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Folder Title:

DPC [Domestic Policy Council] [Meeting] in the Roosevelt Room [on] Global Climate Change, Friday -
October 20, 1989, 2:30-3:30

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Withdrawal/Redaction Sheet (George Bush Library)

Doc. No. / Type	Subject/Title	Date	Restriction	Classification
01. Paper	Draft Guidelines for US Delegation (4 pp.)	10/20/89	(b)(1)	

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WHORM Cat.:

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OA/ID Number: 45038-039

Date Closed: 2/5/2018

FOIA/Sys Case #: 2017-0310-F

Re-review Case #:

P-2/P-5 Review Case #:

Fields-Hall	Synar-Ribicco
centrally funded fleets	centrally funded fleets
* % left up to State in SIP	90% in serious + severe areas
biggest difference	
conversions	conversions
similar	
Govt. fleets phase in (may be the same as Synar-Ribicco) part of SIP	Govt. fleets 30-50-90 by 1999 Federal requirement

November Hague meeting (30 min.)

1. Briefing - Administrator Reilly
2. Discussion: Goals, objectives of U.S. participation, content of U.S. policy, what will be said by U.S. delegation

-- Issues:

1. Should the U.S. go to the meeting; is it more important to go than not to go?
2. What policy position should the U.S. take? (see draft guidelines at back of briefing binders).
3. Should the U.S. support stabilization of CO2 emissions?
4. Should the U.S. offer to host the first negotiating session on a framework convention at this time?
5. Should the U.S. send a ministerial level representative, such as Administrator Reilly?

PROS AND CONS OF U.S. PARTICIPATION AT DUTCH CONFERENCE

PROS:

The President wants to show Environmental "leadership". Not to send an Environmental Minister, i.e. Mr. Reilly, may be misconstrued as a signal that the U.S. is pulling back from commitments made at the Economic Summit.

Some of the actions to "combat" global climate change make sense in their own right, these include controlling emissions of CFCs, halting deforestation, and improving energy efficiency. The U.S. has already endorsed actions in these areas.

The U.S. could use the Conference as an opportunity to stress the scientific uncertainties regarding global climate change and its impacts; we could urge others to join in increasing budgets for research on global change.

CONS:

The current draft of a Conference Declaration, as created by an international working group which included EPA representation, contains several new policies which go beyond current U.S. policy and have substantial economic costs. These include: a specific pledge for unilateral action to stabilize CO2 emissions by 2000 and to reduce them by 20% by 2005; reductions in emissions of CFCs beyond those agreed to by the President; and creation of an international climate fund.

If we send Reilly to the Conference, he will no doubt be "forced" either to dissent from the declaration, which could be an embarrassment, or to agree to a document that exceeds U.S. policy.

U.S. was able to avoid the prior "summit" at the Hague. That "Declaration of the Hague" calls for the creation of a new institution to preserve the Earth's Atmosphere with binding authority and review by the ICJ. The U.S. is the only G-7 nation that did not sign the Hague Declaration. Japan was not so lucky -- it attended the "summit" and was pressured into signing. If we attend the Dutch Ministerial the same could happen to us.

Reilly will suggest that he attend the Hague Meeting with the intention of announcing that the U.S. will host the first negotiating session of a framework convention. Such a strategy is flawed in two respects: 1) any announcement of a U.S. negotiating session would be made by the President at the right time, and 2) until all aspects of the IPCC's work are completed (ie., effects, research, and response strategies), scheduling a negotiating session on a convention, which may not be necessary or appropriate, is premature. It is putting the cart before the horse.

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Appeal Case #:

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Disposition Date:

AR Case #:

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AR Disposition:

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Draft declaration for the Ministerial Conference on Atmospheric Pollution and Climatic Change.

- (1) Today's world is seriously threatened by a man-made change in climate. The composition of the earth's atmosphere is now altering at an unprecedented rate due to pollutants caused by human activity, including inefficient energy use, deforestation and a rapid population growth.
- (2) Although uncertainties remain as to the rate and the extent of climate change, evidence of global warming is now emerging. The best predictions available today indicate potentially severe economic and social dislocation for present and future generations. Any delay in taking action will increase the risks, and reduce the possibilities for survival of the planet as we know it.
- (3) Fortunately, much of the world population and their political leaders have now come to recognize the need for action. The protection of the ozone layer is being addressed by the 1985 Vienna convention and the 1987 Montreal Protocol. Further tightening of the protocol was called for by the London conference in March 1989 and the Helsinki conference in May 1989. This process will presently lead to a phase-out of ozone layer depleting substances before the year 2000.
- (4) Global warming is addressed by the intergovernmental panel on climate change (IPCC) which was established by UNEP and WMO, and recognized by the UN General Assembly resolution 43/53. The Declaration of The Hague of March 1989 put forward challenging ideas for international cooperation, and legal and institutional measures. The UNEP Governing Council and the WMO Executive Council meetings of 1989 have set the time schedule for the preparation and negotiation of a climate change convention. The Economic Summit of July 1989 in Paris strongly advocated common efforts to limit emissions of carbon dioxide and other greenhouse gases. The meeting of non-aligned countries in Belgrade in September 1989 also addressed the issue of climatic change. Given this base it is now time to strengthen and to broaden the action, to discuss targets and to start the process of making commitments.
- (5) Climate is a common concern for mankind. All countries should now initiate action to control, limit or reduce emissions of greenhouse gases and develop adaptive strategies. Industrialized countries, in view of their past contribution to the increase of greenhouse gas concentrations, and in view of their capabilities, have specific responsibilities of two different kinds: i) They should show leadership and set an example by initiating domestic action and ii) They should support the action of countries to which the protection of the atmosphere would prove to be an abnormal burden.
- (6) For the long term survival of our planet and civilization, common effort and action should aim at reducing emissions and increasing 'sinks' for greenhouse gases to a level consistent with the natural capacity of our planet, to safeguard planetary ecosystems. Such a level should be reached within a time frame, so that it would allow for ecosystems to naturally adapt to climate change, so that food production is not threatened and economic activity can develop in a sustainable and environmentally sound manner. Estimates indicate that this would require a reduction of global greenhouse gas emissions by more than 50 per cent from current levels, which may have the effect of arresting global warming below 2 degrees Celsius when compared to pre-industrial global temperatures.
- (7) Such effort and action should include: i) The phase-out of the use of CFC's, which are responsible for about 20 per cent of global greenhouse gas emissions, by national action and international co-operation, including financial assistance and the transfer of technology.

In this connection, it is important that the substitutes for CFCs also should not contribute significantly to the global warming problem. ii) Domestic action by industrialized countries to reduce CO₂-emissions, accompanied by global action to reduce deforestation and increase afforestation in both temperate and tropical zones, and iii) A globally coordinated action plan to reduce the emissions of, and increase the 'sinks' for all greenhouse gases including methane (CH₄), nitrous oxide (N₂O), and to reduce tropospheric ozone (O₃) formation.

- (8) The conference recommends that appropriate forums, including the IPCC, consider the introduction of the concept of CO₂-equivalence. This would provide a single parameter to describe the radiative effects of the various greenhouse gases. Such a concept creates possibilities for the development of trade-offs in response measures for different greenhouse gases in the most cost effective manner.
- (9) All countries should promote better, energy conservation energy efficiency and the substitution of fossil fuels by energy sources with less environmentally damaging characteristics. One direct means of allowing markets to incorporate the risk of climate change is to ensure that the prices of fossil fuels reflect their full social and environmental costs. Options for achieving this are, inter alia, emission fees, regulation and standard setting for products.
- (10) Progress in reducing greenhouse gas emissions depends not only on technical and economic issues but also on attitudinal changes. Improved dissemination of information and better training of personnel is needed, both at the national and international level. Public awareness programmes should include the issue of climate change and its connection with the way individuals use energy.
- (11) Developing countries will require assistance to cope with the problems of climate change. They will need help in using developing and maintaining technologies that are appropriate to their industrial, energy, forestry and agricultural infrastructure. The transfer of technologies of these countries should be facilitated. Furthermore, the capabilities of these countries should be increased so that they can develop the proper technologies themselves.
- (12) Measures to prevent climatic change may have other significant benefits such as reducing acidification, protection of the ozone layer, preserving biodiversity and other natural resources and assisting sustainable development.

More specifically, the conference

Energy

- (13) Urges all countries to take immediate action to promote energy efficiency, energy conservation and the use of environmentally sound energy sources.
- (14) Agrees that industrialized countries recognize the need to stabilize CO₂-emissions at present levels not later than the year 2000 and agree to investigate the feasibility of a 20 per cent reduction in CO₂-emissions by the year 2005, as recommended by the Toronto conference, June 1988. Results of such investigations should be presented to the relevant forums, including the IPCC, in the course of 1990. Industrialized countries with, as yet, relatively low energy requirements, which can reasonably be expected to grow in step with their development, may have to set targets which can accommodate such a development.
- (15) Agrees that developing countries should define future targets for CO₂ emissions in line with financial and technological co-operation agreements.

The need and scope for such co-operation agreements should be treated expeditiously.

Forestry

- (16) Agrees that developing countries will need to be assisted financially and technically to ensure that they will be in a position to develop, protect and manage their forest resources in a rational and environmentally sound manner.
- (17) Agrees to pursue a global balance between deforestation and forest degradation on the one hand, and a sound forest management and afforestation on the other before the year 2000, and a net forest growth of 12 million ha/yr, by that date, and for at least 20 years thereafter. To this end, the world deforestation rate should be reduced and the forest degradation rate should be slowed down by suppression of acid rain and other pollutants; rational forest use and sound forest management practices should be encouraged and at the same time vigorous forestry programmes should be developed in both the temperate and tropical zones. x)

CFC's

- (18) Welcomes the commitment of the industrialized countries to amend the Montreal Protocol and to phase out, before the year 2000, the production and consumption of the controlled substances. It urges developing countries, with the technical and financial support of industrialized countries, to phase out their use of these same substances, by the same date.

Other greenhouse gases

- (19) Urges more research into the sources and 'sinks' of the other greenhouse gases, in particular methane (CH_4), nitrous oxide (N_2O) and tropospheric ozone (O_3). In addition, the development and implementation of specific means of limiting the atmospheric concentrations of these gases should be energetically pursued.

Ministerial meeting

- (20) Recognizes the growing need for a coordinating mechanism for policy development and evaluation until more definitive mechanisms have been developed or are established through a climate change convention. To this end, the conference agrees to convene a Ministerial conference to review the first report of the IPCC, organized back-to-back with the second World Climate conference in November 1990. The conference accepted the offer of The Netherlands, in co-operation with UNEP and WMO, to serve as a secretariat until the next meeting.

Funding

- (21) Recommends that existing institutions for development and financial assistance including the multilateral development banks, bilateral assistance programmes and the relevant United Nations organizations should strengthen climate change policy in their respective fields of competence by providing expanded funding for this purpose. In addition, regional and subregional co-operation should be reinforced as to address and implement the required action at that level.
- (22) Recommends that, parallel to the strengthening of existing organizations, action be taken to further assess the need and the scope of new funding facilities, such as an international fund. Such new facilities should be directly related to a future climate change convention and associated

protocols. They could be located, for example, within the World Bank system and could be used for the generation of additional funds. Such funds could then be allocated to existing institutions, under the guidance of a special body to be established under a climate change convention. In this respect the feasibility of a clearinghouse mechanism should be evaluated as part of such new facilities. This would help channel international resources into those activities and projects that would allow a globally cost-effective reduction in greenhouse gas concentrations.

- (23) Recommends that, initially, international funding be directed towards (i) funding of a cfc phase-out in developing countries, (ii) promoting energy efficiency and the use of renewable resources through, inter alia, research and technology transfer, (iii) increased financial support for forest management improvement, through the tropical forest action plan (TFAP), international tropical timber organization (ITTO) and similar mechanisms, and (iv) increased funding for research and monitoring of emission sources and climate, for awareness 'building' and for the development of policy tools. xx)

At a later stage, the use of the financial resources could be extended to major energy conservation programmes and fuel substitution measures in developing countries and steps to reduce global man-made emissions of methane and nitrous oxide.

Research and monitoring

- (24) Urges all countries and relevant organizations to increase their climatic change research and emission monitoring activities. It also urges states to increase support for international coordinated research and monitoring activities related to climate. Building on the present roles of UNEP, WMO, ICSU, IEA and other competent institutions and international bodies.

Climate change convention

- (25) Urges all countries to join and to speed up the ongoing work of the IPCC with respect to the preparations for a climate change convention so that negotiations upon it can start at the earliest possible date after the IPCC report is available. This convention should generally follow the format of the Vienna convention for the protection of the ozone layer, and lay down, at a minimum, general principles and obligations, as described in the annex. xxx)

- x) A note explaining the basis for the forestry target will follow as soon as possible.
- xx) A note on funding mechanisms will follow, addressing initial funding actions of specific countries and purposes, and channels for such funds. Countries that wish to pledge at this conference should contact the secretariat for more information. The way such initiatives will be presented at the conference is a subject for discussion at the preceding senior officials meeting.
- xxx) See background paper on elements of a climate convention.

DRAFTDutch Ministerial Conference on
Atmospheric Pollution and Climatic ChangePosition Paper on the Draft DeclarationISSUES: (Discussion and position follow)

1. How to characterize the state of scientific knowledge in the preamble?
2. How to characterize the basic objective of governments' response to climate change, e.g., Is it to limit climate change?
3. How to respond to the Dutch proposal of CO₂ equivalent greenhouse gas (GHG) emission reduction targets?
4. How to respond to the desire of other governments for CO₂ emission reduction targets?
5. How to address the need of developing countries for economic growth within the context of a global response to climate change, and specifically how to respond to proposed commitments of substantial financial support?
6. How to phrase commitments to technology development and transfer?
7. How to respond to the concept of "the earth's natural absorption capacity" and an associated proposed commitment to keep global warming well below 2°C relative to pre-industrial times?
8. How to respond to the call for substituting renewable fuels for fossil fuels?
9. How to respond to the proposed commitment to stimulate new forest growth at the rate of 15 million hectares per annum by the year 2000?
10. How to respond to the call for negotiation of a framework convention before the end of 1990?
11. What to agree to regarding general elements of a framework convention?
12. How to respond to the idea of convening an annual ministerial forum (perhaps limited in size) supported by a small secretariat to provide international coordination and policy guidance on this issue?

13. How to respond to the proposed establishment of a coordinated funding mechanism by the developed countries with an initial focus on a) CFC alternatives, b) energy efficiency and renewables, c) forest management, and d) research and monitoring, awareness building and development of policy tools?

This draft (10/11) position paper will focus on the concepts rather than specific words contained in the draft declaration because the words will always be "being revised". However, all or most of these issues will be on the table into the late innings. Each issue is addressed separately below.

1. Science: Much of the preambular language has the effect of characterizing the state of scientific understanding regarding global climate change. The Dutch have agreed to consult with Dr. John Houghton (chairman of the IPCC Science Work Group) and others to get the language right. They will also bring any related language from the rest of the Declaration into the preamble.

Position: Some aspects of global climate change can be documented now and there is a growing consensus in the scientific community that significant global warming due to anthropogenic greenhouse gas emissions is probable. However, there are significant uncertainties regarding the magnitude and timing of warming and the implications of that warming for the climate system and environment. The ways in which small scale atmospheric processes affect larger scale climate processes, the degree of natural stability in climate systems, the quantitative link between trace gas species and climate change, and the details of the role that oceans play in climate change are not well understood. The large scale geophysical and biological processes that control the fluxes of the radiatively important gases and the heterogeneous, tropospheric, and stratospheric transformation processes of these gases are not well understood. The integration of small scale biological processes to regional and global scale ecosystem processes is poorly understood. In addition, a key missing link in the development of any mitigation strategy is a sufficient understanding of the emission factors and global concentrations of the important trace gases.

2. Basic Objective Re: Climate Change: The Declaration tends to formulate this in terms of limiting climate change. This is scientifically unsound because climate change is driven fundamentally by natural forces far beyond humanity's ability to control. It should be phrased in terms of anthropogenically induced changes in the composition of the atmosphere.

Position: The basic objective is to minimize adverse environmental, economic and social impacts of climate change. This will ultimately involve a mixture of efforts to limit GHG emissions, increase sinks and adapt to climate change.

3. CO2 Equivalent Reduction Targets: In an effort to broaden support for GHG emission reduction targets, the Dutch have proposed, for developed countries, a 30% reduction in CO2 equivalent emissions by the year 2000 using "some date" as a base. This is further amplified in the Declaration to require -- as a minimum -- the phase-out of CFCs and stabilization of CO2 emissions as of the base date. Two concerns with the concept have been raised. First, that it might undercut action on CFCs by the less committed. Second (by the FRG and Switzerland) that it would undercut pressure to reduce CO2 emissions.

Position: The U.S. supports the concept of CO2 equivalence. It will provide a necessary but not sufficient degree of flexibility for responding to global climate change in an economically efficient manner. However, there is no consensus on how tradeoffs between the gases can be easily calculated. This topic should be explored by experts through the IPCC. Furthermore, the language in the Declaration must be carefully crafted to a) recognize that CFCs are an important greenhouse gas and that phasing it out is an important response to global warming as well as to the problem of ozone depletion, but b) not undercut the objective of a complete CFC phaseout.

4. CO2 Reduction Targets: The FRG and Switzerland want CO2 emission reduction targets. The Dutch would settle for stabilization. The French have proposed a 20% reduction from 1980-85 levels which, conveniently, they have already achieved. The developing countries are on the sidelines but would tie targets to financial and technical/technological assistance.

Position: The Paris Economic Summit Declaration states "we strongly advocate common efforts to limit emissions of CO2 and other greenhouse gases,..." The U.S. is actively investigating policy options towards this end (beyond our commitment to phase out CFCs) both domestically and internationally through the IPCC. We believe that a goal of stabilizing CO2 emission should be seriously and carefully considered by the IPCC. Such consideration would necessarily involve a) the technological possibilities for achieving stabilization, b) the costs and economic effects of so doing, and c) an assessment of the benefits achieved or damages avoided. The U.S. is not prepared to agree to specific reduction targets without a careful consideration of their achievability, effectiveness and efficiency.

To facilitate further progress on this issue the Conference should agree that all countries will develop and periodically update a greenhouse gas emissions inventory for its territory and a national strategy for dealing with climate change.

5. Developing Country Obligations: Secretary Baker's statement to the RSWG that "those solutions will be most effective if they transcend the great fault line of our times, the need to reconcile the transcendent requirements for both economic development and a safe environment" captures the essence of the issue. The Declaration seeks to resolve the issue by a) focusing on developed country obligations, and b) promising money and technology for developing country efforts. Based on discussions in the Steering Committee, it is the Dutch who are pressing the hardest on this issue. The issue will become critical to developing countries when they are pressed for concrete action.

Position: The U.S. shares the aspirations of all countries for decent economic conditions. We are committed to working with others to find a way to reconcile the requirements for both economic development and a safe environment. We support and participate in a broad spectrum of economic, financial and technical assistance efforts. This is an evolving set of efforts. For example, the U.S. supports the recent resolution of the WMO Executive Committee requesting: a) the Secretary-General to establish a Climate and Atmospheric Environmental Fund with an initial target of \$22M for 1990-1991 and to seek contributions in consultation with the Executive Heads of UNEP, UNDP, and ICSU; b) Members to make voluntary contributions to the fund; c) the Secretary-General to seek additional funding from potential donors, especially UNDP, the World Bank, and other International Development Agencies; and d) the Secretary-General to allocate resources as they become available to the agreed upon priority needs list or other needs as may be identified through consultative meetings with donors. We are prepared to reassess many of these efforts in the light of changing needs and conditions but this must be a considered enterprise. We do not believe that a sound basis has been laid for agreement on new funds or funding mechanisms at this meeting. We are particularly interested in keeping the issue of financial support for developing countries under the Montreal Protocol within the international process established under that Protocol.

We believe that all countries must be committed to addressing the issue of global climate change but recognize that this will entail different responses. Developing a sound set of international responses that reflect basic differences among nations will not be easy but we are committed to working towards this end with others. For example, the U.S. is prepared to cooperate with other developed countries to assist

developing countries in preparing and updating greenhouse gas emissions inventories and climate change national strategies.

6. Technology Development and Transfer: The Declaration contains a couple of brief references to "access appropriate technology" and "technology development and transfer". The current language should be acceptable but it is possible that some countries might push more problematic concepts such as "on concessionary terms", or "at no cost", or "without any restrictions on use."

Position: The U.S. believes (Economic Summit) that "international cooperation needs to be enhanced in the field of technology and technology transfer in order to reduce pollution or provide alternative solutions." However, language should be avoided which would compromise legitimate commercial interests, including intellectual property rights, or imply the transfer of high technology with national security implications.

7. Earth's Natural Absorption Capacity: The Declaration includes as a fundamental idea an agreement that "global greenhouse gas emissions should not exceed the earth's natural absorption capacity" which is asserted to imply that "atmospheric concentration levels whereby the anticipated rise in global mean surface temperature should remain will below 2°C relative to pre-industrial times." The scientific basis for this conceptual approach was questioned severely at the Steering Committee meeting.

Position: There is not sufficient scientific understanding to determine a "natural absorption capacity" for the earth. Moreover, there is no scientific basis for determining atmospheric concentrations of greenhouse gases that would keep global mean surface temperatures well below 2 degrees Celcius relative wot pre-industrial times. During the "little ice-age" of the 16th and 17th century, mean global temperatures were estimated to be on the order of 1.5 degrees Celcius less than today and on the order of 1 degree Celcius less than the 19th century. Furthermore, the paleo record indicates that significantly lower atmospheric CO2 concentrations in the 6th and 10th centuries were not at all correlated with decreases in temperature.

8. Renewables for Fossil Fuels: The Declaration promotes energy conservation, energy efficiency and substituting renewable fuels for fossil fuels. The first two are non-controversial but the widespread adoption of these technologies, without further research and incentives to reduce could have significant economic implications. The development of a consensus on specific policy measures to encourage introduction of renewables in the USG is probably not possible

introduction of renewables in the USG is probably not possible until DOE issues its energy plan.

Position: The U.S. believes that the increased use of renewable fuels should be encouraged and that measures to promote this should be carefully considered by the IPCC and individual governments. The USG should urge all countries to increase support for renewables research. A link to the decreased use of fossil fuels should be avoided.

9. Reforestation: The Declaration contains a general commitment to reduce deforestation and promote reforestation, with a more specific commitment to stimulate "new forest growth at the rate of 12 million hectares per annum by the year 2000 through, inter alia, strengthening" the TFAP. This goal would be tantamount to a global no net forest loss policy. There are no concrete obligations for specific countries.

Position: The U.S. strongly supports the adoption of sustainable forest management practices, with a view to preserving the scale of world forests. Managing tropical forests in a sustainable manner is an urgent need for the world as a whole. While recognizing the sovereign rights of countries to make use of their natural resources, we encourage, through a sustainable use of tropical forests, the protection of all the species therein and the traditional rights to land and other resources of local communities. We support the rapid implementation of the TFAP and appeal to both consumer and producer countries, united in the ITTO, to join their efforts to ensure better conservation of the forests. We are ready to assist the efforts of nations with tropical forests through financial and technical cooperation, and in international organizations. (The above is all from the Economic Summit Declaration.) We believe that temperate and boreal forest resources should also be enhanced and are committed to doing so domestically. We support the overall goal of 12 million hectares per annum by the year 2000.

10. Framework Convention Before the End of 1990. Representatives of UNEP and WMO have pointed out that it conflicts with the Resolutions of their governing bodies asking them to prepare for negotiations, which are to begin after the adoption of the IPCC interim report. At the Geneva Workshop there was significant, but not universal, sentiment for concluding a framework convention by late 1991 or early 1992.

Position: The U.S. believes that a framework convention is urgently required to mobilize and rationalize the efforts of the international community. [Summit Declaration] It is essential, however, that there be sufficient support among nations for commencing negotiations to provide a reasonable prospect for the conclusion of a broadly supported agreement.

The U.S. should support conclusion "as soon as possible" and seek flexible language encouraging the commencement of negotiations as soon as practical. The U.S. should not bind itself to "not preempting the IPCC process."

11. Elements of a Framework Convention: The Dutch have promised to use language that reflects the consensus reached in the IPCC October workshop.

Position:

- A. A framework convention on global climate change should be drafted to be amenable to adherence by a significant majority of the world's countries, including those comprising a significant majority of the world's population and those whose actions are significantly influencing atmospheric concentrations of CO₂, methane, and other greenhouse gases.
- B. The convention's twin goals should be to provide a framework for: 1) increasing our understanding of the scientific aspects of global climate change and its potential impacts; and 2) protecting social, environmental, and economic well-being from adverse impacts likely to result from climate change.
- C. The convention should track the Vienna Convention in that it should be a framework convention (i.e., one that includes general principles of cooperation but does not itself set forth emissions targets and timetables) and should generally contain the same kinds of elements (e.g., general obligations, cooperation in research and monitoring, exchange of information, conference of the parties, secretariat, provision for adoption of protocols).
- D. The convention should provide an institutional framework for cooperation by establishing a Conference of the Parties and a Secretariat, along the lines of the Vienna Convention. It should serve as a legal framework for future agreed measures by providing for the adoption of protocols and/or the use of other legal and institutional mechanisms.
- E. The framework convention should implement its twin goals by generally adopting the conceptual approach taken by the IPCC. Thus the convention should focus on cooperation in: 1) assessing the relevant scientific information related to global climate change; 2) assessing potential impacts of global climate change and their likelihoods; and 3) formulating and evaluating appropriate response measures, on the basis of such assessments as well as social, economic, and environmental factors and cost effectiveness. With respect to the assessment of information and impacts, the framework convention should provide for the exchange of data. In addition, the framework convention should go beyond assessment

of information (to which the IPCC's work is limited) by calling for enhanced cooperation in producing information.

- F. Financial issues are too complex to be dealt with in the framework convention. However, the convention might establish a working group on financial implementation measures that could be charged with preparing a report as expeditiously as possible for the Conference of the Parties to consider.
 - G. In terms of taking into account the special position of the developing countries, the framework convention should go beyond the IPCC's work in another important respect, namely it should provide for cooperation in the development and transfer of technologies to limit or adapt to climate change.
 - H. Finally, it is currently premature to consider the subject of possible protocols and other agreed response measures, the order in which they might be taken up, and whether there will be linkage between various agreed measures.
12. Annual Ministerial Forum: The Dutch idea is to convene an annual ministerial forum, perhaps limited in size, supported by a small secretariat, to provide international political coordination and guidance on the climate change issue. The initial idea is not to tie the forum to the IPCC, WMO or UNEP, although the actual meeting could be scheduled to precede or follow immediately UNEP GC or WMO EC meetings. The Dutch are likely to be open to any compromise that will enable them to announce that Ministers have agreed to meet again. Those few who spoke to this idea at the Steering Committee meeting were generally opposed.

Position: This issue points up the need for a framework Convention to rationalize international efforts. The U.S. believes that Ministers should meet "as needed" to address the issue of climate change. However, given the full schedule of international meetings on this issue and meetings at which this issue is addressed, including meetings attended by Ministers, as may be evolving with the UNEP Governing Council, the U.S. sees no need at this time for scheduling another meeting of Ministers or establishing a new ministerial mechanism. The U.S. could agree to having the Second World Climate Conference meet at the Ministerial level.

13. Coordinated Funding Mechanisms: Covered under five above.

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DRAFT

Background Paper on Climate Change Convention

DUTCH MINISTERIAL CONFERENCE ON ATMOSPHERIC POLLUTION AND CLIMATIC CHANGE

Background

During the past year there have been significant international pronouncements on the legal aspects of climate change, including in particular the development of a new global convention. (It may be noted that the U.S. Global Climate Protection Act of 1987 states that U.S. policy should seek to work toward multilateral agreements on climate change.) The terms of reference adopted by the IPCC in November 1988 for the Response Strategies Working Group (RSWG) includes consideration of "legal matters." The workplan adopted at the group's first meeting in January 1989 includes consideration of "new legal and institutional mechanisms that could be used to implement options to limit or adapt to climate change."

- In this regard, in December 1988 the UN General Assembly adopted Resolution 43/53 on the Protection of Global Climate, which requested that the Secretary General of the WMO and the Executive Director of UNEP, through the IPCC, recommend "elements for inclusion in a possible future international convention on climate."

- The Declaration of The Hague in March 1989 (not signed by the U.S.) urged all states to join "in developing framework conventions and other legal instruments necessary to establish institutional authority...to counter climate change, particularly global warming."

- The Governing Council of UNEP, at its May 1989 session, and the Executive Council of the WMO, at its June meeting, then requested that preparations begin for negotiations on a framework convention on climate change with the actual negotiations to commence following completion of the Fall 1990 IPCC report.

- The G-7 Paris Declaration in July stated that "the conclusion of a framework or umbrella convention on climate change to set out general principles or guidelines is urgently required to mobilize and rationalize the efforts made by the international community. We welcome the work under way by the United Nations Environment Program, in cooperation with the World Meteorological Organization drawing on the work of the Intergovernmental Panel on Climate Change and the results of other international meetings. Specific protocols containing concrete commitments could be fitted into the framework as scientific evidence requires and permits."

- Finally, the Tokyo Conference on the Global Environment in September endorsed "the earliest adoption of...[a framework] convention and, when scientific evidence requires and permits, the conclusion of its relevant protocols."

Vienna Convention on the Protection of the Ozone Layer and the Montreal Protocol

The Vienna Convention and Montreal Protocol represent two important climate related agreements. The Vienna Convention is replete with considerations of the climate impacts of ozone layer modification and the Montreal Protocol-controlled substances are at the same time potent greenhouse gases. (Thus far no serious proposals have been made to amend the Vienna Convention to make it a climate change convention.)

The Geneva RSWG Workshop

In the first week of October the RSWG held a workshop on implementation mechanisms for responding to climate change, including legal measures and possible elements of a framework convention on climate change. It represented the first formal governmental gathering to discuss what actually should go into a climate change convention. The general U.S. approach on this issue was to support development of a framework convention modeled after the Vienna Convention, which would basically incorporate the IPCC process, focusing on research and monitoring, providing a framework for technology transfer, and developing response mechanisms that would be contained in subsequent protocols.

Given the general view that existing legal instruments and institutions are insufficient to meet the challenge of climate change, discussion focused on the contents of a framework convention, for which there was general support. Broad consensus emerged that it should generally follow the Vienna Convention in laying down general principles and obligations, provide for a continuing assessment of the scientific aspects of climate change and its impacts, and formulate response strategies. There was also broad agreement that the framework convention should contain provision for separate protocols to be negotiated to deal with specific obligations, e.g., on the different greenhouse gases.

At the same time, the discussion disclosed fundamental differences over key issues to be addressed in the convention. In particular, the Northern Europeans strongly endorsed emissions control provisions in the convention, while the LDC's stressed the need for new funds, no-cost technology transfer, and delay of any emissions obligations for them. The end product was basically a laundry list of possible elements that

could be included within a convention.

Finally, there was no consensus on a target date for conclusion of negotiations on a convention. While an implicit assumption has been that it should be ready for signature by the 1992 UN Conference on the Environment and Development, a number of delegations suggested 1991 instead, with still others believing that no target date should be identified.

Talking Points

- We strongly support the IPCC as the key governmental mechanism in assessing the science and impacts of global warming as well as defining ways to respond to it, including common efforts to limit greenhouse gas emissions.
- As to the future, it is expected that the U.K., as the topic lead coordinator, will continue efforts to develop elements of a convention which will be discussed within the IPCC process, eventually leading to preparation of an actual text. (It should be noted that UNEP Executive Director Tolba is initiating his own effort to develop a text with the assistance of private advisors.)
- We strongly support early conclusion of a new convention on climate change and believe that the Vienna Convention provides a useful model.
- We would like to see the IPCC intensify its efforts to develop the actual text of an agreement in order to expedite negotiations.
- We believe our goal should be to develop a convention that can attract as wide participation as possible in light of the global nature of the problem, taking into account the needs and concerns of developing countries.
- To this end, we believe that it should establish substantial research, monitoring, and information exchange programs; provide a solid basis for technology transfer and financial assistance; and set forth a dynamic process for developing measures to limit and/or adapt to climate change in subsequent protocols.

DRAFT

Background Paper on International Institutions

DUTCH MINISTERIAL CONFERENCE ON ATMOSPHERIC POLLUTION AND CLIMATIC CHANGE

Background

Increasing attention is being given to the activities of existing international institutions relating to climate change, how they may be enhanced, and how they may be better coordinated. The IPCC Response Strategies Working Group, among other things, is to examine "existing legal and institutional mechanisms to determine how they may be used to implement options to limit or adapt to climate change" and consider "new legal and institutional mechanisms that could be used to implement options to limit or adapt to climate change." However, while there exists strong G-7 support for the IPCC, there is also general agreement that the IPCC process needs to be strengthened. The Paris Declaration also stressed the need to strengthen existing environmental institutions within the UN system.

At the same time, interest has been expressed in the creation of new multilateral authorities. The Dutch are currently proposing an annual ministerial forum to provide for international coordination on climate change. The Declaration of the Hague in March 1989, not signed by the U.S., called for "developing, within the framework of the United Nations, new institutional authority, either by strengthening existing institutions or by creating a new institution,...[and] decision-making procedures as may be effective even if, on occasion, unanimous agreement has not been achieved...[and that] will be subject to control by the International Court of Justice...."

One possibility discussed for invigorating UN institutions is to convert, by amending the UN Charter, the UN Trusteeship Council to a UN Global Environment Council (with perhaps ten permanent members and twenty changing members). The Council would deliberate on global environment issues and oversee the work of UNEP and UNDP. At the RSWG October workshop in Geneva, New Zealand proposed the establishment of a new UN organ, an "Environmental Protection Council," with authority to take binding actions in environmental areas.

The U.S. strongly supports the IPCC process as the key governmental mechanism in assessing the science and impacts of global warming as well as defining ways to respond to it. We favor enhancing the activities and coordination of existing institutions, but we oppose creation of new institutions, except as might be appropriate to implement a framework convention (e.g., a Conference of the Parties).

(It should be noted that the RSWG October workshop focused

its attention almost exclusively on a new convention since the countries' submissions, other than the U.S., did not address institutional issues.)

Four of the key institutions currently involved are the WMO, UNEP, the IPCC, and the UNGA. Additional important institutions and agreements are listed in an Attachment.

World Meteorological Organization (WMO): Coordinates world meteorological activities and encourages efficient exchange of meteorological information between countries. WMO, in cooperation with UNEP and the ICSU, also manages the World Climate Program, a four-part program consisting of applications, data, impact studies, and research.

UN Environment Program (UNEP): Promotes and coordinates international environmental cooperation, provides general policy guidance for environmental programs within the UN, and reviews the world environment situation to ensure that international environmental problems receive appropriate consideration by governments. UNEP manages the impacts portion of the World Climate Program; in addition, under its Regional Seas Program, UNEP has been active in assessing the question of sea level rise.

Intergovernmental Panel on Climate Change (IPCC): An ad hoc intergovernmental working group jointly established by WMO and UNEP. Three IPCC working groups are to assess available scientific information on climate change, assess available environmental and socio-economic impacts of climate change, and formulate response strategies; an IPCC interim report will be submitted September 1990. The U.S. chairs the RSWG.

United Nations General Assembly (UNGA): The UNGA addresses matters within the scope of the UN Charter or relating to the powers or functions of organs provided for in the Charter. It makes recommendations to UN members or to the Security Council except on disputes or situations in which the Security Council is already exercising its functions. In December 1988, UNGA adopted Resolution 43/53 on the Protection of Global Climate.

Talking Points

- We strongly support the IPCC as the key governmental mechanism in assessing the science and impacts of global warming as well as defining ways to respond to it, including common efforts to limit greenhouse gas emissions.
- To this end, we are pleased with the strong support given by WMO and UNEP to the ongoing work of the IPCC and to climate change in general and look forward to their continued active

collaboration.

- We are also pleased with the increasing participation of developing countries in the IPCC and will continue to explore means to enhance our support of their active involvement. We support the ongoing efforts of WMO to facilitate dissemination of scientific information on and development capacities to assimilate such information in developing countries.

- Implementation of the Vienna Convention/Montreal Protocol is also to be lauded. Its parties are moving aggressively forward to phase out CFCs and halons, which are also particularly potent greenhouse gases. We attach significant importance to their efforts, as well as facilitation of the participation of developing countries through active bilateral and multilateral technology transfer programs.

- We strongly share the view that existing institutions and programs should be fully utilized, strengthened, and redirected where appropriate.

- We also strongly agree with the need for a framework convention on climate change, which would presumably include the establishment of appropriate implementing mechanisms, such as a Conference of the Parties.

- The UNEP Regional Seas Program is to be commended for its contribution on a regional basis for the assessment of the implication of sea-level rise and concomitant consciousness-level raising.

- We also believe that the multilateral development banks and development assistance institutions have an important role to play in assessing the needs of developing countries in responding to climate change and facilitating the development of and transfer of appropriate technologies. Thus, we strongly support the active involvement of the World Bank, Regional Development Banks, and UNDP.

- FAO and ITTO also have important contributions to make in conserving forests. We should ensure cooperative support for the FAO, UNEP, UNDP, and WRI Tropical Forest Action Plan and ITTO as important means of limiting climate change that at the same time promote sustainable development.

- While recognizing that the OECD and the International Energy Agency (IEA) include only a portion of the state members represented here, they are actively engaged in the climate change issue, particularly on energy related matters and can play a useful role in sharing technical expertise.

- (As appropriate) While we recognize the importance of

communications among ministers on this as well as other issues, we question the need to institutionalize a ministerial gathering. It seems more appropriately an issue to be addressed in the context of developing a climate change convention.

ATTACHMENT

International Council of Scientific Unions (ICSU): Encourages international scientific activity by coordinating interdisciplinary scientific projects and working with appropriate nongovernmental and intergovernmental agencies.

International Geosphere-Biosphere Programme (IGBP): Interdisciplinary body under the ICSU within which the international scientific community seeks to understand the basic global processes, including the forces driving environmental change.

UN Educational, Scientific and Cultural Organization (UNESCO): Contributes to peace and security by promoting international collaboration in, among other things, science. (U.S. is not presently a member.)

Organization for Economic Cooperation and Development (OECD): OECD's environment work is supervised by the Environment Committee (ENVCOM). The ENVCOM has two groups working on climate change studies -- the Group on Energy and the Environment and the Group of Economic Experts. The Development Assistance Committee also provides a forum for coordinating donor efforts to address environmental problems in developing countries.

Economic and Social Council (ECOSOC): Studies and reports on international economic, social, cultural, educational, and health matters, including population issues. Makes recommendations to the UNGA, UN members, and specialized agencies.

UN Development Program (UNDP): Provides assistance in fields essential to technical, economic, and social development, including population problems, of developing countries. One of the trust funds under UNDP is the UN Fund for Science and Technology for Development.

International Bank for Reconstruction and Development (World Bank): Makes loans for projects for economic growth in less developed member countries. The Bank issued a global warming policy in September.

Regional Development Banks: Could give regional support for limitation or adaptation response options. Regional Banks include Inter-American, Indus Basin, African, Andean, Asian, Caribbean, Arab, Central American, European, OPEC, and Nordic.

Food and Agricultural Organization (FAO): Could assist adaptation to climate change by disseminating technical information and recommending action for agriculture and

OCT 18 1989

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Statement
William K. Reilly
Administrator, U.S. Environmental Protection Agency

Ministerial Conference
Atmospheric Pollution and Climatic Change

Noordwijk, The Netherlands
November 6, 1989

1

Mr./Mme. Chairman, Colleagues and Friends

The issue of global climate change forces us to look at our planet as an integral system. It also requires an integrated policy approach, for it is a scientific, energy, economic and foreign policy as well as environmental issue.

There is a growing consensus in the scientific community, that significant global warming due to man made greenhouse gas emissions is probable if current trends in these emissions continue. There are also significant uncertainties regarding both the magnitude and timing of warming and the implications of that warming for the climate system and environment.

The United States will substantially increase our budget for scientific research into the causes and consequences of climate change. President Bush has proposed a 43 percent increase in expenditures for answering critical scientific uncertainties related to climate change. Thus, we expect in the coming budget year to spend about \$192 million for this purpose. We are also making additional expenditures of about \$300 million on closely related global climate change issues.

Time, however, will not make the problem go away and we can not afford to wait until all the uncertainties have been resolved before we act. We need to provide insurance against the possible

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adverse impacts from the greenhouse effect. We urgently need, as a first step, a Framework Convention on climate change to mobilize and rationalize the efforts made by the international community.

I take pleasure in announcing, on behalf of President Bush, that the United States would be willing to host a meeting of all interested nations to open negotiations on a framework convention, if this is the consensus following the next IPCC meeting this coming February in Washington. The meeting would be held in 1990 at a time convenient to interested parties and build on the work of the IPCC.

As was done by the world community in 1985, in starting with the framework Vienna Convention to initiate protection of the ozone layer, we think an agreement setting out general principles or guidelines is the way to start dealing with global climate change. In our judgement, whatever controls over greenhouse gas emissions are appropriate is a matter to be dealt with in specific protocols as has been done in the Montreal Protocol on CFCs which followed two years after the Vienna Convention.

The United States believes, however, that a goal of stabilizing greenhouse gas emissions should be seriously considered in this process. Each nation needs to take stock of its own situation and identify and assess measures for moving toward stabilizing greenhouse gas emission levels. We in the United

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States are conducting this assessment.

The United States recognizes the special problems of developing countries in participating in the effort to address global environmental problems. We share their aspirations for better economic conditions. To this end we participate in and support a broad and evolving spectrum of bilateral and multilateral financial and technical assistance efforts -- many of which we helped initiate. We also recognize the need to reconcile the requirements for global economic development and a safe global environment.

Assistance is needed and will be provided. We have just launched a high level study on how to facilitate the transfer of environmental technology to countries that cannot afford to pay for it. We are also investigating the possibilities of debt for nature swaps and other innovative approaches.

We believe that the World Bank and other multilateral development banks have a particularly important role to play in promoting sustainable development, a role which we would expect to increase as the global community organizes itself to respond to climate change under a Framework Convention and supporting protocols. We strongly support the movement to have them incorporate environmental assessments into their decision making and to take account of the greenhouse effect when evaluating energy

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and other projects.

In conclusion, we recognize that we are all in the same boat together with respect to global climate change. As President Bush said with respect to the problem of global warming in his recent address to the United Nations, "The United States will do its part;" but success will require the cooperation of all countries. Agreeing on a sound set of international responses is not a simple task; but we are committed to working towards this end building on the foundation of a Global Climate Convention.

Thank you very much.

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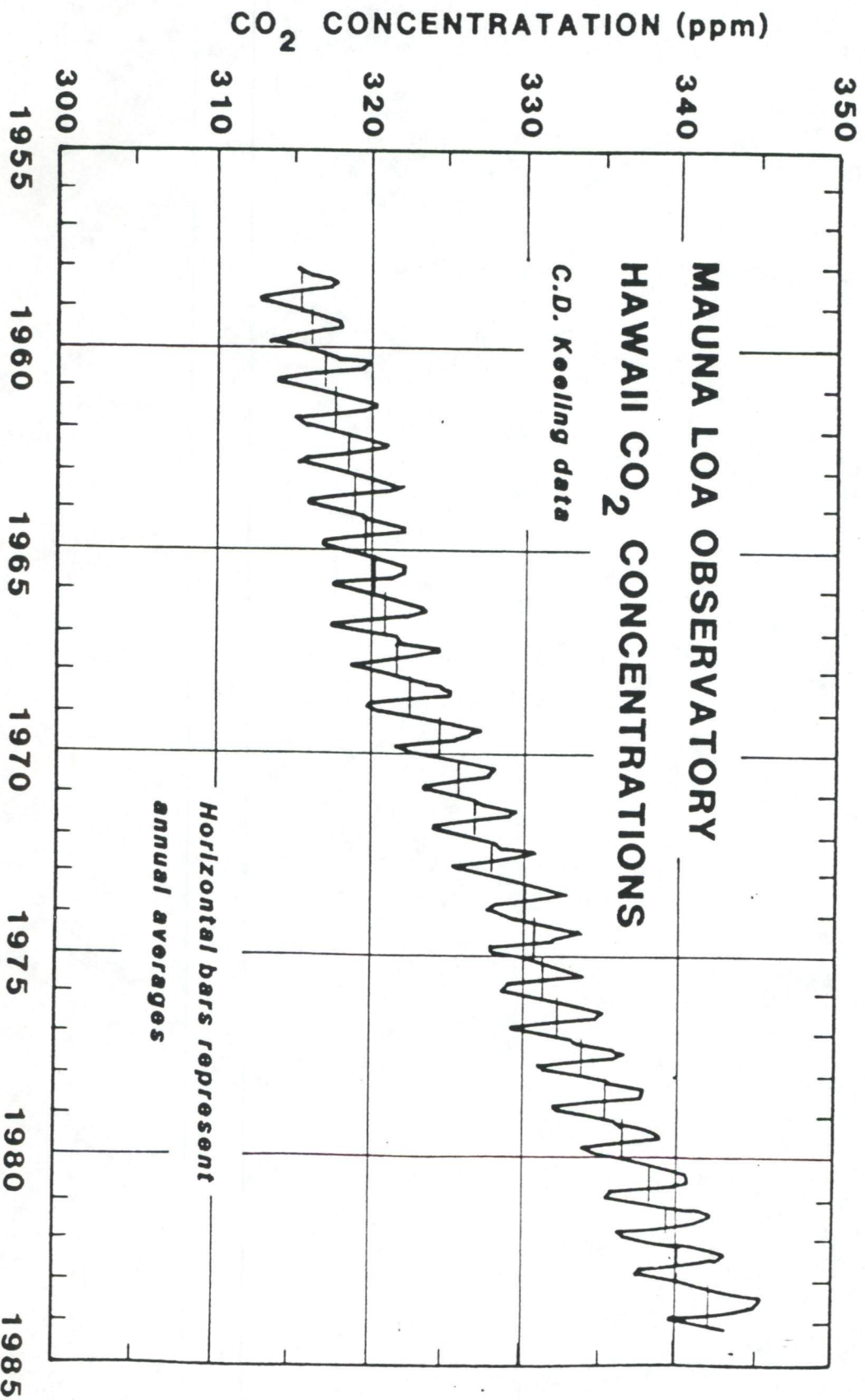
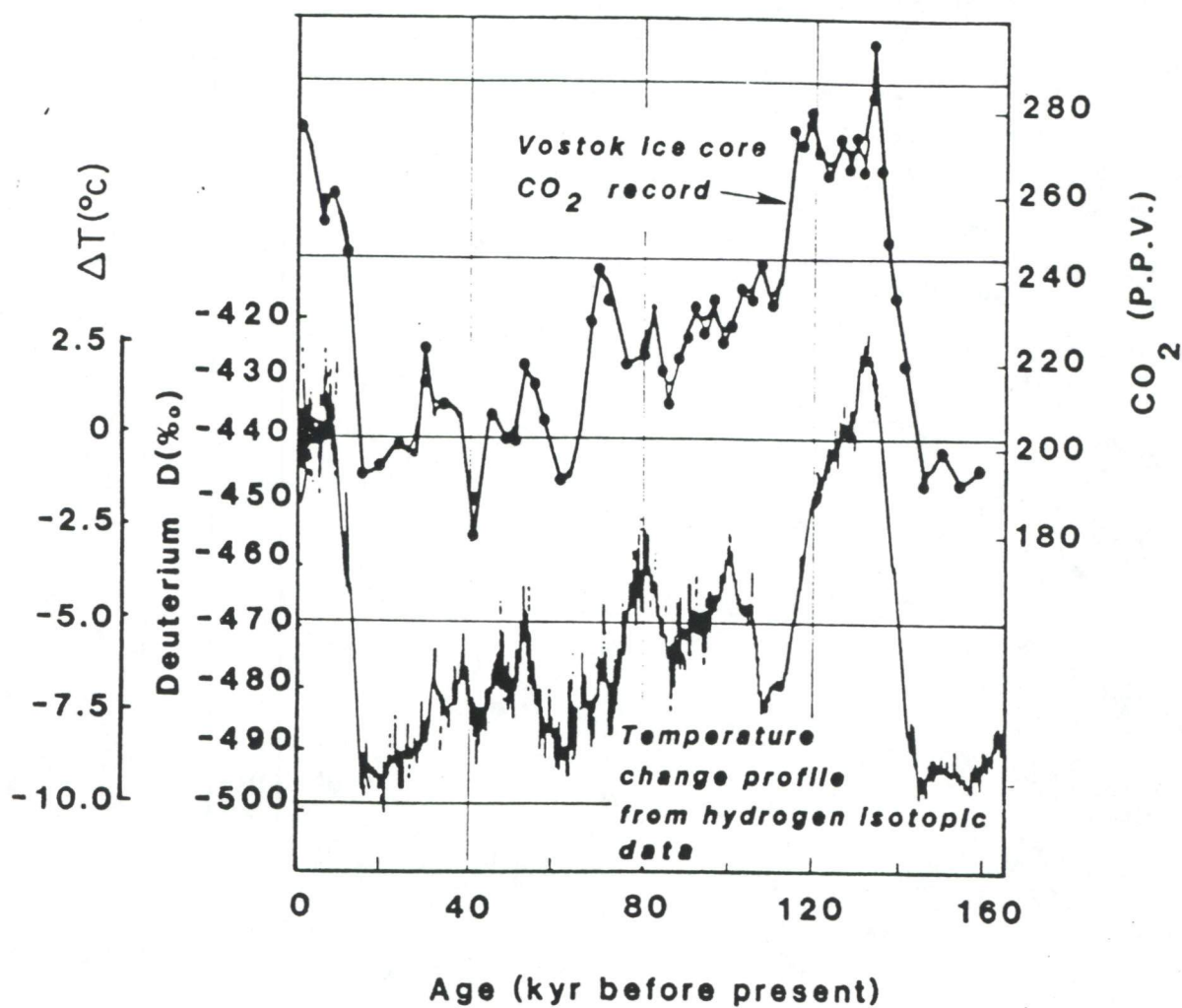


Figure 1

CARBON DIOXIDE CONCENTRATIONS and ATMOSPHERIC TEMPERATURE CHANGES



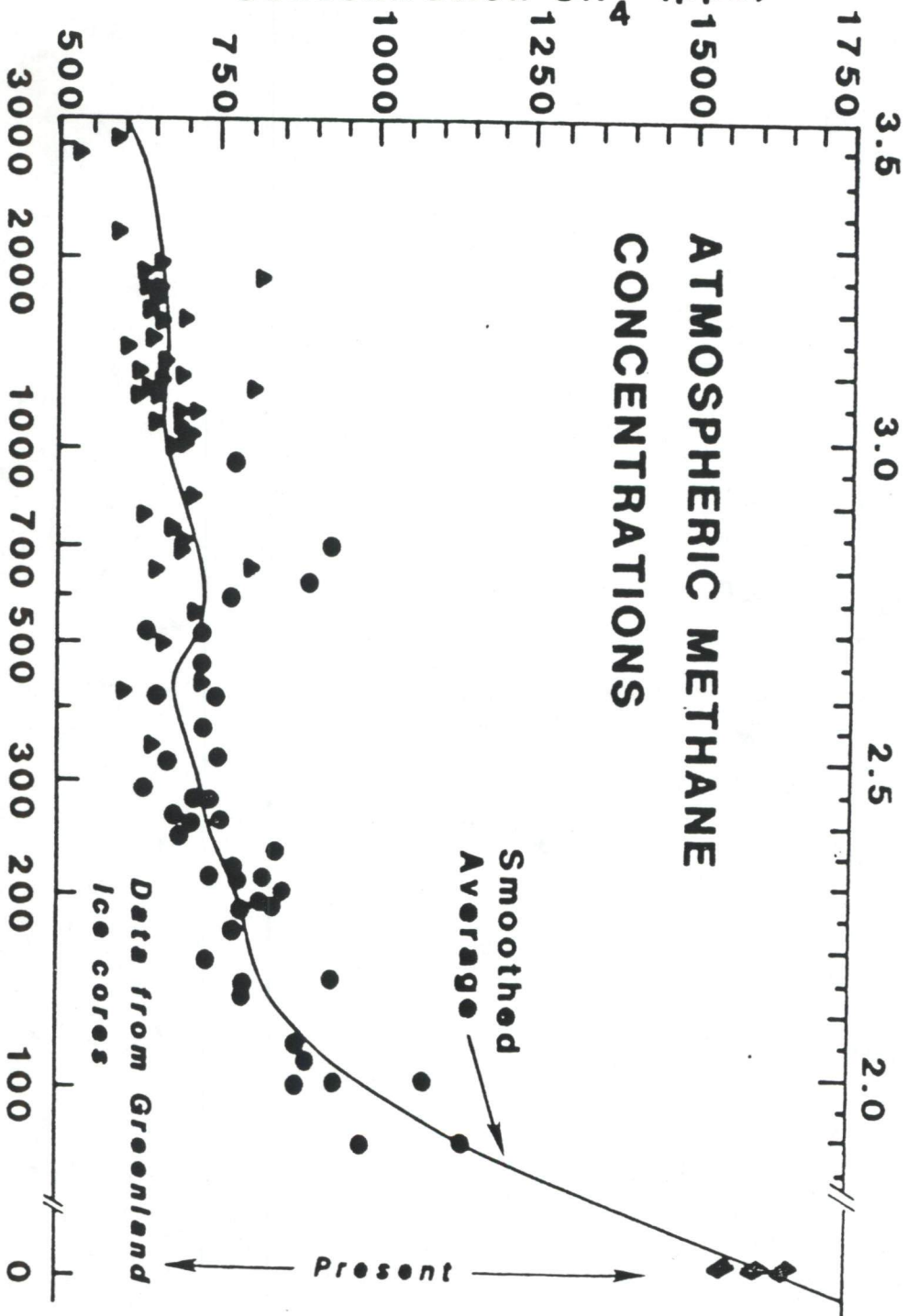
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Figure 3

Log (age yrs. B.P.)

ATMOSPHERIC METHANE CONCENTRATIONS

Concentration CH₄ (ppb)



Time (yrs. before present)

Figure 6

METHANE CONCENTRATIONS AS FUNCTIONS OF TIME

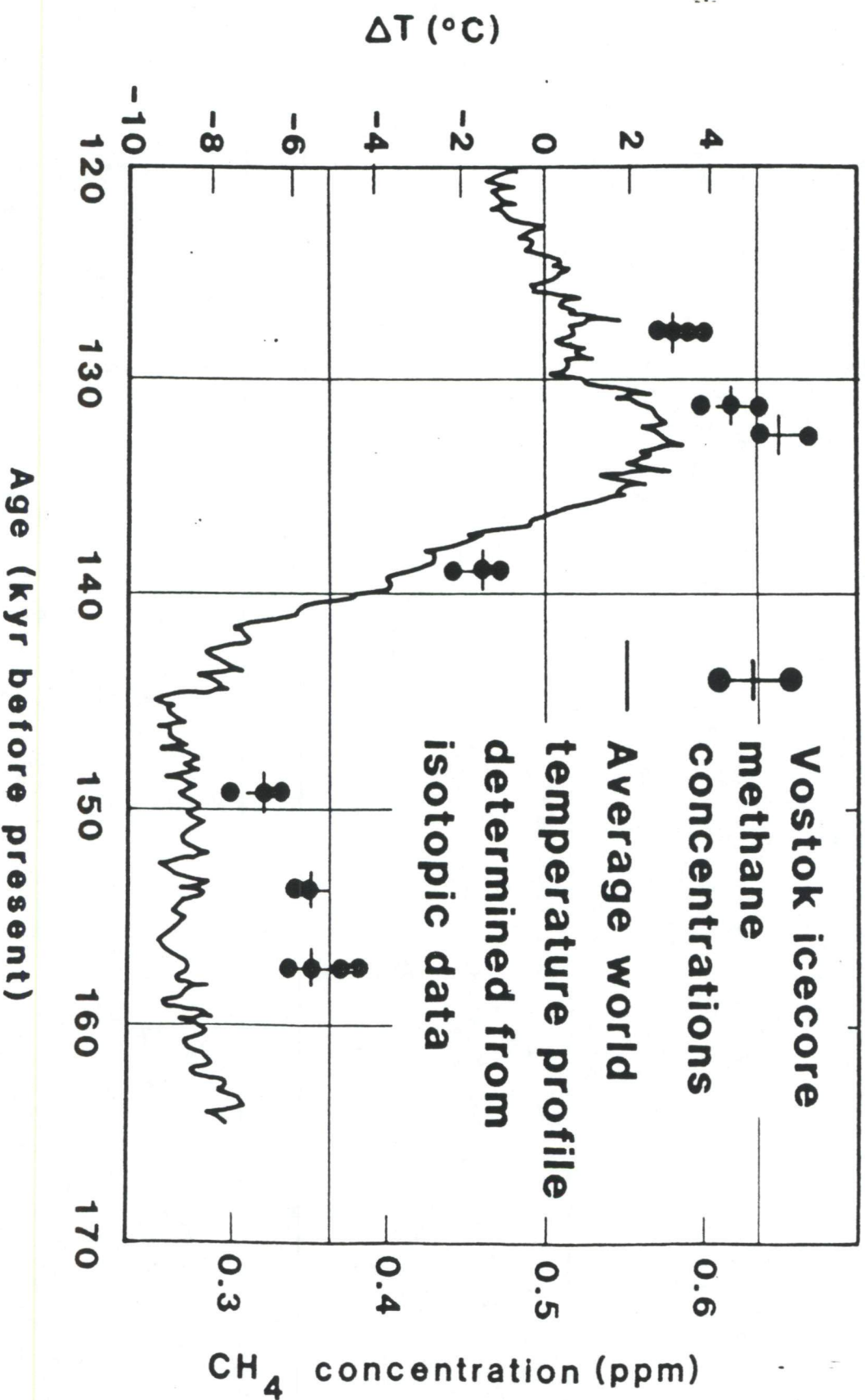


Figure 6

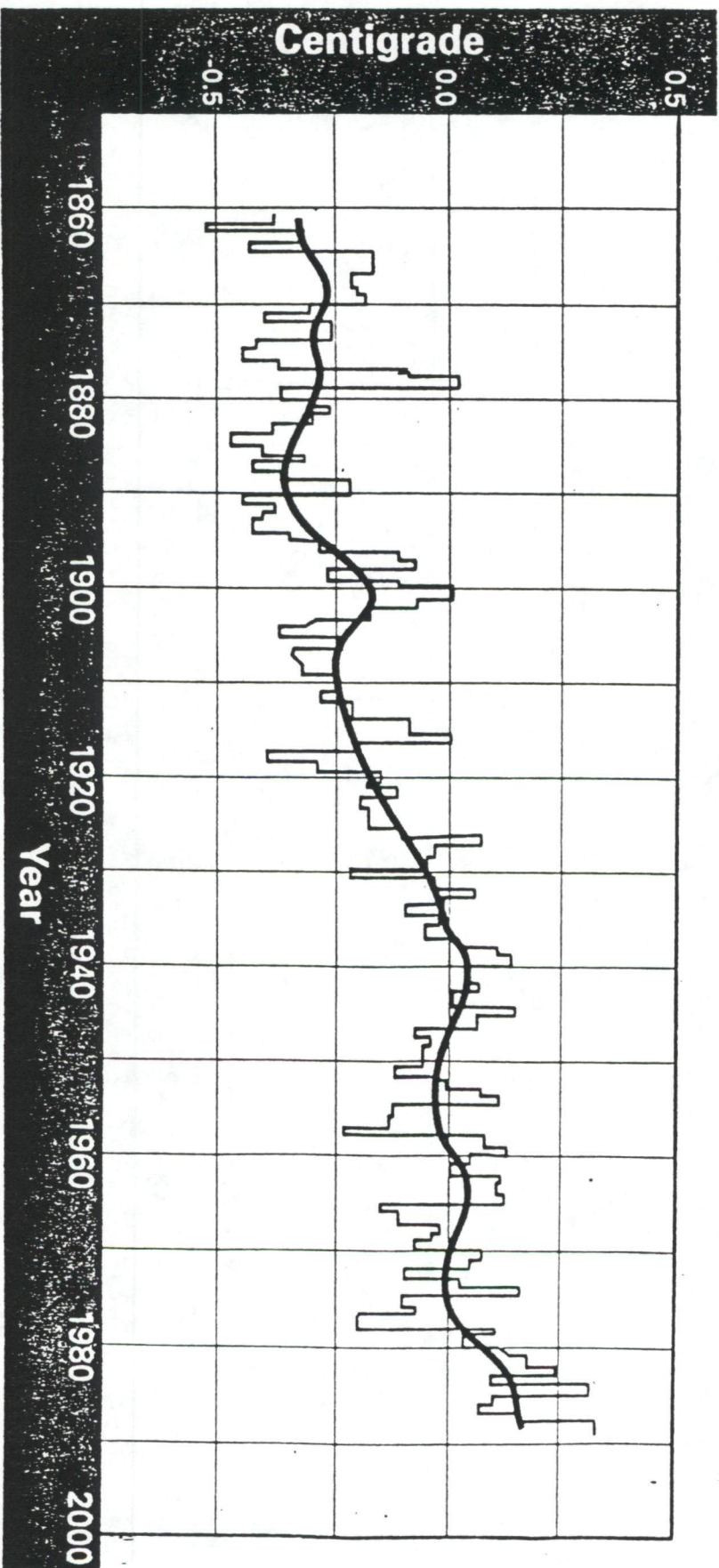


Figure 7

THE GREENHOUSE PROBLEM

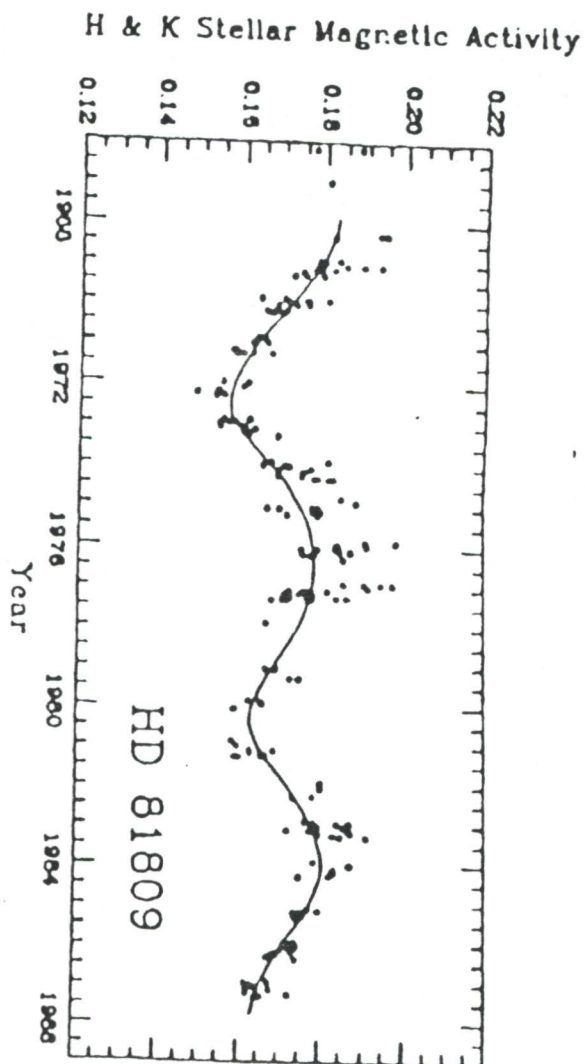


Figure 6. An 8-year cycle of changes in surface activity in HD 81809.

THE GREENHOUSE PROBLEM

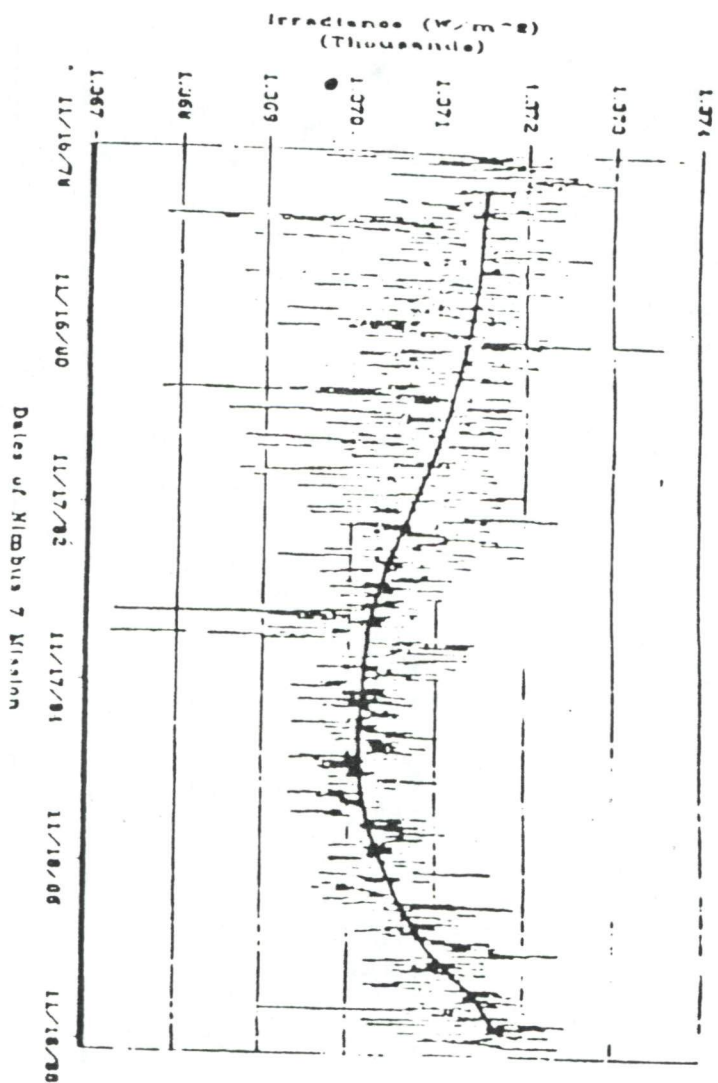


Figure 4. Changes in the solar constant between 1978 and 1988.

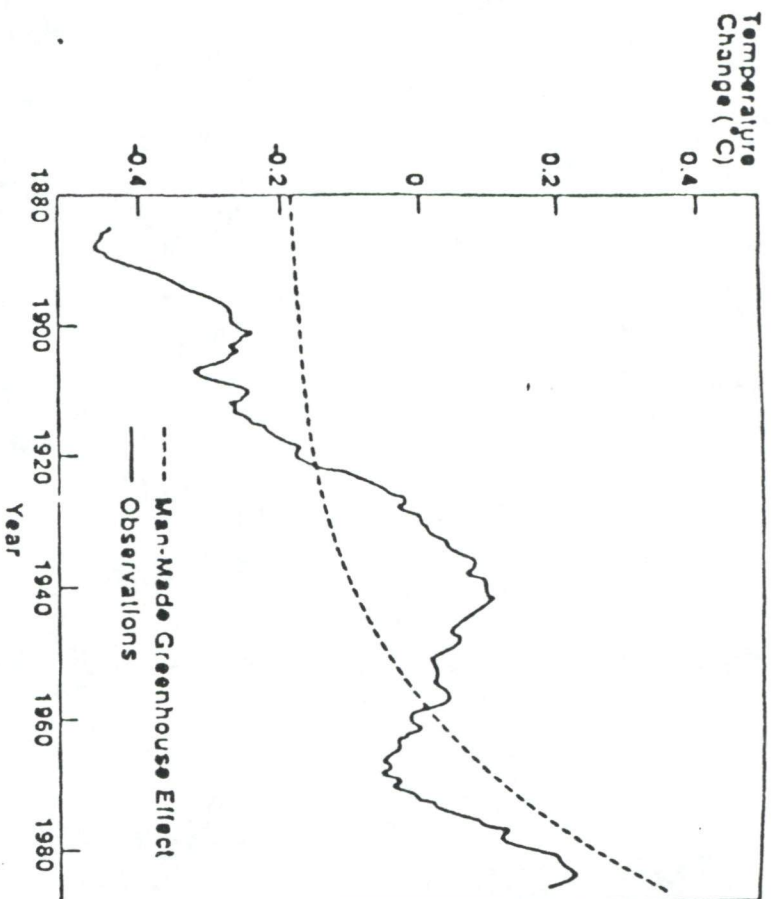


Figure 1. Comparison between observed global average temperature and calculations based on the greenhouse effect. The dashed line indicates the calculated temperature increase caused by the greenhouse effect since 1880. The solid line indicates the observed temperatures for the same period.

NEWS AND VIEWS

CLIMATE CHANGE

Wetter clouds dampen global greenhouse warming

Tony Slingo

VARIATIONS in cloudiness can significantly affect the Earth's radiation budget — the absorbed solar energy and the thermal energy radiated back to space¹. This conclusion is supported by various modelling studies of the 'greenhouse' effects of increased CO₂ concentrations²⁻⁴. In these studies, the CO₂ forcing induces changes in the cloud coverage and liquid-water content, which alter the radiation budget further and thus modify the original perturbation. On page 132 of this issue⁵, Mitchell *et al.* add a new twist to the story, showing how changes in the relative amounts of ice-crystal and water-drop clouds substantially reduce the sensitivity of their model to changes in concentration of CO₂. Indeed, it is becoming apparent that uncertainties in the treatment of clouds severely undermine model prediction of climate.

Mitchell *et al.* used various versions of the UK Meteorological Office atmospheric general circulation model⁶ coupled to a 50-m ocean mixed layer⁷. Replacing the standard cloud prediction scheme based on relative humidity by a more sophisticated prescription including liquid water and ice virtually halves the average equilibrium surface warming due to doubled CO₂ — from 5.2 K to 2.7 K. They argue that this spectacular sensitivity to details of the cloud scheme is caused by the replacement of ice clouds by water clouds near the freezing level. In the new cloud scheme, the fall-speed assumed for water drops is much smaller than that for ice crystals, so that liquid-water clouds can dissipate more slowly than ice clouds. According to Mitchell *et al.*, this leads to the predicted relative increase in water clouds near the freezing level, which consequently reduces the amount of solar energy absorbed in the system (more is reflected back into space) and hence gives a smaller warming. When, in addition, cloud radiative properties are allowed to depend on the liquid-water content of clouds, the surface warming drops still further, to only 1.9 K.

The strong dependence of the magnitude of cloud feedback in this work on the details of the model parallels results presented recently⁸ by a large *ad hoc* group (including Mitchell and myself) led by Robert Cess of the State University of New York. We compared 14 general circulation models and found a three-fold variation in global climate sensitivity, caused largely by differences in the cloud feedbacks. The models disagreed not only as to the magnitude but also the sign of the net cloud feedback. For this reason, it is

clear that uncertainty in how to formulate clouds represents a formidable obstacle to reliable climate prediction.

This underlines the continuing need for physical parameterizations to be compared with results from field studies. This is particularly important now that models are becoming increasingly complex. Mitchell *et al.* argue that the assumptions in their model are 'at least qualitatively realistic', but if climate change simulations are to be believable, then all parts of a model must be validated quantitatively, and important processes that are ignored must be identified. Of particular relevance to the cloud problem is the FIRE programme (first regional experiment of the international satellite cloud climatology project), both in its stratocumulus⁹ and cirrus¹⁰ field phases. Several papers are in preparation that highlight the complexity of the meso-scale dynamical structure of cirrus, so that the fall-speed of ice crystals is only part of the story. It is also interesting that two cases of highly supercooled liquid-water altostratus clouds at temperatures around -30 °C were observed (A.J. Heymsfield *et al.*, personal communication), which suggests that the transition from water to ice clouds is more subtle than Mitchell *et al.* assumed for their model.

The substantial sensitivity of climate models to the details of their formulation,

and the fact that 14 models give 14 different answers for the cloud feedback, show that we are far from the goal of accurate predictions of future climate change. Sensitivity studies such as that reported by Mitchell *et al.* and comparisons between models as done by Cess *et al.* are now the bread and butter of climate modelling. But at the present rate of progress, it will be several years before reliable predictions of global and regional climate change are available from the models. That underlines the need for comprehensive monitoring that is capable of unravelling the climate change signal from the noise and of providing enough data on the state of the atmosphere, the Earth's radiation budget and clouds for the feedbacks to be determined by observation. Such an analysis may well yield the fifteenth answer but at least it will have come from the real world and will permit a much needed test of the models. □

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1. Ramanathan, V. *et al.* *Science* **243**, 57-63 (1989).
2. Schlesinger, M.E. & Mitchell, J.F.B. *Rev. Geophys.* **25**, 765-798 (1987).
3. Schlesinger, M.E. *Nature* **328**, 303-304 (1988).
4. Roeckner, E. *Nature* **328**, 304 (1988).
5. Mitchell, J.F.B., Senior, C.A. & Ingram, W.J. *Nature* **341**, 132-134 (1989).
6. Slingo, A., Wilderspin, R.C. & Smith, R.N.B. *J. Geophys. Res.* **94**, 2281-2301 (1989).
7. Wilson, C.A. & Mitchell, J.F.B. *J. Geophys. Res.* **92**, 13315-13343 (1987).
8. Cess, R.D. *et al.* *Science* **246**, 513-518 (1989).
9. Albrecht, B.A., Randall, D.A. & Nicholls, S. *Bull. Am. met. Soc.* **69**, 619-626 (1988).
10. Starr, D.O.C. *Bull. Am. met. Soc.* **68**, 119-124 (1987).

ECOLOGY

Just proportions in food webs

Joel E. Cohen

IN FOOD webs of natural communities with varying numbers of species, the number of green plants and other species that consume no prey in the web (basal species) is nearly proportional, on average, to the number of species that have both predators and prey in the web (intermediate species), according to studies reported over the past dozen years¹⁻⁴. Empirical rules^{5,6} of that type describe structural or anatomical properties of food webs. An important question in community ecology is whether parallel regularities exist in the way in which food webs function^{7,8}. On page 142 of this issue⁹, McNaughton *et al.* report remarkable regularities in measures of food web function. Their findings indicate the existence of a physiology of food webs that generalizes across natural communities. Their report opens up the distant, but highly attractive, prospect of linking the previously known structural regularities

with new functional patterns.

McNaughton *et al.* show that the biomass, consumption and net secondary productivity (NSP) of herbivores are all related to the net above-ground primary productivity (NAP) of a natural habitat by simple power laws. Particularly striking is that the exponent of the power law that relates NSP to NAP is not significantly different from 1: to a first approximation, NSP and NAP are directly proportional. In effect, the energy converted into herbivores per square metre of surface area per year is, on average, about one-thousandth of the energy that is converted into plants per square metre of surface area per year. The ecological energy pyramid has a much larger base than second storey.

This proportionality would be a triviality if secondary productivity were passively controlled and limited by primary productivity. But this trickle-down view of

LETTERS TO NATURE

TABLE 2 Newtonian error and signal strength

Distance r (m)	Maximum 1- μm shape error		Fifth force	
	Displacement $r^2 S$ (m s^{-2})	Strain $r^2 h$ (s^{-2})	Displacement $r^2 S \lambda^2 / \alpha$ ($\text{m}^3 \text{s}^{-2}$)	Strain $r^2 h \lambda^2 / \alpha$ ($\text{m}^2 \text{s}^{-2}$)
2	4×10^{-16}	2×10^{-17}	1.1×10^{-13}	3×10^{-13}
4	1.3×10^{-18}	3×10^{-18}	1.4×10^{-14}	2×10^{-14}
8	4×10^{-21}	5×10^{-21}	1.8×10^{-15}	1.3×10^{-15}

The results detailed here show that it may be feasible to use the asymmetric monopole to test the fifth-force hypothesis, although the experiment is obviously not easy, and practical problems remain to be examined in detail. For example, there are small elastic distortions in a rotating body as a result of centrifugal forces. The shape defined by Table 1 is the shape that must be achieved at the final rotation speed. A numerical calculation would give the correct initial shape for a given material. Advantages of the experiment are that the experiment is a null one and one can adjust the shape to find the null, and that only octupole-patterned deformations give rise to error signals as large as in Table 2. Also, the parameters I have chosen (size, distance, tolerance and material) are nominal. There is also the possibility that a refinement of this idea, or an incorporation of the mathematical idea into other experimental techniques (such as torsion balances) may prove effective. I note that the experiment would not depend on any variation of the fifth force with chemical composition, as do many of the recent experiments.

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1. Sinsky, J. A. *Phys. Rev.* **187**, 1145-1151 (1968).
2. Miyakawa, K. & Kuroda, K. *Phys. Rev. D* **30**, 342-346 (1985).
3. Stubbs, C. W. *Nature* **338**, 301-302 (1989).
4. Stacey, F. D. et al. *Rev. Mod. Phys.* **59**, 157-174 (1987).
5. Duff, G. F. D. & Naylor, D. *Differential Equations of Applied Mathematics* 386 (Wiley, New York, 1986).
6. Ward, H. et al. *Proc. Int. Symp. Exp. Gravitational Phys.* (eds Misner, C. W., Hu, Y.-L. & Pizzetti, G.) 322-327 (World Scientific, Singapore, 1988).
7. Del Fabro, R. et al. *Phys. Lett. A* **134**, 253-257 (1987).
8. Del Fabro, R. et al. *Phys. Lett. A* **138**, 237-240 (1987).
9. Thorne, K. S. in *300 Years of Gravitation* (eds Hawking, S. W. & Israel, W.), 330-458 (Cambridge University Press, 1987).

ACKNOWLEDGEMENTS. I thank G. Gibbons for discussions about the fifth force, J. Hough for discussions about gravity-wave detectors and M. Hindmarsh for practical help.

CO₂ and climate: a missing feedback?

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THE potential of changes in cloud properties to modulate climate perturbations is well known^{1,2}. Changes in cloud amount and cloud height³, cloud radiative properties⁴⁻⁶ and cloud condensation nuclei⁷ (CCN) have all been recognized as possible sources of climate feedbacks. Here we report results of simulations that indicate that the changes of state of cloud water may provide a substantial negative feedback on climate. The feedback is concentrated in mid-latitudes and affects both the magnitude and distribution of the climate change expected from increases in 'greenhouse' gases. Improved measurements and parameterizations of cloud processes are needed to quantify this process.

The model is an 11-level atmospheric general-circulation model on a $5^\circ \times 7.5^\circ$ (latitude $\times$ longitude) horizontal grid coupled to a 50-m mixed-layer ocean with a prescribed seasonally and geographically varying oceanic heat convergence to represent heat advection by ocean currents⁸. In the standard

model⁸ cloud cover is a function of relative humidity. A second version of the model was constructed with an explicit cloud-water variable for all but deep convective cloud⁹. A balance is maintained between cloud water content and water vapour, which is altered by dynamical, convective and boundary-layer processes. Cloud water content is depleted by precipitation at a rate dependent on the phase of the cloud water, which is a function of the local temperature of the layer. For water cloud the rate of conversion to precipitation increases as a function of the in-cloud water content and is marginally enhanced in the presence of precipitation from higher layers. The transition from water cloud to ice cloud occurs between -15°C and 0°C as a smoothly varying function of temperature. Ice-cloud particles are assumed to start falling as soon as they form, with a fixed fall speed of 1 m s^{-1} . The rate of precipitation of ice is, on average, an order of magnitude greater than that of water even in the presence of precipitation from the layer above. Cloud radiative properties were prescribed. Note that although the revised cloud scheme is more detailed, it is not necessarily more accurate than the less sophisticated scheme. Our work highlights how different parameterization schemes can affect the sensitivity of the climate to CO₂.

Two simulations, with CO₂ concentrations of 320 and 640 p.p.m., were performed for each version of the model. The results shown here are averaged over five years after the simulations reached equilibrium. On replacing the relative-humidity cloud scheme⁸ (henceforth referred to as RH) with the model based on cloud water content⁹ (CW), the global annual average surface warming is reduced from 5.2 K to 2.7 K. The largest fractional reduction in the warming occurs in higher latitudes (Fig. 1a) where the large decreases in total cloud cover with RH have been replaced by much smaller reductions or slight increases (Fig. 1b).

With RH, reductions in cloud cover are found throughout the depth of the mid-latitude troposphere (Fig. 2a), as in earlier studies³. With CW, the main differences in response occur near the freezing level (Fig. 2b) where, in the warmer doubled-CO₂

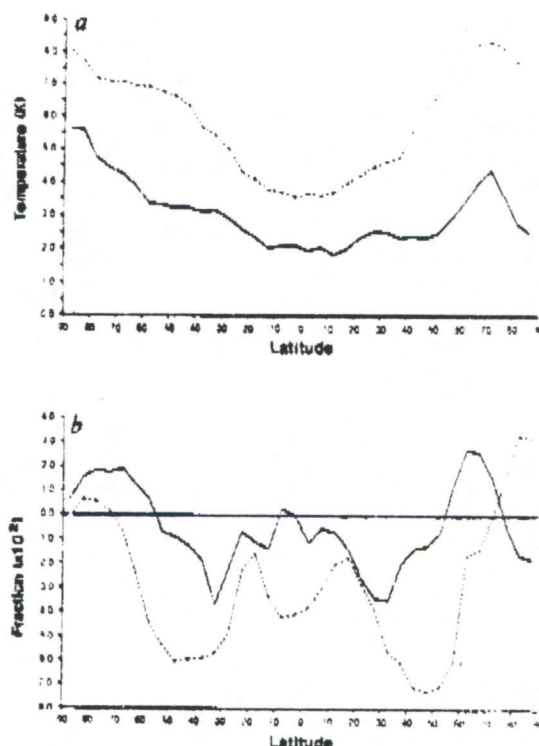


FIG. 1 Zone-averaged equilibrium changes in a, surface temperature and b, fractional cloud cover on doubling CO₂ (five-year means). Solid line, simulation with CW. Dashed line, simulation with RH.

simulation, ice cloud which is depleted rapidly by precipitation is replaced by water cloud which is depleted more slowly, so that cloud cover increases. This can be seen more clearly in the height-latitude distribution of the changes in cloud liquid water and cloud ice (Fig. 3). Also shown are the mean 0 °C and -15 °C isotherms in the control simulation. Because of the increases in cloud, the enhanced absorption of solar radiation in mid-latitudes found with RH is greatly reduced when using CW (Fig. 4).

One can define a climate sensitivity parameter λ ($=\Delta Q/\Delta T$) where ΔQ is the change in radiative heating at the tropopause on doubling CO_2 and ΔT is the equilibrium change in surface temperature. Assuming¹⁰ $\Delta Q = 4 \text{ W m}^{-2}$, λ is increased from 0.77 to $1.48 \text{ W m}^{-2} \text{ K}^{-1}$ on replacing RH by CW. Thus changes in the phase of cloud water provide a strong negative feedback on climate, cancelling almost all the previous strong positive feedback from cloud in RH¹¹. Although our model does not allow for this process in deep convective clouds, these have a small areal coverage and a relatively high liquid-water content,

however, suggesting that any radiative feedback from this type of cloud would be small.

The lower-cloud increases in the simulations arise from the assumption that under similar conditions ice is removed more efficiently from cloud than water. In real water clouds, relatively few droplets become large enough to fall out, as the available condensed water is spread over many cloud condensation nuclei (CCN)¹². Very few CCN act as ice nuclei¹³, so in ice clouds the cloud water is spread over fewer, larger particles, all of which have appreciable fall speeds¹⁴. The microphysics of mixed-phase clouds are complex and not fully understood. Although our model does not explicitly represent them it effectively includes their most important aspect, the continual rapid conversion of water to ice¹⁵. A more complex representation would certainly change the pattern in Fig. 2 locally, but the vertically integrated response would probably depend primarily on the overall change from pure ice cloud to pure water cloud. Thus our assumptions concerning the relative fall-out of ice and water are at least qualitatively realistic.

As 1 m s^{-1} may be a large value for ice fall speed, we have rerun experiment CW using a parameterization of fall speed in terms of ice-water content based on observations¹⁴ (experiment CWH). For typical simulated ice-water contents, this gives fall speeds of 0.2 m s^{-1} for high ice cloud and 0.7 m s^{-1} for ice cloud near the freezing level. Cloud changes (Fig. 2c) are qualitatively similar to Fig. 2b and the global warming is 3.2 K, only slightly larger than in CW. The similarity between CW and CWH is to be expected, given that the depletion rate of ice relative to water is large near the freezing level in both experiments.

It has recently been suggested that changes in cloud radiative properties may contribute an important feedback to climate^{4,5,16}. In a warmer climate, greater cloud water content would increase cloud albedos (a negative feedback) and emittances (a positive feedback). A further experiment was carried out using the revised version of the model with an additional modification to

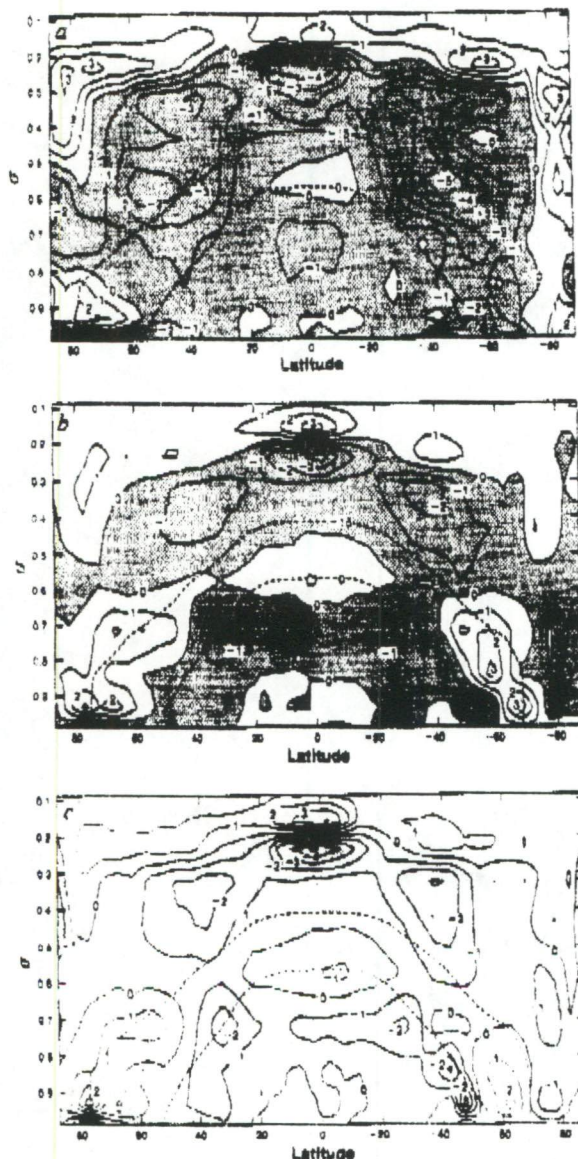


FIG. 2 Height-latitude cross-section of equilibrium changes in cloud amount on doubling CO_2 . The height coordinate is σ (pressure/surface pressure). Areas of reduction are stippled and the contours are every 1%. The dashed lines are the 0 and -15 °C contours from the control simulation. a, Simulation with RH. b, Simulation with CW. c, Simulation with CWH.

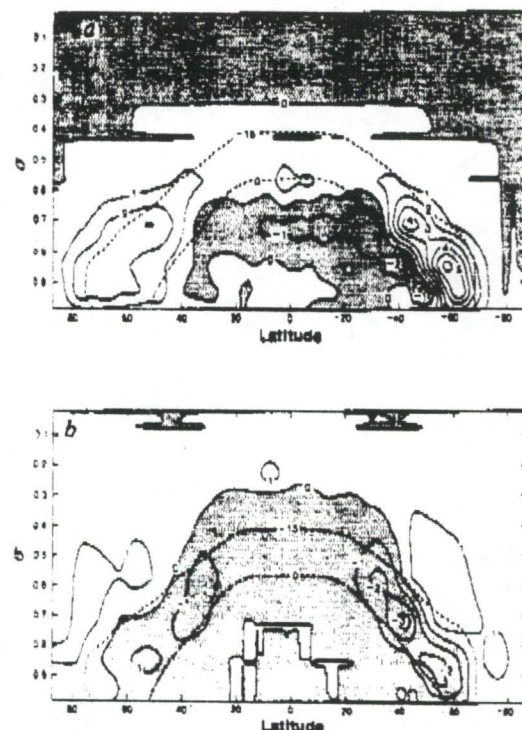


FIG. 3 Height-latitude cross-section of equilibrium changes in cloud water in CW on doubling CO_2 . The height coordinate is σ . Areas of reduction are stippled. The dashed lines are the 0 and -15 °C contours from the control simulation. a, Liquid-water content only. Contours every $4 \times 10^{-8} \text{ kg kg}^{-1}$. b, Ice-water content only. Contours every $4 \times 10^{-8} \text{ kg kg}^{-1}$.

LETTERS TO NATURE

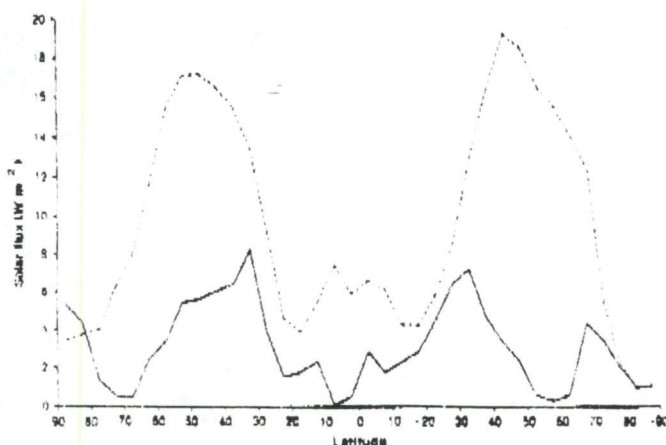


FIG. 4 Zone-averaged equilibrium change in net solar flux at the top of the atmosphere on doubling CO_2 (five-year mean). Solid line, simulation with CW. Dashed line, simulation with RH.

allow the cloud radiative properties to depend on the cloud water content (scheme CWRP). (Given the similarity between CW and CWH, this experiment was carried out with the CW formulation only.) Analytical fits of the short-wave albedo and transmittance as functions of cloud-water path and solar zenith angle were made to a published scheme¹⁷ based on observations and theoretical considerations. The long-wave flux emittance was given by $(1 - \exp(-\kappa q))$ where q is the condensed-water path and $\kappa = 0.13 \text{ m}^2 \text{ g}^{-1}$ for water clouds and $0.065 \text{ m}^2 \text{ g}^{-1}$ for ice clouds¹⁸.

On doubling the CO_2 concentrations the global annual average equilibrium surface temperature increased by 1.9 K with CWRP compared to 2.7 K with prescribed cloud radiative properties (CW), indicating a further increase in λ to $2.1 \text{ W m}^{-2} \text{ K}^{-1}$. This negative feedback from changes in cloud radiative properties lies between the very strong negative feedback suggested by one-dimensional calculations^{16,19} and the positive feedback found in a previous study with a low-resolution general-circulation model (GCM)⁴⁻⁶. We note that all existing numerical studies assume that the number of CCN remains constant under climate change. Changes in CCN are a further possible source of feedback^{7,20}.

The sensitivity of the climate to doubling the CO_2 concentrations that we have found is substantially smaller than the 4–5 K found in other recent studies^{10,21}. A significant part of this reduction in sensitivity is due to the different cloud scheme. If correct this will have two important consequences. First, the equilibrium warming expected from the estimated 2 W m^{-2} increase in radiative heating at the tropopause since 1860 (ref. 9) will be smaller. Second, the proportion of the equilibrium reached will be greater, because the thermal response time of the climate system is reduced if climate sensitivity is reduced²². Based on calculations using a simple one-dimensional model of the ocean, the expected warming to date, using the climate sensitivity found when employing CW, is 0.6 K. This is close to the observed warming since the beginning of the century (0.5 K; ref. 23). The record of observations shows considerable variability on interannual and interdecadal timescales, however, including a period of cooling during the 1950s and 1960s, so that it is not possible to attribute the 0.5 K rise unambiguously to the effect of increases in trace gases. □

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1. Manabe, S. & Wetherald, R. T. *J. Atmos. Sci.* **34**, 241–250 (1987).
2. Schneider, S. H. *J. Atmos. Sci.* **29**, 1413–1422 (1972).
3. Wetherald, R. T. & Manabe, S. *J. Atmos. Sci.* **48**, 1397–1415 (1991).
4. Roeckner, E. et al. *Nature* **328**, 138–140 (1987).

5. Roeckner, E. *Nature* **328**, 304 (1988).
6. Schlesinger, M. E. *Nature* **328**, 303–304 (1988).
7. Chanson, R. J. et al. *Nature* **328**, 418–420 (1988).
8. Mitchell, J. F. B. & Warrilow, D. A. *Nature* **328**, 238–240 (1987).
9. Smith, R. N. B. *Q. J. R. Met. Soc.* (in the press).
10. Dickinson, R. E. & Clisamore, R. J. *Nature* **328**, 108–115 (1988).
11. Wilson, G. A. & Mitchell, J. F. B. *J. Geophys. Res.* **92**, 12315–12343 (1987).
12. Pruppacher, H. R. & Klett, J. D. *Microphysics of Cloud and Precipitation* (Reidel, Dordrecht, 1978).
13. Heymsfield, A. J. & Sabin, R. M. *J. Atmos. Sci.* **46**, 2262–2264 (1989).
14. Heymsfield, A. J. *J. Atmos. Sci.* **34**, 367–381 (1977).
15. Mason, B. J. *The Physics of Clouds* (Clarendon, Oxford, 1957).
16. Somerville, R. C. J. & Raman, L. A. *J. Geophys. Res.* **89**, 9666–9672 (1984).
17. Liu, K.-N. & Wittman, G. D. *J. Atmos. Sci.* **36**, 1261–1273 (1979).
18. Stephens, G. L. *J. Atmos. Sci.* **38**, 2123–2132 (1981).
19. Somerville, R. C. J. & Jacobellis, S. *Am. Met. Soc. 7th Conf. Ocean-Atmos. Interaction* 53–55 (1988).
20. Liu, K.-N. & Ou, B.-C. *Preprints of 10th Int. Cloud Phys. Conf.* Vol. II, 118–120 (1988).
21. Schlesinger, M. E. & Mitchell, J. F. B. *Rev. Geophys.* **25**, 760–786 (1987).
22. Hansen, J. E. et al. *Geophysical Monograph Series* Vol. 29, 130–163 (American Geophysical Union, Washington, DC, 1984).
23. Jones, P. D. et al. *Nature* **328**, 790 (1988).

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Disequilibrium silicate mineral textures: fractal and non-fractal features

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IGNEOUS rocks formed from lava flows of the Archean era (>2,700 million years ago) are often found to contain disequilibrium-textured crystals characterized by spherulitic, branching or dendritic morphologies that occur in layers near the flow surface. Well-known examples are the plagioclase spherulites of basalts and the platy and branching spinifex-textured olivines and pyroxenes of komatiites^{1,2}. Here we present evidence that, over a finite range of length scales, some disequilibrium textures are scale invariant. This observation implies that over this range of length scales their random patterns can be quantitatively characterized by a unique number, the fractal dimension³. We also demonstrate that some textures have a crossover from fractal to non-fractal behaviour. It is known that most disequilibrium crystals arise in part from rapid cooling and represent the case where the growth rates of the crystals are large compared to the diffusion rates in the silicate melt^{1,2,4}. We therefore formulate a quantitative model for the growth that is based on a variant of diffusion-limited aggregation (DLA)⁵.

Figure 1 shows a section of small disequilibrium crystals, at different magnifications. These form close to the quench/glassy margin of some lava flows⁶, and their outline remains the same as the microscope objective power is increased. Similar remarks can be made about textures on other length scales, such as the much larger branching pyroxene crystal of Fig. 2a.

The concepts and techniques of fractal geometry⁷ have proven useful in understanding other random morphologies, in part because a fractal object is characterized quantitatively by a number, the fractal dimension d_f , that relates the increase in mass M of the object to its characteristic length scale L , $M \propto L^{d_f}$ (ref. 7).

To determine d_f we digitized photographs of the textures using a video camera with a grid of 65,536 pixels. First we randomly chose any pixel belonging to the digitized texture. About this 'local origin' we constructed a sequence of concentric shells of

-FINAL DRAFT-

COMPARISON OF HAZARDOUS AIR POLLUTANT
PROVISIONS OF
H.R. 4, S. 816 H. R. 2585,
AND ADMINISTRATION BILL

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DEFINITION OF MAJOR SOURCES

- HR. 4 - A "major source" is defined as any stationary source, including all units of the source within a contiguous area and under common control that emits, or has the potential to emit in the aggregate, considering controls, 10 tons per year or more of any one hazardous pollutant, or 25 tons per year in combination. EPA may establish a lesser quantity, or for radionuclides, different criteria, at its discretion.
- S. 816 - A "major source" is defined as any stationary source, including all emission points and units of the source within a contiguous area and under common control, that emits, considering installed and operating controls, in the aggregate, 10 metric tons per year or more of any one hazardous pollutant, or 25 metric tons per year in combination. EPA may establish a lesser quantity, or for radionuclides, different criteria, at its discretion.
- HR. 2585 - A "major emitting facility" is defined as all stationary sources belonging to the same industrial grouping, located on one or more contiguous or adjacent properties under common control, and which in the aggregate emit, or have the potential to emit, considering installed and operating controls, 10 tons per year or more of any hazardous pollutant, or 25 tons per year in combination. EPA may establish a lesser quantity, or for radionuclides, different criteria, at its discretion.
- ADMIN - A "major source" is defined as any stationary source, or group of stationary sources located within a contiguous area and under common control, that emits, or has the potential to emit, in the aggregate, considering controls, 10 metric tons per year or more of one hazardous pollutant, or 25 metric tons per year in combination. EPA may establish a lesser quantity. The major source threshold for radionuclides will be defined by EPA.

LIST OF HAZARDOUS POLLUTANTS

- HR. 4 - This bill includes a list of 187 pollutants, derived primarily from the SARA and CERCLA lists. Anyone may petition the EPA to either add or delete a substance; EPA has 18 months in which to grant or deny the petition. Substances may be added or deleted at the discretion of EPA. EPA must review and revise the list at least every 3 years. Health effects only are considered.
- S. 816 - The list of pollutants is to be compiled by EPA not later than 3 months from the date of enactment of the bill and is to include all of the air pollutants listed in committee print 101-XX, "Air Pollutants Subject to Section 112 of the Clean Air Act," published by the Senate Committee on Environment and Public Works. Anyone may petition the EPA to add or delete a substance; EPA has 12 months in which to grant or deny the petition. The list may not include substances solely for their effect on the environment, nor because of releases covered under the Accidental Release portion of the bill. EPA is to periodically review and revise the list, and may be modified at EPA's discretion at any time.
- HR. 2585 - This bill contains a list of 187 hazardous pollutants. Anyone may petition the EPA to add or delete a substance; EPA has 12 months in which to grant or deny (in writing) the petition. No substance may be included on the list solely because of its effect on the ozone in the stratosphere. The list may be modified at EPA's discretion. Substances may be added if either the petitioner or EPA demonstrates that the substances (emissions, ambient concentrations of, or chemical transformation products in the atmosphere) is an air pollutant and is known to cause, or may reasonably be anticipated to cause serious adverse effects to human health or serious or widespread adverse environmental effects. Substances can be deleted upon determination that the above effects are not known, or reasonably anticipated to occur.
- ADMIN - This bill contains a list of 191 pollutants. EPA may add or delete chemicals at any time of its own initiative or by petition of any person. EPA has 18 months in which to grant or deny the petition.

THE DESIGNATION OF SOURCE CATEGORIES BY EPA

- HR. 4 - Within 12 months after the date of enactment, EPA is to list all categories of major sources of the listed pollutants and designate 50% for regulation. Within 5 years after the date of enactment, EPA may designate any additional categories, including area sources, from the remaining 50% for regulation. EPA may, at its discretion, remove a source category if risks are determined to be minimal. The list is to be periodically reviewed and revised according to an unspecified timeframe.
- S. 816 - Within 12 months after the date of enactment, EPA is to list all source categories of major sources of the listed pollutants, consistent as far as possible with Part C (PSD Rules) of the Act. EPA can at anytime designate additional source categories. This list is to include categories of area sources the EPA determines present a threat of adverse effects to human health or the environment. The list is to be periodically reviewed and revised according to an unspecified timeframe.
- HR. 2585 - Within 12 months after the date of enactment, EPA must list all source categories of major emitting facilities. The list is to be periodically reviewed to insure the list includes all categories of major emitting facilities, and revised according to an unspecified timeframe. Whenever any additional category is included on the list, EPA shall establish a date no later than 3 years after its inclusion on the list for the promulgation of emission standards for major emitting facilities.
- ADMIN - Within 12 months after the date of enactment, EPA is to list all categories of major sources, including any area sources, and from time to time revise the list in response to public comment or new information. EPA may, on its own initiative, decide not to list a source category if the source is already sufficiently controlled, or withdraw a source category upon a finding of "negligible risk" to public health.

AREA SOURCES

- HR. 4 - There are no separate provisions or programs for area sources. Area sources may be designated for regulation among the second half (remaining 50%) of the listed source categories, but there is no specific guidance on their regulation. The bill does not address mobile sources.
- S. 816 - Area sources, which include both mobile and stationary sources, may be regulated the same as major stationary sources although the EPA is, in addition, authorized to promulgate standards reflecting cost-effective, "generally available control technologies". Separate provisions on area sources include an EPA research program (preliminary results due 3 years after enactment of the paragraph), and a state toxics monitoring program beginning 18 months after enactment of the subsection. EPA is given discretion whether to promulgate regulations to carry out the monitoring program. Finally, EPA must submit a strategy to control hazardous pollutants from area sources in urban areas within 5 years of the date of enactment of the subsection. No guidelines are given concerning the extent of required control.
- HR. 2585 - This bill contains separate provisions and compliance schedule for area sources. The area source program includes an EPA conducted research program with respect to categories of area sources in urban areas and mobile sources. The final report is due 2 years after enactment. Within 12 months of enactment, EPA is to promulgate regulations on establishing monitoring programs (with emphasis on area sources) to be implemented by air pollution control agencies that have obtained grants under Section 105 and have responsibility for Metropolitan Statistical Areas with populations greater than 250,000. Within 3 years after enactment, EPA is to list, by rule, categories of area sources known or anticipated to cause serious adverse effects to human health or serious or widespread environmental effects. Standards for categories of area sources are to be promulgated that require the maximum degree of emission reduction that EPA determines is achievable, including prohibition, taking into consideration cost and any non-air quality health and environmental impacts and energy requirements. Standards may differ between new and existing area sources. Standards are to be promulgated as follows (from the date the categories are listed): 25% within 2 years; 50% within 4 years; 75% within 6 years; and 100% within 8 years.

AREA SOURCES
(Continued)

- ADMIN - Area sources are regulated the same as major stationary sources except that generally available control technologies may be applied. Mobile sources are not included in the definition of an area source.

**"DE MINIMIS" EMISSION LEVELS FOR EXEMPTION FROM
HEALTH-BASED AND TECHNOLOGY-BASED STANDARDS**

- HR. 4 - This bill does not specifically require that de minimis levels be set at the time a standard is established. The permitting authority may, however, grant a major source a variance from the standards, based on a determination that the emissions present an insignificant risk to public health. "Insignificant" is undefined.
- S. 816 - A minimum emission rate (de minimis level) must be established for each hazardous air pollutant at the time a standard is set for a source category. Source categories emitting more than this level for any pollutant are subject to the standards. The quantities are not to exceed 10 tons per year for emissions of a single pollutant, or 25 tons per year for pollutants in combination. A greater de minimis level may be established only if the "health effects threshold" of a noncarcinogen is determined to be above these levels.
- HR. 2585 - EPA may establish a de minimis level for emissions of any pollutant (or pollutants in combination) for any category of major emitting facilities for which a standard is set. The de minimis level for noncarcinogens, or any pollutant for which a threshold can be established, is to be at or below the level which results in ambient concentrations at the threshold level or the level which is known or may be reasonable anticipated to cause serious or widespread adverse environmental effects. For carcinogens, or any pollutant for which a threshold can not be established, the de minimis level is to be at or below the level representing a lifetime risk of carcinogenic effects or other serious adverse effects to human health of 1 in 10,000,000 for the most exposed individual, and below the level known to cause, or anticipated to cause serious or widespread adverse environmental effects. The de minimis level is not to exceed 10 tons per year for a single pollutant or 25 tons per year for pollutants in combination.
- ADMIN - This bill does not specifically require that de minimis levels be set at the time a standard is established; however, a major source may be granted an alternative emissions limitation by the permitting authority based on a determination that the emissions from the major source present a negligible risk. "Negligible" is undefined.

SETTING OF TECHNOLOGY-BASED EMISSION STANDARDS

- HR. 4 - The technology-based standards, applicable to both new and existing sources, are to reflect the maximum degree of emission reduction deemed achievable by the Administrator (including prohibition) considering costs and non-air health, environmental, and energy impacts. For new sources, the level of emission reduction must be at least as stringent as the most stringent level achieved by any other facility in the same source category. Standards for existing sources may be less stringent.
- S. 816 - The technology-based standards, applicable to both new and existing sources, must reflect the maximum degree of emission reduction (including prohibition) deemed achievable by the Administrator considering costs, and non-air quality health, environmental, and energy impacts. For new sources, this level must be at least as stringent as the most stringent emission level achieved by any other facility in the same source category. Standards for existing sources may be less stringent if new source control levels are technologically or economically infeasible. The level of control must reflect the most stringent level that is "generally feasible" and that represents the maximum total emission reduction of all sources in the same category; the "benchmark" for existing sources is 90% emission reduction from uncontrolled levels.
- HR. 2585 - The technology-based standards, applicable to both new and existing major sources must reflect best available control technologies and require the maximum degree of emission reduction the Administrator deems is achievable (including prohibition where achievable) considering costs and any non-air quality health and environmental impacts, and energy requirements. The level of emission reduction is not to be less stringent than the "greatest degree of emission reduction" achieved by any major emitting facility in the same source category. In establishing standards for existing major emitting facilities, the 10% of existing major emitting facilities with the lowest emission rates may be excluded. These requirements do not preclude EPA from establishing a standard that is more stringent than the most stringent emission reduction achieved in practice by major emitting facilities in the source category. Standards are to be reviewed and, if necessary, revised at least every 5 years.

SETTING OF TECHNOLOGY-BASED EMISSION STANDARDS
(continued)

ADMIN

- The technology-based standards are applicable to both new and existing major sources as well as to area sources. The standards are to reflect the maximum degree of emission reduction achievable (including prohibition) considering costs and both non-air and air quality health, environmental, and energy impacts. The level of emission reduction for new sources must be at least as stringent as the emission control achieved by the best controlled similar source, as determined by the Administrator. Standards may be established regardless of the level of emission reduction or technology achieved in practice by similar sources if none employ what is determined to be maximum available control technology. Emission standards for existing sources may be less stringent than standards for new sources in the same category, but must be at least as stringent as the emission controls achieved by the best controlled similar sources.

SCHEDULE FOR ESTABLISHING
TECHNOLOGY-BASED STANDARDS

- HR. 4 - EPA must designate 50% of the source categories for regulation at the time the categories are listed. Any of the remaining 50% of the source categories, which may include area sources, may be designated for regulation at EPA's discretion within 5 years of the date of enactment. The schedule for promulgation of standards is as follows:

<u># of Source Categories</u>	<u>Deadline from Date of Enactment</u>
At least 10 categories	2 years
25%	4 years
50%	7 years
Any of the remainder	10 years

- S. 816 - Within 2 years after the date of enactment of the subsection, EPA must publish a list assigning to each source category a deadline for promulgation of standards, setting priorities according to certain health effects criteria and in keeping with the following overall schedule:

<u># of Source Categories</u>	<u>Deadline from Enactment of Subsection</u>
All source categories for a given list of 12 pollutants	2 years
25%	3 years
50%	5 years
100%	10 years

SCHEDULE FOR ESTABLISHING
TECHNOLOGY-BASED STANDARDS
(continued)

- HR. 2585 - At the time the source categories are listed, EPA must designate and publish a list specifying which of the categories are subject to the 2 year deadline for promulgation of standards. The remaining source categories must be assigned to any of the other deadlines within 2 years after enactment of the bill. Not later than one year before a deadline, EPA may substitute another category for the category that would otherwise be subject to that deadline. If, within 6 months of the deadline, no standard has been promulgated, any major emitting facility subject to that standard will be subject to a standard requiring the greatest degree of emissions reduction achieved in practice by major emitting facilities in the same category. The schedule for promulgation of standards is as follows:

<u>% of Source Categories</u>	<u>Deadline from Date of Enactment</u>
10%	2 years
25%	3 years
50%	5 years
100%	8 years

- ADMIN - Emission standards are to be promulgated according to the following schedule and in keeping with priorities based on certain health effects criteria:

<u>% of Source Categories</u>	<u>Deadline from Date of Enactment</u>
At least 10 categories	2 years
25%	4 years
50%	7 years
Any of the remainder	10 years

Standard setting for the remaining 50% of the categories is discretionary.

COMPLIANCE SCHEDULE FOR TECHNOLOGY-BASED STANDARDS^{1/}

	<u>HR. 4</u>	<u>S. 816</u>	<u>HR. 2585</u>	<u>ADMIN</u>
<u>New/ Modified Sources</u>	Effective immediately	Effective immediately	Effective immediately	Effective immediately
Extensions for New/Mod. Sources	N/A	N/A	N/A	N/A
<u>Existing Sources</u>	3 years	3 years	3 years	3 years
Extensions for Existing Sources	2 years, if necessary for installation of controls	N/A	N/A	2 years if necessary for installation of controls ^{2/}

Note: See page 16 for compliance flexibility options.

^{1/} All Compliance dates are from date of promulgation of the applicable standard.

^{2/} An additional 3 years may be added to dry and cover mining waste, if necessary.

RISK EVALUATION AND SETTING OF HEALTH-BASED STANDARDS

- HR. 4 - A "significant risk evaluation" is required by EPA within 7 years after promulgation of a technology-based standard to evaluate residual risks to public health. If EPA determines that significant risk of serious or widespread adverse effects on public health remain, EPA must promulgate, within 2 years after the evaluation is completed, standards that achieve a 90% additional emission reduction, or less if it will reduce or eliminate the risk. The bill does not define "significant".
- S. 816 - EPA must commence an evaluation of residual risks to human health and environment within 3 years after promulgation of a technology-based standard. If significant risk of adverse effects on public health or threat of adverse environmental effects remain, EPA must, within 2 years, complete the evaluation and revise the standard. The health-based standards must be promulgated without taking into consideration cost, cost-effectiveness, economic, energy, or other factors, or technological feasibility. For carcinogens, two emission limits are established simultaneously. The first must achieve a lifetime cancer risk of 1 in 10,000. The second must achieve a lifetime cancer risk of 1 in 1,000,000. For non-carcinogens, the revised standard must provide an "ample margin" of safety to protect public health. A more stringent standard may be adopted if necessary to protect the environment.
- HR. 2585 - EPA must complete an evaluation of the residual risks to human health and the environment attributed to emissions of hazardous air pollutants from major emitting facilities within 4 years after promulgation of the technology-based standard. If EPA determines that the technology-based standard for carcinogens, and other pollutants for which EPA has not established a threshold, does not eliminate all lifetime risks of carcinogenic effects or other serious adverse human health effects greater than 1 in 1,000,000, for the most exposed individual, the standard must be revised within 5 years after promulgation of the technology-based standard. The revised standard for carcinogens must eliminate lifetime cancer risks greater than 1 in 1,000,000 for the most exposed individual. For non-carcinogens or pollutants for which EPA has established a threshold, the technology-based standard must be revised within 5 years of its effective date if EPA determines that the level of emission control does not reduce emissions at or below the level resulting

RISK EVALUATION AND SETTING OF HEALTH-BASED STANDARDS
(continued)

in ambient concentrations attributable to emissions at or below the threshold, or to a level at which no serious or widespread adverse environmental effects occur. The revised standard for non-carcinogens must establish an emission limit that will achieve these levels.

ADMIN

- An "unreasonable risk evaluation" must be conducted by EPA within 7 years after promulgation of a technology-based standard. If EPA determines that the category presents an unreasonable risk to public health, considering cost and technical feasibility, EPA must, within 2 years of completing the evaluation, promulgate standards to "adequately" protect against the risk. The standard will take into account cost and technical feasibility.

COMPLIANCE SCHEDULE FOR HEALTH-BASED STANDARDS*

HEALTH-BASED STANDARDS	<u>HR. 4</u>	<u>S. 816</u>	<u>HR. 2585</u>	<u>ADMIN</u>
New/Modified Sources	Effective immediately	Effective immediately	Effective immediately	Effective immediately
Extensions for New/Mod. Sources	N/A	N/A	N/A	N/A
Existing Sources	6 years	3 years	3 years	6 years
Extensions for Sources	N/A	Up to 5 years or temporary exception (see next page for details)	Up to 3 extensions of 2 years each (see next page for details)	N/A

Note: See page 16 for compliance flexibility options.

* All Compliance dates are from date of promulgation of the applicable standard.

COMPLIANCE EXTENSIONS FROM HEALTH-BASED STANDARDS

HR. 4 - N/A

S. 816 - Existing sources may be granted an extension of up to 5 years from compliance with the 1 in 10,000 lifetime cancer risk health-based standard if there is evidence of economic hardship and public health is not endangered. A "temporary" exception from the simultaneous 1 in 1,000,000 lifetime cancer risk health-based standard may be granted existing sources, pursuant to public comment and hearing, if the standard cannot be achieved using all available technology and operational controls, and a risk reduction program is implemented. The facility or operator may be required to conduct research and development on improved control technologies. The temporary exception is to be reviewed at the time the permit is renewed and may be extended subject to the same conditions as previously required.

HR. 2585 - A permitting authority may grant existing sources up to 3 extensions of the effective date of up to 2 years each under certain conditions. Existing sources of "non-threshold" pollutants (carcinogens or other non-threshold pollutant) may be granted the first extension if it is determined that the emissions do not present a risk greater than 1 in 10,000 for the most exposed individual. The subsequent extensions may be granted if the standard cannot be achieved using all available technology. For sources of "threshold" pollutants (non-carcinogens or other threshold pollutants), the first extension may be granted if the facility complies with the technology-based standard and a standard which requires the greatest degree of emission reduction achieved in practice by major emitting facilities in the same category. Subsequent extensions may be granted if the health-based standard is not achievable using all available technology and operational controls. All permits granted under these requirements must contain an enforceable emissions limit and require facilities to comply with the technology-based limit.

ADMIN - N/A

COMPLIANCE FLEXIBILITY FOR
HEALTH- AND TECHNOLOGY-BASED STANDARDS

- HR. 4 - 1) The "grace period" provided in this bill gives existing major sources that had previously installed RACT, BACT, or LAER a 5 year extension from the date the technology was installed to comply with the applicable health- or technology-based standard. 2) The bill would also allow EPA or the state (with an approved program) to grant a variance from either the health or technology standards if the source can demonstrate that the emissions "present an insignificant risk to public health." EPA is to publish rules on granting variances, including a list of source categories for which a variance may not be granted.
- S. 816 - 1) This bill provides a 5 year extension from the health- or technology-based standards for existing sources that have installed RACT, BACT, or LAER, or voluntarily reduced emissions 90% on or after Jan. 1, 1993, but prior to the promulgation of the standard. 2) EPA may also exempt any existing source from a technology-based standard if it can be demonstrated that the source has achieved a voluntary 90% or more emission reduction on or before Dec. 31, 1992. 3) Finally, this bill also provides a waiver from both the health- and technology-based regulations for any pollutant emitted below "de minimis" amounts if the pollutant is subject to regulation only because of the source's emissions of other pollutants in greater than "de minimis" amounts. "De minimis" levels are described elsewhere in this document.
- HR. 2585 - 1) Major sources may be exempted from the health-based standards if, for carcinogens, alternative emissions limits eliminate lifetime cancer risks greater than 1 in 1,000,000. For noncarcinogens, the alternative emission limit must provide an "ample margin" of safety in preventing serious adverse effects to human health and serious or widespread adverse environmental effects. 2) Also under this bill, a permitting authority may exempt an existing major emitting facility from compliance with the technology-based standards if it is demonstrated that the facility voluntarily reduced emissions 95% or more from uncontrolled levels prior to proposal of the standard. The permit must include an enforceable emissions limit.

COMPLIANCE FLEXIBILITY FOR
HEALTH - AND TECHNOLOGY-BASED STANDARDS
(continued)

3) Under the permit program, "alternative means" of compliance may be granted a major emitting facility if the emission reduction and level of human health and environmental protection achieved is greater than that expected by application of the otherwise applicable health- or technology-based standards.

ADMIN

- 1) This bill allows major sources to comply with alternative emission limitations in lieu of the technology-based standards upon a finding of negligible risk to public health. 2) Existing sources that voluntarily achieve emission reductions of 90%, or 95% for particulates within 5 years prior to the date the applicable technology-based standard is proposed may meet limits based on the voluntary reduction in lieu of the technology-based standard. 3) Existing sources may be granted a 5 year extension from compliance with the technology-based standards if LAER, or the most stringent of any applicable NSPS, BACT, or RACT determination was implemented within 5 years prior to proposal of the standard. EPA is to promulgate regulations, no later than 2 years after enactment, on implementing the above-mentioned alternative emission limits, including a list of sources that are not eligible.

WORK PRACTICE STANDARDS

- HR.4 - EPA may promulgate technology-based standards based on work-practice or operational methods.
- S. 816 - A work practice or operational standard may be established for any source category if it is not feasible, due to design or operational factors, to assign or enforce a numerical emission limit. The standard must include requirements to assure proper operation and maintenance of design elements or equipment. The facility may be subject to additional monitoring, recordkeeping, and reporting requirements and may be required to install a leak detection system. A numerical standard is to be established as soon as feasible. The work practice standard may replace either a health- or technology-based standard.
- HR. 2585 - A work practice, design, equipment, or operation standard may be established for major emitting facilities in lieu of either a health- or technology-based standard if EPA determines that a numerical standard is not feasible. The work standard must include requirements to assure proper operation and maintenance of design elements or equipment and must achieve reductions comparable to the emission reductions achieved by the numerical standard.
- ADMIN - If the enforcement or application of an emission standard is not feasible, EPA may instead require any combination of design, operational, or work practice methods, or training/certification.

PROVISIONS FOR MOBILE SOURCES

- HR. 4 - This bill does not address mobile sources.
- S. 816 - There are no separate provisions on mobile sources, but mobile sources are included under the definition of an area source. Under area source provisions, applicable standards in general must reflect "generally available control technologies", taking cost into consideration.
- HR. 2585 - The motor vehicle air toxics provisions require EPA to list air pollutants emitted from motor vehicles that contribute to serious adverse effects to human health or serious or widespread adverse environmental effects and to establish regulations necessary to reduce emissions to the lowest achievable emission rate. The list is to be published within 18 months of the date of enactment of the section, and is to include benzene, diesel particulates, formaldehyde, and 1,3-butadiene, but not VOC's, NO_x, or carbon monoxide. Any person may petition to modify the list; EPA has 12 months in which to grant or deny (in writing) the petition. Within 3 years of listing a substance, regulations are to be promulgated under either Section 211 (motor vehicle emission stds) or Section 202 (regulation of fuel). The regulations are effective 3 years from the date of promulgation. EPA is required to conduct a residual risk evaluation 4 years following promulgation of a standard and standards are to be revised in order to prevent serious effects to human health or serious or widespread adverse environmental effects. The section also contains a ban on leaded fuel, standards for diesel particulates and a emission reduction plan for diesel particulates from buses.
- ADMIN - The hazardous air pollutant provisions of this bill do not address mobile sources. Under mobile-source provisions, however, EPA must study air toxics emissions from mobile-sources within 18 months of enactment of that subsection and promulgate regulations if deemed necessary.

AUTHORITY AND SCOPE OF STATE PERMIT PROGRAM

- HR. 4 - States may submit a permit program to EPA for approval and delegation of whole or partial authority. EPA is to promulgate regulations establishing the minimum elements of a state permit program within 12 months of enactment of the bill. It must include a standard permit application form, monitoring and reporting requirements, and fees. The bill states that a facility may be issued a single permit covering new or modified sources, or multiple sources within the facility, providing all are in compliance.
- S. 816 - States may submit a permit program to EPA for approval and delegation of whole or partial authority. The program is to be established according to guidelines and regulations that EPA must complete no later than 12 months after enactment. Any source may be issued a temporary permit, providing certification of compliance is submitted. For new sources, this must be done before operations begin; for existing sources, certification must be made 6 months after the effective date of the standard. A temporary permit, which may be recertified annually, will be issued upon receipt of the certification unless EPA rejects the permit within 30 days. A review for issuance of a full operating permit must be conducted no later than 6 months after issuing the temporary permit. The temporary permit will be suspended immediately if deemed inadequate as a result of the review. No temporary permit may be issued to a facility if the applicable standard has not been promulgated for that source category.
- HR. 2585 - States may submit a program to EPA for approval and whole or partial delegation of authority to implement the permit program for major emitting facilities, standards for area sources, or both. EPA is to publish guidance for state programs no later than 12 months from enactment of the bill. Also within this timeframe, EPA is to promulgate regulations establishing the minimum elements of a permit program, including a standard application form and fees, monitoring requirements annual fee, annual certification, and opportunity for public comment. Existing major sources may continue operations without a permit for 6 months after the effective date of the standard if the source certifies compliance on or before that date. A temporary

AUTHORITY AND SCOPE OF STATE PERMIT PROGRAM
(continued)

permit may be issued within 90 days of certification for a term not to exceed 1 year. Review for issuance of a full permit is to be completed within the 1 year term.

- ADMIN - This bill does not have permit program requirements specific to air toxics control. The permit program general requirements are applicable to all titles of the bill. EPA is to promulgate regulations establishing the minimum elements of a permit program within 12 months after the enactment date. These are to include a standard application form, fees, requirements for adequate personnel and resources, and procedures to allow for public access to files and public notice. States must submit a permit program for approval within 3 years after enactment of the title. EPA may issue a single permit for a facility with multiple sources and may also exempt any source category from permitting requirements providing the exemption is consistent with the purposes of the Act. Sources must submit a permit application within 6 months after the date the source becomes subject to the permit program. A compliance plan, including a compliance schedule and schedule for submitting progress reports (at least every 6 months), is to be submitted with the permit application. Periodic certification that the facility is in compliance is also required. A source permit will not be considered in violation if a complete permit application has been submitted on time, but final action has not yet been taken, unless the delay is due to the applicant.

TIMEFRAME FOR ISSUANCE AND APPROVAL OF STATE PERMIT

	<u>HR. 4</u>	<u>S. 816</u>	<u>HR. 2585</u>	<u>ADMIN</u>
<u>STATE PERMIT PROGRAM</u>				
Promulgation of reg. establishing minimum elements of a permit	within 12 months of enactment date of bill	within 12 months of enactment date of bill	within 12 months of enactment date of subsection	within 12 months of enactment date of title ^{1/}
Maximum term of permit	10 years	5 years	5 years	5 years
EPA approval state permit program	within 180 days of receiving submittal	within 180 days of receiving submittal	within 180 days of receiving submittal	within 1 year of receiving submittal
Review of state program	N/A	N/A	Every 2 years	N/A
State response to correct program deficiencies	within 90 days	within 90 days	within 90 days	within 180 days
<u>PERMIT APPLICATION APPROVAL/REJECTION PROCEDURE</u>				
EPA rejection of submitted permit application	within 60 days of submittal	within 60 days of submittal	within 60 days of submittal	within 90 days of submittal
Submittal of revised permit	within 90 days of rejection	within 90 days of rejection	not specified	within 90 days of rejection

^{1/} These are general permit program requirements that apply to all titles of the Administration bill.

LIST OF SUBSTANCES SUBJECT TO
ACCIDENTAL RELEASE PROVISIONS

- HR. 4 - This bill does not address accidental releases.
- S. 816 - EPA must propose a list of not less than 50 substances no later than 12 months from the enactment date of the section and promulgate the list within 24 months of this enactment date. The list is to be taken from, but not limited to the SARA Section 302 list and must include 28 mandatory substances listed in the bill. Threshold values must be established at the time a substance is listed. Review and revision of the list is to be conducted at least every 5 years.
- HR. 2585 - EPA must propose a list of not less than 100 substances within 12 months, and promulgate the list no later than 24 months from the date of enactment of the section. Substances are to be listed which are known to cause or may be anticipated to cause serious adverse effects to human health or serious or widespread adverse environmental effects as a result of accidental release. At the time of listing, a de minimis level must also be established. In the case where at least 100 substances are not listed within the given timeframe, the list of toxics (by inhalation) identified by the Secretary of Transportation will automatically be considered listed. Within 3 years of enactment, EPA is to complete a review of substances not listed under this section but which are on the SARA Section 302 list and the Secretary of Transportation list of toxics (by inhalation) to determine whether any should be added. The list is to be reviewed at least every 5 years. Anyone may petition to add or delete a chemical at any time, and EPA may modify the list at its discretion.
- ADMIN - There is no specific list of substances under this bill subject to accidental release provisions.

ACCIDENT PREVENTION, DETECTION, AND RESPONSE REGULATIONS

- HR. 4 - This bill does not address accidental releases.
- S. 816 - Facilities are required to prepare hazard assessments for any substance emitted in quantities greater than threshold values set by EPA, no later than 12 months from the date the substance is listed. The hazard assessment is to be updated every two years. EPA is to publish guidance on preparing hazard assessments within 2 years from the date of enactment of this section. Under Accident Prevention provisions, EPA may promulgate regulations that may include monitoring, recordkeeping, reporting, and any other "design, equipment, work practice, and operational requirements" as deemed necessary. As far as possible, the regulations should coordinate with efforts undertaken by OSHA. EPA is given authority to abate actual or threatened releases, including any additional orders necessary to protect health and the environment, and a \$25,000 per day fine for noncompliance with these orders. EPA must publish guidance within 180 days after enactment of this section defining the use and authority of the accident provisions.
- HR. 2585 - EPA is required to promulgate no later than 3 years from enactment of this section regulations for the prevention, detection, and management of accidental releases. Provisions will include requirements for monitoring and inspection, installation, operation and maintenance of control equipment, repair and replacement of defective devices, safety inspection every 2 years, installation of best available leak control devices (considering cost), and preparation of a risk management plan. This plan is to include a hazard assessment, and development of specific prevention and response programs. EPA must publish guidelines on preparing the risk management plans at the time the accidental releases regulations are promulgated. These regulations become effective 3 years from the date of promulgation or listing of a substance, whichever is later.
- ADMIN - This bill does not specifically address the regulation of accidental releases. It does establish an Air Pollutant Release Investigation Board to investigate major life-threatening releases of air pollutants.

CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD

- HR. 4 - There are no provisions establishing a Chemical Safety and Hazard Investigation Board.
- S. 816 - The Chemical Safety and Hazard Investigation Board provided for in this bill is a 5 member independent team within the EPA. The chairperson is appointed by the President; two are selected by the EPA; and 1 each is selected by the Secretary of Labor and Secretary of Transportation. Members serve a 5 year term. The Board is required to publish a report on the use of hazard assessments no later than 18 months from the date of enactment of the section, including a list of substances, thresholds, and source categories for which hazard assessments are recommended. Other duties include investigations of accidental releases and issuance of various periodic reports, including an annual report to Congress. EPA must respond in writing to any recommendation made by the Board within 180 days. An annual budget of \$12,000,000 is authorized through 1994.
- HR. 2585 - The Chemical Safety and Hazard Investigation Board established by this bill is a 5 member board, all appointed by the President with the consent of the Senate. Members serve a 5 year term. Duties include investigations and reports on accidental releases, periodic reports to Congress on accident prevention and management, development of procedures for assessment and investigation of accidental releases, and establishment of regulations pertaining to reporting requirements. EPA must respond in writing to any of the Board's recommendations within 90 days.
- ADMIN - This bill establishes an Accidental Release Investigation Board, to be convened by the EPA Administrator and comprised of one or more 5 member panels. Each panel member is to include 4 EPA employees, appointed by the Administrator and the Secretary of Labor, although other federal agency employees may also be appointed. Duties include the investigation of any major life-threatening releases except nuclear incidents and any under the jurisdiction of the National Transportation Safety Board. Reports are to be prepared for each investigation and made available to Congress and the Public.

REPORTS, GUIDANCE, OR SPECIAL STUDIES
REQUIRED OF EPA

- HR. 4 * Guidance on methods of evaluating proposed source permit variances and health risk assessment. No deadline.
- S. 816 * Annual report to Congress on state and federal progress made in implementing provisions of the bill. Due Jan. 15, 1991 and within 105 days of the end of the fiscal year every year thereafter.
- * Guidance to states on developing a permitting program. Due no later than 12 months after enactment of the paragraph.
- * Guidance to sources on preparation of hazard assessments. Due no later than 12 months after the enactment date of the subsection.
- * Report to Congress on health effects of hydrogen sulfide emissions from oil and natural gas extraction. Due within 12 months of enactment of the paragraph.
- * Report to Congress on EPA risk assessment methodologies used in determining carcinogenic exposure risks. Due no later than 24 months after enactment of the subsection.
- * Report and recommendations on health impacts of mobile source benzene emissions due within 24 months after enactment of the bill.
- * Area source research program. Report due no later than 3 years from the enactment of the paragraph.
- * Strategy to control emission from area sources in urban areas. To be submitted to Congress no later than 5 years from the enactment date of the subsection.
- * Report to Congress on progress made to reduce public health risk pursuant to provisions of the bill. Due in intervals no later than 8 and 10 years after enactment of the subsection.

REPORTS, GUIDANCE, OR SPECIAL STUDIES
REQUIRED OF EPA
(continued)

- HR. 2585 * Annual report to Congress on state and federal progress made in implementing provisions of the bill. Due 1 year from enactment of the bill and annually thereafter.
- * Annual report to Congress on recommendations made to EPA by the Chemical Safety and Investigation Board and EPA's responses. Due the first of each year.
- * Guidance to states on developing a state permit program. Due within 1 year after enactment of the bill.
- * Area source research program. Report due no later than 2 years after enactment of the bill.
- * Report to Congress on Protection of the Great Lakes. Due within 5 years of enactment of the bill.
- ADMIN * Study on emissions of air toxics from mobile sources, due no later than 18 months from enactment of the subsection (Title II-Mobile Source Provisions).
- * Report to Congress on public health hazard occurring from toxic emissions from electric utility steam generating units. Due 3 years after date of enactment.

October 19, 1989

Clean Air Issues

Acid Rain

Level, timing, and cost effectiveness of SO₂ reductions

Trading system

No "cost sharing"

Level, timing, and cost effectiveness of NO_x reductions

Number of plants covered in first phase

Post-compliance cap and flexibility for economic growth

Incentives for clean coal technology

Non-Attainment

Automobile tailpipe standard

Onboard/Stage II refueling emissions: on-board
canisters and/or stage II controls

Alternative fuels

Oxygenated fuels (3.1%)

Definition of major source

Deadlines for reaching attainment

Changing non-attainment area definitions

Sanctions for non-attainment

Percent reduction requirements (4% vs. 3%)

Emissions fees

Air Toxics

Residual risk

BACT vs. MACT

Utilities/Radionuclide

Timing of regulation

Accidental releases

Number of regulated source categories