GRAND TOTAL	6833		
Federal Funds	2261		
State Funds	343		
Private Funds	4229		

* These numbers are preliminary numbers shared with staff of Environment Canada on January 7, 1987. Subsequent revisions have occurred and are continuing. Updated values will be provided in the draft for consideration a the 25 February BACG meeting.

b. Innovative Controls Panel

To oversee the U.S. technology demonstration effort the Special Envoys made the following recommendation:

> We further recommend that a panel, headed by a senior U.S. cabinet official, be established to oversee this research demonstration program and select the projects to be co-funded by the federal government. The U.S. Environmental Protection Agency and Department of Energy should provide the technical expertise necessary to select demonstration projects. Other members of the panel should be drawn from the Department of State and state governments. Canada also should be invited to send a representative to sit on this panel.

After detailed analysis, the U.S. Government has concluded that it cannot implement in a timely and effective manner the recommended oversight panel, as proposed. Under existing U.S. statutory and regulatory authority it is not possible for the panel to be responsible for direct project selections as recommended. Panel alternatives reviewed, including an advisory committee under the Federal Advisory Committee Act, a panel composed solely of U.S. federal officials, and a more directly bilateral entity, all raised significant problems of structure and responsibility casting doubt on the practicability and utility of the approach.

In view of these difficulties, the BACG has agreed, initially at least, to the establishment of a bilateral consultative mechanism which it is believed will most effectively preserve the apparent central objective of the Envoys that U.S. commercial demonstration efforts be developed and carried out with the recommendations of the Special Envoys clearly in mind.

The consultative mechanism agreed upon will assure that the Government of Canada is kept currently apprised of relevant developments within the United States and has the opportunity regularly to make its views known for consideration within the planning, program development and project selection processes of the U.S. Government related to commercial demonstration of innovative control technologies. The agreed arrangements call for scheduled meetings between senior officials of the Government of Canada and senior USG officials responsible for management of innovative technology demonstration efforts to review details and status of all such programs underway and in planning.

2. Canadian Activities

(to be furnished by GOC)

B. Co-operative Activities

Recognizing "the need to put in place mechanisms to help both governments deal with this issue in such a way that differences are not exaggerated and opportunities for cooperation seized" the Envoys made two recommendations concerning each country's domestic legislation and regulations and two recommendations concerning bilateral consultation and information exchange.

1. Domestic Legislation and Regulations

a. "Both the United States and Canada should review their existing air pollution programs and legislation to identify opportunities, consistent with existing law, for addressing environmental concerns related to transboundary air pollution. The results of these reviews should be made available to the chief environmental officials of both countries for their consideration in the management of their respective programs."

i. The U.S. Environmental Protection Agency has conducted an extensive review pursuant to this recommendation. The primary findings of their report are:

(TO BE PROVIDED)

ii. [Section on Canadian review to be provided by Canada.]

b. "Agencies contemplating changes to laws or regulations that may alter the flow of transboundary pollutants should give timely notice of their intent to agencies of the other country through diplomatic channels."

i. U. S. agencies have carefully reviewed the mechanisms by which Canadian officials are informed of proposed changes of law or regulation of potential concern to Canada. The conclusion was reached that the procedures already in place are working well to provide timely notice of relevant actions. Illustratively, the U.S.

Environmental Protection Agency informs the Government of Canada through the Embassy of Canada on major policy and regulatory decisions under the Clean Air Act. This includes proposed decisions as well as final decisions. Additionally, in special circumstances, EPA provides specific briefings to the Government of Canada through either the U.S. Embassy in Ottawa or the Embassy of Canada in Washington, DC.

ii. [Section on Canadian efforts to be provided by Canada.]

2. Bilateral Consulation and Information Exchange

a. "Acid rain should remain high on the agenda of meetings between the President and Prime Minister. They should be prepared to intercede personally from time to time to resolve difficulties and ensure progress. The U.S. cabinet official heading the technology development panel and a Canadian cabinet official would jointly advise the President and Prime Minister."

"The President and the Prime Minister are meeting in Ottawa in April. Acid rain is high on the agenda, and both leaders remain personally committed to ensuring progress on this issue.

Important bilateral consultations on acid rain have occurred in a number of other ways since endorsement of the Envoys' Report. Secretaries of State Clark and Shultz have reviewed the issue in their quarterly bilateral consultations and exchanged correspondence on the subject. Environmental Protection Agency Administrator Thomas and Canadian Environment Minister McMillan discussed the issue within the context of their broader consultations on May 13, 1986, and October 18 and during a meeting on water quality in Toronto on February 4, 1987. Canadian Environment Minister McMillan and United States Secretary of Energy Herrington reviewed on December 1, 1986, U.S. programs underway and anticipated with applicability to the two countries' efforts to address transboundary acid rain. At the official and technical level repeated exchanges have taken place on aspects of the issue and bilateral cooperation.

b. The second recommendation is this area was addressed in the introduction to this report.

C. Research

The Special Envoys recognized that "scientific information provides a basis for determining the most effective actions to address the damage caused by acid rain and that "there are several areas where research would be of special value to decision makers...." They recommended that active research efforts should be pursued through the combined efforts of both countries in six areas: 1) deposition monitoring, 2) rates of aquatic change, 3) aquatic biology, 4) forest effects, 5) materials damage, and 6) the role of heavy metals.

The BACG, recognizing that effective cooperation already exists between the principal acid rain research entities of the two governments -- the U.S. National Acid Precipitation Assessment Program (NAPAP) and the Canadian Federal-Provincial Research and Monitoring Coordinating Committee (RMCC) -- requested RMCC and NAPAP to work together to advance research in the areas identified by the Envoys and to strengthen joint research efforts. The two bodies were asked to report jointly to the BACG on their progress and on new scientific findings. The Executive Summary of the joint report, dated _____, follows:

III. FUTURE WORK OF THE BACG

The BACG will meet again in May-June of 1987 to review the results of the discussions on acid rain of President Reagan and Prime Minister Mulroney during the April summit. The program for next year's activities will be elaborated at that time.

Generally, however, during the next year the BACG will continue to focus on monitoring and facilitating implementation of the Envoys' Report. It is anticipated that the main thrust of the cooperative effort will be devoted to the continuing development of innovative control technologies and scientific research, as the recommendations concerning co-operative activities have been or will shortly be fully implemented. The BACG will also review implications of each side's review of domestic legislation and regulations.

Introduction - BACG

Drafted:OES/ENH:JFitzgerald:gw:dah
1/13/87, 647-9169
Revised:1/27/87
#2119T

Clearance:OES/ENH:JHRouse

DRAFT

EXECUTIVE SUMMARY

This is a joint report by the U.S. National Acid Precipitation Assessment Program (NAPAP) and the Canadian Federal-Provincial Research and Monitoring Coordinating Committee (RMCC), the coordinating bodies for the scientific research directed toward understanding acidic deposition related to transboundary fluxes of SO_2, NO_x, VOC and their associated acids and oxidants. Its purpose is to summarize for the BACG the ongoing research program of both countries, including research specifically aimed at issues raised in the Envoys report, the joint projects, and the significant new additions to the scientific findings.

Joint research projects were initiated in the 70s. Currently, there are 21 joint projects (Table 1) distributed in areas of Forest Effects, Aquatic Effects, Atmospheric Transport, Deposition Monitoring, and Effects on Materials. Particular emphasis has been placed on intercalibration of sampling and laboratory analysis so that results are consistent across North America. Mutual support and full exchange of data exists in areas of acidic deposition and air quality monitoring, cloud chemistry at high elevation in the Applachian mountain chain, material samples at test sites, national emission inventories, cross-continent tracer experiments, and surface water chemistry surveys.

At the joint RMCC/NAPAP meeting in Washington, DC on November 25, 1986, several potential new joint projects were identified: (1) Cause of sugar maple decline, (2) Chemical composition of ground level fogs, (3) Intercomparison of sites for dry deposition. Joint participation in the formal peer reviews of completed or continuing programs was established.

The major part of this report consists of a summary of new scientific information developed subsequent to the data base used in producing the Special Envoys Report. Highlights of the "New Findings" are as follows:

1. Emissions - In the eastern states bordering Canada, which make the largest contribution to transboundary Flux the emissions of SO_2 have declined by about one million tons (10%) from 1980 to 1985.

SO_2 emissions in eastern Canada decreased by 45 percent from 1970 to 1984 in response to a series of increasingly stringent emissions regulations.

2. Atmospheric Chemistry - Studies around Philadelphia, PA during selected storm events showed that nitrate and sulfate deposition were significantly elevated downwind from the urban area and that low concentrations of oxidants in winter limit the production of sulfate and nitrate from SO_2 and NO_x.

3. Atmospheric Modeling and Transport - Large-scale experiments with inert tracers showed that simple trajectory long-range transport models can reproduce the movement of air parcels well for at least the first 24 hours in the absence of storms.

Canada and the U.S. evaluated the performance of eleven linear sulfur atmospheric chemistry models. In comparing observed deposition with that predicted patterns, the models, did not reproduce secondary peaks, and displaced the maxima by several hundred kilometers. However, given the low discriminating power of the test, the differences between observed and predicted patterns were generally not significantly different over most of the area.

4. Deposition Monitoring - Over the period 1978-1983 where sufficient stations were operational, the trends of sulfate and nitrate concentrations in wet deposition were downward overall. In addition, nonanthropogenic ions, sodium and chloride also showed downtrends. These trends are thought to reflect trends in meteorology rather than emissions changes.

Preliminary estimates of dry deposition suggest that dry deposition ranges from 14 to 26% of the total deposition of sulfur in remote locations. The contribution may be up to 40% nearer emission sources.

5. Cloud Chemistry - Wintertime cloud chemistry at Whiteface Mountain, NY shows low concentrations of oxidants leading to higher SO_2 and NO_x and less acid than in the summertime with nitrate dominating. Summer hydrogen peroxide levels are in the thousands of parts per billion and may account for most of the acid formation.

Ozone concentrations in clear air at Whiteface Mountain are about twice as high in May-June as in December-January.

6. Aquatic Effects - Sulfate and acidity decreased in twelve Nova Scotia and eight Newfoundland rivers between early 1970's and early 1980's consistent with decreased emissions in the eastern U.S. and Canada.

In the two decades before 1983, two benchmark streams in the northeast showed sulfate down and alkalinity up. In addition, regression analysis suggests that a reduction in regional emissions would lead to a nearly proportional reduction in stream sulfate yield.

The Eastern U.S. Lake Survey of areas most likely to be sensitive to acidic deposition has been completed. In the northeast, the highest percentage of lakes with pH <5.0 occurs in the Adirondacks (10 percent of number of lakes, 1.6 percent of lake area). The Western Lake Survey found only one acidic lake fed by an acidic hot spring.

The Alk/Ca + Mg ratio will decrease from a value near unity for a lake unaffected by atmospheric deposition to zero as the alkalinity is exhausted. Analysis of surface water chemistry from about 8500 lakes in eastern Canada shows ratios varying from less than zero to 1.0 in lakes from about Sault Ste. Marie eastward and south of 52° latitude. This deficit results from the presence of sulfates. Several studies in Canada and in the U.S. have shown that natural organic acids cannot account for the acidic status of these lakes.

Over the past 50-60 years, no significant change in alkalinity in tested lakes in New Hampshire (an area of relatively high acidic deposition) is apparent and average pH may have increased. During this period, the pH and alkalinity of Wisconsin (an area of relatively low acidic deposition) lakes have increased significantly. In the Adirondacks (an area of relatively high acidic deposition) pH and alkalinity appear to have remained constant or decreased.

Water chemistry in the Sudbury area has shown major decreases in sulphate concentrations and substantial increases in pH and alkalinity since the early 1970's when a large local SO_2 emission reduction programs were implemented.

In concert with these emission reductions, historical data at Joe Lake near Sudbury spans a complete cycle of fish extinction from acidification in the 1950's to nearly full recovery by 1984 following stocking in 1977. This

demonstrates recovery potential for even highly acidified lakes.

The RAIN project in Norway has shown rapid response (1 year) of a very sensitive acidified watershed when deposition is reduced. Recent measurements of shallow groundwater (less than one metre) have shown acidification by mineral acids.

7. Crops - Dose/response experiments in laboratory and field grain crops show no significant reduction in yield over a wide variety of species when exposed to simulated acidic deposition in the ambient range experienced in eastern North America.

In contrast, for an average, 7 hr growing season concentration of ozone over the eastern U.S. and southeastern Canada of about 90 ug/m^3 (45 ppb), all species tested including major grains and vegetables show a reduction in yield over controls which were exposed at 40-50 ug/m^3, (20-25 ppb).

8. Forests - Results of a controlled study on seedlings of tulip, poplar, white oak, and virginia pine using simulated acid rain over three growing seasons at pH 5.7, 4.5, 4.0, and 3.5 showed no significant response in growth, photosynthesis or morphological properties.

Another study exposed eleven species of deciduous and coniferous seedlings during their first five weeks from germination to simulated rain at pH 5.6, 4.6, 3.6, and 2.6. (U.S. Interpretation: Except at pH of 2.6 there were no significant effects on cumulative germination, survival or above ground biomass. Effects on some morphological characteristics were ambiguous at pH 3.6 and 4.6). (Canadian Interpretation: Treatment with pH $\leq$ 4.6 rain was sufficient to induce statistically significant growth reduction and morphological changes in coniferous seedlings).

Seedlings of four tree species (hybrid poplar, sugar maple, northern red oak, and eastern white pine) common in northeastern U.S. were exposed to a range of ozone levels up to 280 ug/m^3 over the growing season. This resulted (Figure 22) in reductions in net photosynthesis of 10 to 40 percent over growth under an assumed background level of about 50 ug/m^3.

Surveys of red spruce in New England and New York have shown some retardation in growth in the low elevation forests and serious decline and visible damage on spruce trees above cloud base. There is a major sugar maple dieback in Quebec and to a lesser extent in Ontario. Surveys have been carried out in Quebec and it is noted that "there were very few cases of maple stands totally exempt of damage in some form or another". Some damage was observed in 40% of the 533,582 hectares surveyed. The Quebec surveys indicate that dieback of sugar maple occurs throughout its range and within different forest types and on several different sites. Surveys of beech, red maple and yellow birch in New Brunswick and parts of Nova Scotia bordering the Bay of Fundy have shown decline symptoms. Southern pine in the southeastern piedmont region have shown reduced growth in recent decades. Natural stresses and air pollution have been proposed as causative factors for all three observations, and experiments have been planned to test these hypotheses. At present, these survey observations cannot demonstrate whether or not acidic deposition is a factor.

9. Materials - While exposure to the atmosphere clearly causes corrosion of various materials, and acids should accelerate the process, these relationships have not been quantified.

Long-term exposures of galvanized steel specimens show runoff losses of zinc that are dependent on total acid deposition.

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U.S. POSITION PAPER

UNEP Ozone Layer Protocol Negotiations

Second Session: February 23-27, 1987

Vienna, Austria

I. Background:

This is the second round of resumed negotiations under U.N. Environment Program auspices to control chemicals which deplete stratospheric ozone. In the first round, in Geneva December 1-5, 1986, most participants agreed that new measures must be taken in the near-term to control emissions of ozone-depleting chemicals. However, differences remain over the scope, stringency and time-phasing of control measures.

The U.S. delegation asserted that the risk to the ozone layer warrants a scheduled phase-down of emissions of the major ozone-depleting chemicals (e.g., CFC 11, 12, 113, 114, Halon 1211, and 1301). We also emphasized that the protocol should provide for periodic assessment and possible adjustment of the control measures, based on a periodic review of advances in scientific/technical knowledge. Neither the U.S. protocol text nor others (e.g., Canada's) were discussed in detail. It was apparent that many participants had not yet begun to consider in depth many of the elements the U.S. believes important to an effective protocol.

The U.S. delegation focused in the first round on seeking support for the basic elements of a protocol which would have both meaningful near and longer term control measures.

II. Overall U.S. Position:

The U.S position is to continue to pursue our ozone layer protection goals and objectives as advanced in the U.S. proposed protocol text.

III. U.S. Objectives for this Session:

Based on extensive discussions with representatives of other countries subsequent to the resumption of negotiations in Geneva last December, it appears highly unlikely that agreement on a protocol text can be reached in Vienna, and thus at least one further session will be required. Nonetheless, the U.S. delegation should approach this second session with a view to achieving agreement on as many of the key components of a protocol as possible, if not on the total document. At the minimum, it is important to ensure that all key components, and issues, are identified and debated.

The principal U.S. objectives therefore include:

- utilizing this session to heighten awareness of the ozone depletion problem, and the need for effective international controls on an urgent basis.

- soliciting the views on, and support for, the U.S. position from other nations (including developing countries) which have thus far not been heard from or have been noncommital.

- focusing attention on U.S. protocol text, and attempting to have it utilized as the principal negotiating vehicle.

- ensuring full discussion of ozone depletion risk management in the longer term, noting the essentiality of including this in any protocol.

- seeking to achieve agreement on as many areas as possible, and identifying differences in order to facilitate post-Vienna consultations and analyses.

IV. Positions on Key Issues:

This section identifies the key issues which the USG believes must be addressed in the protocol, along with instructions for the delegation for each.

1. Stringency: The delegation should support: (1) a near-term freeze at 1986 levels and (2) longer-term phased reductions, at levels substantial enough to give real incentive for conservation, recycling, and development of substitutes. The U.S. proposed text calls for phased reductions down to 95%. This figure should be used as the U.S. position, illustrating our conception of longer-term measures. However, within the context of the short and long-term goals, the delegation may indicate its willingness to consider other reduction levels and formulas, noting that the degree of stringency which it could accept depends on the timing (i.e. when a control provision would take effect) and the scope (i.e., which chemicals are controlled).

The U.S. proposed protocol text contains four phases in the reduction schedule. The delegation should continue to support

having several phases, so as to provide multiple opportunities for scientific review and risk assessment before the required reductions take effect, and to provide "milestones" by which Parties' progress in achieving reductions can be gauged.

2. Timing: The delegation should support a timeframe for the controls which: (a) is short enough to provide incentive for the development of conservation/recycling techniques and substitutes, yet (b) long enough that compliance does not create undue economic disruption.

Since it is likely to be 3-5 years before the protocol enters into force, the delegation should support having the near-term freeze take effect within one year after entry into force, with the final phase of 95% reduction taking effect within 10 - 14 years after entry into force (based on current analysis).

3. Scope: The general U.S. objective is for the protocol to cover all major ozone-depleting chemicals. Therefore, the delegation should support having the protocol control the following chemicals: CFC 11, 12, 113, 114, and Halon 1211 and 1301. In the U.S. proposed text, reference is made to controlling "all fully-halogenated alkanes", which would include other chemicals in addition to those listed above. This discrepancy can be corrected by replacing the phrase "fully-halogenated alkanes" with "the controlled substances" and then listing the specific chemicals in an annex.

For the purposes of this session, the delegation should maintain the U.S. position of including all six chemicals listed above in the reduction schedule. However, if there is significant opposition to this position and, depending on the dynamics of the discussions, the delegation may indicate that the scope question is linked to the stringency and timing questions; e.g., the broader the scope of control, the greater the flexibility which the U.S. could show on stringency or timing, and vise versa. If this is indicated, the delegation should insist that all six chemicals be covered in the protocol (even if not initially controlled) and that the protocol provide a mechanism for moving chemicals onto (or off of) a control schedule, based upon the periodic scientific/technical review. In this regard, the delegation may advance the "three-tiered" approach for addressing the scope question (see separate paper).

4. Calculation of Emissions: The delegation should support measuring compliance with the reductions in Article II by use of "adjusted production" (production + bulk imports - bulk exports to parties - amount destroyed); i.e., by removing the brackets in Article III para. 1 of the U.S. proposed text. There is considerable efficacy in using this formulation as the measure of emissions for each Party to the protocol, because it: (a) allows for free trade among the Parties; (b) gives countries which use but do not produce the controlled chemicals some responsibility for protecting the ozone layer; and (c) provides a more equitable allocation than control measures based strictly on production. The EC alternative

-- using production as the surrogate for emissions -- is less equitable, excludes non-producers, and may create an incentive for movement of production capacity "offshore" to non-Parties. The delegation should therefore oppose basing the control measures strictly on production.

5. Allocation: The U.S. proposed text implicitly allocates an emissions limit via a reduction schedule based on current levels of adjusted production. The delegation should oppose any explicit allocation mechanism; e.g., such as that in the Canadian or USSR draft texts, on the grounds of the complexity of such mechanisms and the difficulty of negotiating what would amount to emission allocation rights worldwide.

6. Countries with Low Adjusted Production: The delegation may support an exemption for countries which have an adjusted production of less than a certain per capita level. The Nordic proposal for an exemption up to .2 kg per capita may allow too much expansion of global emissions.

7. Assessment and Adjustment of Control Measures: The delegation should support retention of language in the U.S. draft Article IV, while being open to alternative versions as long as they improve rather than dilute the commitment to a serious periodic review. If there is significant opposition to including the establishment of an international monitoring and detection network in the protocol (para. 1 of Art. IV), the delegation should insist that

in lieu of such a provision, the commitment to such a network be confirmed by a Diplomatic Conference resolution calling for the Convention Parties to establish and support the network as soon as possible.

The current U.S. draft calls for the scientific panel to convene at least one year before implementation of future reductions. The delegation should seek to have the scientific panel convene two years before each reduction and the Parties to carry out their assessment at least one year before each scheduled reduction. This change will allow adequate time for conducting a fairly comprehensive assessment.

The delegation should amend paragraph 3 of the U.S. draft to insert "and in light of new technical and economic information" after "scientific review." This will enable Parties to make an informed risk management decision prior to another phase taking effect.

The current Article IV would have the Parties adjust the stringency, timing, or scope of the control article using the protocol amendment procedures in the Convention (Article 9), with slight modification. Under the "three-tiered" approach, stringency and timing could be adjusted via Article 9 of the Convention and scope via Article 10, amendment of annexes. The delegation should explore the possibility of more streamlined procedures for the limited scope required for this Article of the Protocol.

8. Control of Trade:

a. Import Restrictions - Restricting imports from non-parties would: (a) protect industries in countries party to the protocol from being put at a competitive disadvantage vis a vis industries of non-parties; (b) create an incentive for non-parties to join the protocol, in order to preserve existing (or gain access to new) export markets in other Parties; and (c) discourage the movement of capital or production facilities to non-Parties.

The delegation should therefore strongly support paragraph 1 of Article IV of the U.S. proposed text, which calls for a ban of bulk imports from non-parties. The delegation should replace "fully-halogenated alkanes" with "the controlled substances", and should support having the same number of years for this provision to take effect as for the first phase in the Article II reduction schedule.

In principal, the same rationale in support of restrictions on bulk imports from non-parties applies to product imports (i.e., products made with or containing the controlled substances). However, developing and implementing such restrictions, and ensuring that they are applied uniformly by all parties, could unduly slow down the negotiations if all the details were to be worked out in the protocol itself. Hence, the U.S. proposed text calls for the parties to "jointly study the feasibility" of restricting imports of products from non-Parties. In order to emphasize the importance which the U.S. attaches to protecting protocol members

from being put at a competitive disadvantage, the delegation should, during discussions on this issue, offer the following amendment to the U.S. text:

> Within [ ] years after entry into force of this Protocol, each Party shall restrict imports of products containing substances controlled by this Protocol from any state not party to this Protocol [unless such state is in full compliance with Article II and this Article, and has submitted information to that effect as specified in paragraph 1 of Article VI]. At least one year prior to the time such restrictions take effect, the Parties shall elaborate in an annex a list of the products to be restricted and standards for applying such restrictions uniformly by all Parties.

This should become new paragraph 2 of Article V. The delegation should support having the number of years for this provision to take effect no later than the second phase in the Article II reduction schedule. Current paragraph 3 of the U.S. text would remain, with the words "containing or" deleted and the phrase "fully-halogenated alkanes" replaced by "substances controlled by this protocol". As appropriate, the delegation may also add the phrase "and practicality" after the word "feasibility".

b. Export Restrictions:

The U.S. proposed text includes (in Article V par. 2) bans on technology exports to, and direct investment in, the territory of non-parties. However, further assessment of these provisions subsequent to the December session has indicated that such bans may not be effective. With respect to technolgy exports, the ready availability of the technology would make it difficult for all the

parties to enforce a ban. With respect to an investment ban, the diversity (and velocity) of transboundary monetary flows would make such a ban virtually impossible to enforce by any party. In addition, it is not clear that the U.S. has the legal authority to impose such a ban, other than the general language in section 157 of the Clean Air Act (see separate paper).

In discussions on these issues, the delegation should note the importance of technology and investment flows to non-Parties. The delegation should support retention of sub-par.(a) (export of technologies) in order to emphasize the importance which the U.S. attaches to this issue -- and to use as a "tradeable" in subsequent sessions for the higher priority import restrictions. In addition, the phrase "for producing fully-halogenated alkanes" should be replaced by "for the production or use of the controlled substances".

The delegation should propose that sub-par.(b) (the ban on direct investment) be deleted, and a new paragraph be added:

> Parties shall not provide bilateral or multilateral subsidies, aid, credits, guarantees, or insurance programs for the export of products, equipment, plants, or technology for the production or use of the controlled substances.

V. Positions on Other Articles:

The delegation should support the revised text prepared by the "Working Group on institutional and financial matters "(UNEP/WG.157/CRP.9) at the December session, except as indicated below:

1. Article I (Definitions) - In order to clarify the distinction between "bulk" and "product" exports/imports, the delegation

should seek to have the following definition added:

> "bulk" exports or imports means any export or import of a commodity containing [10 lbs.] or more of non-recycled substance(s) controlled by this protocol.

2. Article III (Secretariat) - Redraft subparagraphs (b) and (c) so as to be consistent with new operative articles.

3. Article XII (Entry into Force) - The USSR may oppose the working group's text (in CRP.9). In particular, they may take issue with the requirement of nine instruments of ratification (etc.) and the thirty days entry into force provision in para. 1, preferring instead eleven instruments and 90 days, respectively, as indicated in Article 17, para. 2 of the Convention. The delegation should initially support the 9/30 format. However, if this appears to be a major obstacle to Soviet concurrence on this article, the delegation should propose a 10/60 format and may, if other delegations do not have a strong preference to the contrary, agree to the 11/90 format.

The delegation should also support amending Article XII so as to ensure that the protocol enters into force only when a sufficient number of the major producer/user countries have submitted instruments of ratification (etc.). To this end, the delegation should propose adding qualifying language to paragraph 1, specifying that of the number of instruments required for entry into force, [X] number must be from nations with adjusted production greater than [Y]. This will decrease the possibility of the protocol entering into force with just the U.S. and 9 or 10 developing countries as the initial Parties, thus putting the U.S. at a competitive disadvantage vis a vis its primary competitors.

In order to ensure that nations which become Party to the Protocol do not have less obligations than nations already Party, and to remove an incentive for countries to be "free-riders" by delaying entry into the protocol, the following sentence should be added at the end of paragraph 3:

> "Any such Party shall assume all applicable obligations then in effect for all other Parties.

Although agreement on including this sentence in the final protocol text may not be achievable, having it inserted at this session is tactically beneficial in that it gives other countries the message that there are advantages to joining the protocol as one of its initial parties, and that there is a potential penalty for not joining the protocol right at the start (i.e., the controls to date would not be phased in for that Party).

VI. Other Issues:

A. Future Negotiating Schedule - The original UNEP schedule called for the Diplomatic Conference to be held in April 1987. If it appears that the protocol is sufficiently close to completion at the conclusion of this session, the delegation should support holding the Conference May 4-8, 1987. If not, the delegation should push for a third negotiating session during the May 4-8 time-slot, and support having the Diplomatic Conference as soon as possible thereafter; i.e., in the first or second week of July. If it appears that two negotiating sessions prior to the Diplomatic Conference are needed, the delegation should push for a May-July timeframe, with the Diplomatic Conference as possible thereafter.

B. Financial Contributions for Future Meetings - UNEP has previously indicated that it may not have sufficient funds for future meetings and/or to support participation by developing country representatives. UNEP may raise this issue again at this session. If so, the delegation should indicate that U.S. EPA is willing to contribute up to $20,000. for these purposes.

C. Press: All press inquiries should be referred to the head or alternate head of delegation, or their designee.

D. Budgetary Commitments: The delegation should not commit the USG to any activity that cannot be funded out of current appropriations.

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