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THE SECRETARY OF COMMERCE
WASHINGTON, D.C. 20230

NOV 30 1974

The President
The White House
Washington, D.C. 20500

Dear Mr. President:

Scientific attention has recently been focused on the possibility that the release of man-made fluorocarbons, used as refrigerants and as propellents in spray cans (popularly called Freons, a trade name of the DuPont Company), is chemically depleting our atmosphere's ozone layer. A reduction in the thickness of this layer will increase the intensity of the sun's ultra-violet rays, possibly resulting in a higher incidence of skin cancers and detrimental effects to agricultural processes.

A number of scientific groups, including the National Academy of Sciences, have predicted this phenomenon. A theoretical study done at Harvard has concluded that the current depletion, if any, is approximately one percent. While there are many uncertainties in each link of the chain connecting Freons to ozone depletion, there is little doubt that the problem deserves serious attention. Therefore, I have asked Dr. Robert White, Administrator of the Department's National Oceanic and Atmospheric Administration (NOAA), to advise me on this issue.

Freons are released to the air via spray cans, through certain manufacturing processes (principally polyurethane foam) and during the "scrapping" of old refrigeration systems. Approximately two billion aerosol cans and 16 million refrigeration and air conditioning units were produced in 1973. This Freon-dependent industry generates roughly \$8 billion of annual revenue from production. In addition, approximately 800,000 jobs are involved directly or indirectly accounting for \$8 billion of related personal income.

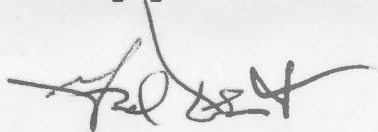


Currently, no satisfactory substitute for Freon is available, although research might identify alternative products. Therefore, three courses of action suggest themselves:

1. An immediate ban on Freon release to the atmosphere.
2. No Federal action, leaving resolution of the problem to the courts, the states or technological innovation by the industry.
3. Positive Federal action to accelerate scientific research concerning the problem.

I recommend that the Administration immediately undertake a research effort in collaboration with industry and other agencies to verify or disprove the ozone depletion by Freon release. Federal attention now may well forestall disruptive state action as well as responding in a timely fashion to the needs of the economy as it interacts with the environment. The Department is prepared to offer technical leadership through NOAA and has incorporated a research program in the Climate Program for Fiscal Year 1976. This Program contemplates a three-year effort funded at the level of \$10 to \$12 million over that period, and is now being submitted to the Domestic Council by one of its subcommittees.

Sincerely yours,



Secretary of Commerce



THE SECRETARY OF COMMERCE
WASHINGTON, D. C. 20230

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The President
The White House
Washington, D.C. 20500

File

FREON/OZONE REPORT -- PROPOSED PRELIMINARY OUTLINE

Executive Summary

Report (Conclusions)

Atmospheric Issues -- (ICAS)

-- State of the art

- . Atmospheric chemistry relating to ozone
- . Atmospheric transport
- . Other sources of stratospheric Cl and ozone
- . Atmospheric modelling
- . Possible scenarios
- . Strength and limits of current knowledge

-- Ongoing research

-- Research needed

Effects

Health effects -- (HEW)

-- State of the art

- . Skin cancer
- . Aging

-- Ongoing research

-- Research needed

Climatic effects -- (NOAA)

-- State of the art

-- Ongoing research

-- Research needed

Agricultural and biological effects -- (USDA)

-- State of the art

- . Agricultural effects
- . Other potential ecosystem disruptions

-- Ongoing research

-- Research needed



Commercial Information -- (Commerce)

-- State of the art

- . Types of freons
- . Physical and chemical properties
- . Uses
- . Production
- . Production trends
- . Description of industry
- . History of freon development -- advantages and disadvantages
- . Manufacturing processes
 - Possible alternatives
 - Industrial timetables
- . National versus international situation
- . The release of freon into the environment

- Ongoing research
- Research needed

Federal Authorities -- Justice (CPSC, EPA, FDA)

- Survey of potentially applicable Federal authorities
- Regulatory options
- Need for proposed Toxic Substances Control Act



EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
722 JACKSON PLACE, N. W.
WASHINGTON, D. C. 20006

Jellinek
F.L.

January 14, 1975

MEMORANDUM FOR: ATTORNEY GENERAL
SECRETARY OF COMMERCE (NOAA)
ADMINISTRATOR, NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION
CHAIRMAN, CONSUMER PRODUCT SAFETY
COMMISSION
ADMINISTRATOR, ENVIRONMENTAL
PROTECTION AGENCY
COMMISSIONER, FOOD AND DRUG
ADMINISTRATION
SECRETARY OF TRANSPORTATION

SUBJECT: Task Force on Inadvertent Modification of the Stratosphere (IMOS)

In recent weeks a widespread concern has developed over the question about possible future depletion of the stratosphere ozone layer by certain chlorofluoromethanes (Freons). A number of atmospheric scientists have called for a ban on the use of Freons. The Consumer Product Safety Commission has been petitioned by the Natural Resources Defense Council, a private organization, for such a ban.

Some scientists, on the other hand, while sharing a concern about possible effects of Freons upon the ozone layer, feel that more research is necessary before these hypotheses can be substantiated. Thus, they do not believe that immediate regulatory action is required at this time.

Given the many agencies responsible for research and regulatory actions, the potentially dramatic consequences, and the heightened public and Congressional interest on this problem, a coordinated Federal effort will be required. Therefore, we are establishing a joint CEQ-FCST sponsored task force on the Inadvertent Modification of the Stratosphere (IMOS). This task force would be responsible for preparing within three to four months a public report on the most immediate issue, the Freon-ozone relationship. This report would outline the atmospheric, medical, and ecological issues, commercial information, relevant Federal authorities and the Federal research, and/or regulatory actions to be taken.

We believe that representation from your agency would be particularly valuable on this task force and request, therefore, that you designate one or more participants, as appropriate. Several agencies with



relevant atmospheric research programs will be represented on this task force by the FCST Interagency Committee on Atmospheric Science of which they are members. An initial meeting of the task force is planned for January 30 at 9:30 a. m. in the CEQ conference room, 722 Jackson Place, N. W. Drs. Edward Todd (632-4240) and Warren Muir (382-6854) will represent the ICAS of the FCST and CEQ respectively on the task force. Please contact Dr. Todd concerning your representation as soon as possible but no later than January 23.

Russell W. Peterson

Russell W. Peterson
Chairman, Council on
Environmental Quality

H. Guyford Stever

H. Guyford Stever
Chairman, Federal Council for
Science and Technology



EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
722 JACKSON PLACE, N. W.
WASHINGTON, D. C. 20006

February 11, 1975

MEMORANDUM TO

Members of Interagency Task Force on Inadvertent
Modification of the Stratosphere (IMOS)

Subject: Next Meeting of IMOS and Related Information

Attached for your information are the following: minutes of the organizational meeting on January 30, a revised timetable for the Freon report, the proposed report outline and assignment of agency responsibilities, and a list of attendees at the January 30 meeting. Because of the time pressures surrounding the issues, it is hoped that maximum continuity of agency representation will be maintained. The Energy Research and Development Administration and Department of Defense have been invited to participate on IMOS.

The next meeting of IMOS will be on February 18, from 9:00 a.m. to 12:00 noon in Room 543 at the National Science Foundation, 1800 G Street, N.W. This meeting will be for the purpose of each agency reporting briefly on the relevant research it is conducting, any policy or regulatory actions it is considering, and any specific critical items on which action is recommended prior to completion of the IMOS report in June. At this meeting a preliminary report will be made from the Justice Department concerning the legal issues related to Federal authority to take any regulatory actions. Also at this meeting plans will be



discussed for the meeting with industry, the National Resources Defense Council, and several concerned scientists. The meeting on February 27 will be open to the public and will be held in Room 5104 of the New Executive Office Building, 726 Jackson Place, N.W., from 9:00 a.m. to 4:30 p.m. Please reserve your calendar now for this important session.

Carroll Leslie Pegler

Carroll Leslie Pegler
Co-chairman of IMOS for
Federal Council for Science
and Technology

Warren R. Muir

Warren R. Muir
Co-chairman of IMOS for
Council on Environmental Quality

Attachments



MINUTES (JAN. 30th, 1975) OF THE INTERAGENCY TASK FORCE
ON INADVERTENT MODIFICATION OF THE STRATOSPHERE

- I. Co-chairmen Ms. Carroll Pegler and Dr. Warren Muir opened the meeting with a brief summary of the genesis and purpose of the group. It was noted that although DHEW and USDA had inadvertently been omitted from the original list of invitees, a representative from each had been invited and was present.
- II. It was agreed that the ozone-Freon relationship should be the first item of concern. A proposed outline and timetable for a public report was presented. The report would be issued in 3-4 months and would address the atmospheric, medical, and ecological issues, commercial information, the responsibilities of each Federal agency involved and a recommended program to resolve the issues. The attached outline of the report received general approval as to form, content, and assignment of respective responsibilities.
- III. Several attendees suggested that the proposed timetable for the report did not adequately reflect the urgency with which some questions can and should be addressed. The decision was made to retain the proposed time frame of the report but to focus the February 18 meeting on the current status of each agency's concerns in order to identify specific items of immediate critical importance and to activate any existing mechanism for implementation. The meeting with industry representatives was then tentatively rescheduled for the morning of February 27 and the meeting with NRDC was tentatively rescheduled for that afternoon.
- IV. After some discussion of whether meetings should be public, the co-chairmen agreed to investigate the regulations governing the February 27 meeting with industry and NRDC. The consensus was that other meetings, however, should be closed.



- V. It was suggested that DOD and ERDA ought to be included in the Task Force. All present concurred and it was agreed that they be invited to the next meeting.
- VI. The question of the status of research and regulation in the international community was raised. CEQ offered to contact appropriate international organizations.
- VII. The representatives from FDA, EPA, and CPSC reported on their respective legal authorities. Justice was designated to take the lead in resolving the legal issues, starting immediately. A progress report will be made at the Feb. 18 meeting.
- VIII. The co-chairmen assumed responsibility for maintaining liaison with the National Academy of Sciences, the Office of Management and Budget, and appropriate congressional committees.
- IX. Members agreed to keep the task group up-to-date on other activities of their respective agencies (e.g., congressional hearings) having a bearing on the IMOS proceedings.



REVISED FREON REPORT TIMETABLE

January 30	First meeting
February 8	Meeting to discuss current or imminent Federal actions
February 27 (a.m.)	Meeting with industry representatives (tentative)
February 27 (p.m.)	Meeting with Natural Resources Defense Council (tentative)
March 31	Draft of analytical sections
April 15	Meeting to discuss draft of analytical sections
April 30	Draft full report
May 15	Discuss draft of full report
May 31	Final report completion
June 15	Release



FREON/OZONE REPORT -- PROPOSED PRELIMINARY OUTLINE

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- . Atmospheric transport
- . Other sources of stratospheric Cl and ozone
- . Atmospheric modelling
- . Possible scenarios
- . Strength and limits of current knowledge

-- Ongoing research

-- Research needed

Effects

Health effects -- (HEW)

-- State of the art

- . Skin cancer
- . Aging

-- Ongoing research

-- Research needed

Climatic effects -- (NOAA)

-- State of the art

-- Ongoing research

-- Research needed

Agricultural and biological effects -- (USDA)

-- State of the art

- . Agricultural effects
- . Other potential ecosystem disruptions

-- Ongoing research

-- Research needed



Commercial Information -- (Commerce)

-- State of the art

- . Types of Freons
- . Physical and chemical properties
- . Uses
- . Production
- . Production trends
- . Description of industry
- . History of Freon development -- advantages and disadvantages
- . Manufacturing processes
 - Possible alternatives
 - Industrial timetables
- . National versus international situation
- . The release of Freon into the environment

- Ongoing research
- Research needed

Federal Authorities -- Justice (CPSC, EPA, FDA)

- Survey of potentially applicable Federal authorities
- Regulatory options
- Need for proposed Toxic Substances Control Act



ATTENDEES

<u>NAME</u>	<u>AGENCY</u>	<u>PHONE</u>
Warren Muir	CEQ	382-6854
Carroll Pegler	STPO (NSF)	632-7447
John E. Naugle	NASA	755-3818
James King	NASA	755-3767
Chris Schonwalder	FDA	443-4500
Donald T. Krizek	USDA-ARS	344-3143
Jesse H. Bennett	USDA-ARS	344-2135
Richard A. Carrigan	NSF/RANN	632-5888
Marion Suter	CEQ	382-6867
Edward S. Epstein	NOAA	496-8646
Hugh Albers	ICAS	632-1976
Edward P. Todd	Chair.-ICAS	632-4240
Lester Machta	NOAA	427-7645
Alan J. Grobecker	DOT/Office of Sec.	426-9676
Joseph J. Gwiazdowski	DOT/OST	426-0846
Joan Cloonan	Justice	739-3140
Tom Cator	CEQ	382-5259
Robert M. Hehir	CPSC	496-7766
Herbert S. Posner	NIEHS	(919) 549-8411 ext. 327
John Butler	EPA	755-2733
Robert Pepetti	EPA	245-3024
F. G. Blake	STPO/NSF	632-9242



INFORMATION NEEDS FROM INDUSTRY

- Description of ongoing and future R&D into possible atmospheric alterations and effects of U.V. reduction modification.
- Possible mechanisms of interaction between industry and government sponsored research programs.
- Mechanism of data release in industry sponsored studies.
- The history of the fluorocarbon and carbon tetrachloride market. The development of a market. Preceding chemical and technologies.
- Production and use figures for all volatile or gaseous fluorocarbons and carbon tetrachloride. (Domestic and worldwide -- past, present, anticipated.)
- Estimates of fluorocarbon and carbon tetrachloride release into the atmosphere (including production, use, disposal).
- Fluorocarbon industry profile and carbon tetrachloride industry profile (primary manufacturer and processors) including
 - . Number of plants
 - . Number of workers affected
 - . Freon production as a percent of total plant production
- Future industrial or marketing expansion plans, level of commitment to expansion, and timetable of expansion and future commitments.
- Possible substitutes for Freon-11, Freon-12, carbon tetrachloride. Advantages and disadvantages of each substitute.
- Ongoing and upcoming industrial research into alternative chemicals and technologies.
- Circumstances under which industry would view curtailment of all or part of fluorocarbon and/or carbon tetrachloride use as necessary and proper.



- If curtailment decision were made, a discussion of the timetable considerations for implementation.
- The impact of a total curtailment of Freon-11, Freon-12, or carbon tetrachloride production or use.



INTERAGENCY TASK FORCE ON INADVERTENT MODIFICATION OF THE STRATOSPHERE

IMOS

Council on Environmental Quality
722 Jackson Place, N.W.
Washington, D.C. 20006

Federal Council for Science and Technology
1800 G Street, N.W.
Washington, D.C. 20550

March 4, 1975

MEMORANDUM TO: Members of IMOS

Subject: Next Meeting

The next meeting of IMOS will be held on Wednesday, March 12, from 9:30 a.m. to 12:00 noon in Room 704 at the National Science Foundation, 1800 G Street, N.W. The reason for scheduling a meeting so soon after the last one is the necessity for reaching agreement on the content of the IMOS report, especially in view of the many issues discussed at the February 27 meeting.

You will recall that the timetable proposed for the IMOS report called for a first draft of the technical sections by March 31, if the final report is to be completed by June 15. Therefore, we ask that the representatives of the various agencies responsible for technical sections of the report please come to next Wednesday's meeting prepared with a detailed outline of the proposed content of their sections. Agency responsibilities are as follows:

Atmospheric issues	ICAS
Health effects	HEW
Climatic effects	NOAA
Agricultural and biological effects	USDA
Commerical information, economic impact	Commerce
Federal authorities	Justice

Other agenda topics for this meeting include the following:

- Final agreement on the chemical compounds to be considered in the June report.
- Status report from ICAS on its analysis of atmospheric research programs and needs.
- Status report from the co-chairmen on liaison with the National Academy of Sciences and international organizations.
- Discussion of further follow-up needed with industry on matters unanswered at February 27 meeting.



Enclosed for your information is a copy of the request for analysis of research programs and needs sent from IMOS to ICAS as a result of the discussion at the February 18 meeting of IMOS; some recent Congressional testimony for your information; the industrial hand-outs from the February 27 meeting in case you did not receive all of them; and a sampling of recent press coverage of the ozone problem. We hope to have copies of the transcript of the February 27 meeting for you by next Wednesday, as well as some extra copies of the December testimony before the Rogers subcommittee for those who do not yet have a copy. (The Rogers testimony will be in Warren Muir's office if you need it before next Wednesday.)

Carroll Leslie Pegler

Carroll Leslie Pegler
Co-chairman (for Federal
Council on Science and
Technology)

Warren R. Muir

Warren R. Muir
Co-chairman (for Council on
Environmental Quality)

Attachments

ICAS
HEW
NOAA
USDA
Commerce
Justice

Atmospheric issues
Health effects
Climatic effects
Agricultural and biological effects
Commercial information, economic impact
Federal authorities

Other agency topics for this meeting include the following:

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- Status report from the co-chairmen on liaison with the National Academy of Sciences and international organizations.
- Discussion of further follow-up needed with industry on matters unanswered at February 27 meeting.

FUNDED PROJECTS

12 mo 1.25M \$ 3.75 M - 3yr -

J. Lovelock
Reading University

Continuing measurement of atmospheric concentrations of fluorocarbon 11, fluorocarbon 12, carbon tetrachloride, methyl chloroform, methyl chloride in the troposphere and lower stratosphere which is accessible by conventional aircraft.

J. N. Pitts
University of California

Exploration of chlorine atom/ozone interactions under simulated stratospheric conditions.

C. Sandorfy
University of Montreal

Continuing spectral investigation of fluorocarbon compounds and of possibly important naturally-occurring chlorine compounds. Special emphasis on quantum yields of decomposition products from irradiation at 1700-2000 Å. Investigation of end products when photolysis is carried out in the presence of air.

D. Davis
University of Maryland

Development of a tuned laser fluorescence method for direct measurement of ClO in the stratosphere.

D. Stedman
University of Michigan

Development of a chlorine fluorescence method for direct measurement of ClO in the stratosphere.

RECOMMENDED PROJECTS

R. Rasmussen
Washington State Univ.

Direct measurement of chlorofluoromethanes, related chlorine species, and total chlorine present in the stratosphere and upper troposphere.

R. Nicholls
York University

Spectral studies of ClO radical in preparation for direct measurement of ClO from atmospheric transmission measurements.

J. Birks
University of Illinois

Exploration of ClX reactions which may be important in the stratosphere.

J. Anderson
University of Pittsburgh

Agreed in principle (no proposal 1/20). Will propose a technique for direct measurement of chlorine atoms in the stratosphere and will propose suitable flights to make the necessary measurements.

D. Murcray, U. of Denver

In situ measurement of chlorine- and fluorine-containing compounds in the stratosphere.

PROPOSED PROJECT

Modeling Study
Contractor to be Selected

Critical analysis of current models of the stratosphere including a sensitivity analysis of the several assumptions and estimates which have been used to predict ozone destruction.



Sens. Edmund Muskie and Jennings Randolph.

Under a new law, Congress has authority to approve or disapprove the Administration's request for deferral of spending authorizations and appropriations.

Muskie told the Senate that the Bureau of Labor Statistics estimates that each \$1 billion of contract construction for waste treatment plants creates 22,000 on-site jobs. In addition, he said that "delay in funding seriously hampers the national goal of elimination of discharge of pollutants into navigable waters by 1985."

Muskie sharply criticized President Ford for allocating only \$4 billion out of \$9 billion authorized for fiscal years 1973, 1974 and 1975. The remaining \$5 billion was put in deferral status.

"This \$5 billion could be putting Americans to work," Muskie said, "\$5 billion to give Americans the quality environment they have asked for, \$5 billion to stimulate a sagging construction industry; \$5 billion for a meaningful, productive program." He added:

"While the Supreme Court considers the legality of Presidential impoundments, we must move now to release these funds under the authority of Section 1013(b) of the Impoundment Control Act of 1974 if we are to effectively halt the current economic recession.

"Some would argue that the obligational process is too slow for waste treatment construction programs to have any substantial effect on the unemployment situation. I do not believe this is necessarily correct. EPA has indicated in recent testimony that they are attempting to speed up the obligation process through administrative action such as the budget request for 172 new positions for construction grant administration, State certification of compliance with procedural requirements, and elimination of as much red tape as possible. Any increase in obligation rate will help the employment situation and that is what is needed at this time.

"It has been argued that EPA can't spend the money any faster than they are—how will they know unless they try it? There certainly are countless worthy projects all across the country just waiting for Federal funding so they can begin. The States are constantly crying out for more Federal construction grant funds."

FEDERAL TASK FORCE TO STUDY LINKS BETWEEN FREON AND OZONE DEPLETION:

A Federal inter-agency task force is being formed to investigate a possible relationship of Freons (fluorochlorohydrocarbons) to future reductions in the ozone content of the atmosphere. It will serve under direction of the Council on Environmental Quality and the Federal Council for Science and Technology, the latter headed by Dr. H. Guyford Stever.

Called the Federal Interagency Task Force on Inadvertent Modification of the Stratosphere (IMOS), the ad hoc group brings together representatives of major Federal agencies with responsibilities involving the stratosphere. They include Agriculture, Commerce, Defense, HEW, Justice, Transportation, Consumer Product Safety Commission, ERDA, EPA, NASA, National Science Foundation and Interdepartmental Committee for Atmospheric Sciences (ICAS).

Several Freon compounds are currently produced for use as the propellant gas in aerosol products and as the principal fluid in refrigeration and air conditioning. IMOS will prepare a report on the Freon/ozone relationship within approximately four months. The report is expected to summarize atmospheric, medical and ecological information on the subject, evaluate possible economic impacts and alternatives available to the industry, define potentially applicable authorities under which Federal action can be taken, and outline the proposed Federal program to resolve the issues.

AMERICAN LUNG ASSOCIATION OPPOSES RELAXATION OF AUTO EMISSION STANDARDS:

The American Lung Association has opposed relaxation or suspension of automobile emission standards on the ground that uncontrolled auto exhaust would seriously threaten the health of the public.

Dr. John R. Goldsmith, representing ALA's National Air Conservation Commission, told an EPA public hearing that the goal of fuel economy could be accomplished by other means and that health considerations are primary in preserving the automobile emission standards of the Clean Air Act.

Dr. Goldsmith, who is in charge of air pollution health effects studies for the California Department of Public Health and is an adviser to the World Health Organization and various Federal agencies, told the hearing, called to consider applications by automobile manufacturers for suspension of hydrocarbons and carbon monoxide emissions standards:

"We believe that air pollution is having major effects on the lung and respiratory system and that these

**Group to probe Freon
tie to ozone loss**

2/27/75

Please sign name **TIMES OBSERVERS**

address

Affiliation



- 1 CAROL BENSON EG & G Envtl Chmtrls Waltham, Mass
- 2 JEFF CONVERSE NL INDUSTRIES WASH., D.C.
- 3 JAMES AKERSON GILLETTE ROCKVILLE, MD.
- 4 ERNEST BAUER IDA ARLINGTON, VA.
- 5 W.J. Lanouette, The National Observer, 11501 Columbia Pike
Silver Spring, Md. 20910
- 6 C. T. CHEN OSHA, U.S. DOL Washington, D.C.
- 7 P. R. Datta EPA WASH D.C.
- 8 T. J. O'Loynahan Sr. Attach British Embassy
- 9 MARK PADOW NATL PAINT & COATNGS ASSN WASH. DC
- 10 RALPH ENGEL CSMA WASH. D.C.
- 11 John Butler EPA WASH. D.C.
- 12 F.T. Byrne ZMC WASH DC
- 13 Ralph Cicerone U of Michigan Ann Arbor
- 14 F. S. Rowland U. Calif Irvine Irvine, Cal.
- 15 R VAN BUITEN, General Electric, TEMPO WASH DC
- 16 RAY TRETHEWY Conservation Foundation WASH
- 17 HUGH ALBERG ICA8 WASH DC
- 18 FG BLAKE STPO/NSF WASH DC

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F. M. Hunt

Dow Chemical, Washington D.C.

J. H. Plonka

Dow Chem, Midland, Mich

Hugh A. Barker

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"

Robert M. Hehir

Consumer Prod. Safety Comm.

Michael SanGiovanni

AEROSOL AGE MAGAZINE, N.J. 07009

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ALAN J. GROBECKER

DOT - OST - CIAP

JOSEPH J. GUINDOWSKI

DOT / CIAP



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3	Hans Georg Thiele	The Ore & Chemical Co.	New York
4	Thomas B. Stiel, Jr.	Nat. Res. Def. Council	Washington, DC
5	M. N. Christiansen	U.S. DA - AIPS	Beltsville Md
37	ALLAN HOFFMAN	} SENATE COMMITTEE ON COMMERCE	
38	KATHI KORPON		
39	Justice Manning	EPA, on Committee	RTP DURHAM, NC
40	Anthony S. Longone	COAS	c/o CSMA Wash D.C.
41	Leach, Bawel	MCA	Washington D.C.
42	Oliver Hammond	Science	1575 Texas World D.C.
43	H. T. Gilkey	Air Land + Refug. Inst.	1815 N. Fort Myer Dr Arlington, VA 22204
44	A. W. Stockton	AP	2021 K ST, NW EX 1067 Arlington
45	Michael J. Lee	Air/Water Pollution Report	Sub St, Ind 20710
46	A. Stewart Anderson	Report Co.	1701 Penna Ave Arlington, VA
47	George Wright	EPA	401 M. St. SW (A/C) Wash. DC
48	William F. Allen	ARK Industries	SC 160 330 Church St W 20201 Bu 4740
49	Franklin J. Jones	DHEW	
50	D. P. Thacker	NRL	Code 7139 Naval Research
51	S. R. Schwartz	NRL	7138 - NRL
52	Thomas J. Brennan	En. Sciences Corp	4400 - N. City
53	Heck Carlson	T-D-C Reports	Wash., D.C.
54	W. Spindel	NAS	
55	James J. Kelling	U.S. Senate Com. on Arms + Space Science	



50 A. Karim Ahmed	17 Hubbard Dr, White Plains, NY	NRDC
51 E. C. De Franco	USCA - AFS, Bethesda, Md	
52 K. Koppou	Senate Commerce	
53 Kenneth H. Lloyd	EPA - CARPS, Durham, N.C.	
54 R. G. Kitchin	Del Pont Co.	
55 John Sullivan	N.Y. Times	
56 William P. Wood	Green-Horn Products Corp	
57 Samuel C. Gorman	DOT	
58 John S. Sengler	Systems Control Inc.	
59 J. D. Johnson	N.Y. Chamber Com	
60 John J. Shivers	Associated Membership Corp	
61 G. R. Smith	Manufacturing Chemists Assoc	
62 J. Childers	Environment Report	
63 Edgar Burgess	Public House	
64 Melinda Cain	National Academy of Sciences	
65 Poran Pashayan	EPA	
66 Deborah Feinberg	New York State Attorney General's Off.	
67 Angela Karpis	Comm. on the Environment	
68 Crady Scherer	Medell News Service	
69 Ann Rethorst	J. Randolph Publications	



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25. *David Blackburn* National Resources Defense Council
26. *Joe Hillman* Joe Hillman Lawyer
27. *Robert H. Bingham* D.E.
28. *Charles E. Brown* Kaiser Aluminum Al. Bldg.
29. *Eric Davis* R.H. Davis
30. *David Merikosa* National Paint & Coatings Association



**OPINION POLL
RESULTS**

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BARRON'S

MARCH 3, 1975

NATIONAL BUSINESS AND FINANCIAL WEEKLY

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"The Sky Is Falling!"

see
page **3**

"The Sky Is Falling!"

Chicken Little Is Alive and Well and Worrying About the Ozone

BY DANA L. THOMAS

producers of the propellants; they turn around the early 1980s and remain sig- craft and those scheduled to enter ser-



Directly involved are the six major

banished immediately, depletion of the ozone could still reach a peak of 2-3% released last month, the study concludes that operations of the current SST air-

Continued on Page 8

Science News of the Week

Volcanoes and ice ages: A link?



February 20, 1975

MEMORANDUM TO

Dr. Edward P. Todd, Chairman
Interdepartmental Committee for
Atmospheric Sciences (ICAS)

From: Carroll Leslie Pegler
Warren R. Muir
Co-chairmen, Task Force on Inadvertent Modification
of the Stratosphere (IMOS)

Subject: Request for Information on Research Needs and Budget for
Stratospheric Measurements and Monitoring

At the IMOS meeting on February 18, 1975, reports were made by the member agencies of their current research programs and the most pressing needs for additional investigations. It was reported that ICAS will recommend an accelerated research program to Dr. Stever, with NASA to be the lead agency in the area of measurement and instrumentation, working in close cooperation with NOAA and other appropriate agencies. Dr. John Naugle of NASA reported that NASA was presently attempting to re-program some of its FY 76 funds in order to give increased emphasis to stratospheric research. Dr. Lester Machta of NOAA reported on his analysis of research needs, totaling \$3 million, of which perhaps half would not likely fall under NASA jurisdiction.

The consensus of IMOS members seemed to be that there are many critical needs which must be started as soon as possible and which would require some new funding. In order to discuss such needs with the Office of Management and Budget and other appropriate parties, IMOS will need to have a coherent plan of research, responsibilities, and justification.

It was therefore decided to request that ICAS prepare such a plan by March 15. Note that this plan will not include all of the research needs which may be identified in the June IMOS report, which will cover research on impacts of any ozone reduction and of any curtailment



of production or use of fluorochlorohydrocarbons. Instead the ICAS report should focus on those special research needs relating to measurement and monitoring on which immediate action and budgetary decisions are desired. It would be helpful if the report included the following information:

- brief description of unmet research needs
- justification
- which agency should fund the research (either directly or indirectly) and what should be the funding mechanism
- amount of funding required; how much can come from existing budgets and what additional funding would be required
- relationship of this new research to agency's base program
- research timetable

Thank you very much for your assistance in this important matter.





DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898

ANIC CHEMICALS DEPARTMENT

February 13, 1975

The Honorable Paul G. Rogers
U. S. House of Representatives
Washington, D.C. 20515

Re: H.R. 17577 and H.R. 17545 - To Amend
the Clean Air Act with Respect to
Fluorocarbon Products

Dear Mr. Rogers:

On December 12, 1974 I gave testimony before the Subcommittee on Public Health and Environment of the Commerce Committee. Following my testimony, you raised two questions that I would like to answer by this letter, namely, (I) Are there alternatives to fluorocarbons?, and (II) Could I let the Committee know the amounts fluorocarbon manufacturers are spending on environmental research?

Enclosed are my answers to these questions. If you wish any further information concerning these or other points, please have your staff telephone me at (302)-999-3814.

Again, let me express my thanks for the opportunity to discuss this topic with your Subcommittee.

Very truly yours,

Raymond L. McCarthy



ATTACHMENT

I. Are there alternatives to fluorocarbons? (Transcript p. 141, l. 17)

About 50% of the fluorocarbons produced in the U.S. are used in aerosol products, about 30% in refrigeration equipment. The remainder is in other applications such as precision cleaning and as a blowing agent in foams. Refrigeration equipment (including air conditioners) utilizing fluorocarbon refrigerants accounts for about \$5.5 billion of the Gross National Product, and aerosol products containing fluorocarbon propellants account for about \$2 billion of the Gross National Product.

Refrigerant Alternatives

Mechanical refrigeration systems using fluorocarbons constitute the great majority of the refrigeration units and include all automotive air conditioners, at least 95% of household refrigerators, freezers and air conditioners, 90% of building air conditioners and substantially all transportation mechanical refrigeration.

Alternatives for the fluorocarbons currently used in these units are ammonia, sulfur dioxide, methyl chloride and hydrocarbons. These materials were used in certain refrigerant applications prior to the development of fluorocarbon refrigerants. (It should be noted that prior to the use of fluorocarbons ice was the principal household refrigerant.) None of these can be used as a replacement for the fluorocarbons that are in existing equipment without substantial rebuilding. Nor are they suitable for new equipment for most of these uses, unless the equipment were radically redesigned. The present units have the motor and the compressor together with a mixture of oil and refrigerant hermetically sealed in the same case. To change to these earlier refrigerants probably would require that the motor and the compressor be in separate units. This would increase unit prices and leakage susceptibility.

Significant properties of these "alternate candidates" are as follows:



Ammonia

1. Toxic to humans, having a Threshold Limit Value (TLV) of 25 parts per million (ppm), as compared with the high TLV of 1,000 ppm for fluorocarbons.
2. Explosive - forms an explosive mixture in air at 16% concentration, whereas fluorocarbons are non-explosive in air and nonflammable.
3. Corrosive - typical home refrigerator and air conditioning units are hermetically sealed with the refrigerant in contact with the electrical components; ammonia will corrode these components.

Because of its toxic and explosive properties, ammonia is unsuitable for use in units within buildings where human exposure is possible; i.e. houses, stores, offices, hospitals and particularly automobiles where the severe vibrations increase leakage potential.

Sulfur Dioxide

Sulfur dioxide is even more toxic than ammonia, having a TLV of only 5 ppm. This high toxicity, coupled with the possibility of leaks, makes sulfur dioxide completely unsuitable for household, auto and building air conditioning and refrigeration units. Also, it is highly corrosive, requiring expensive corrosion-resistant materials of construction not required by present day equipment. Its corrosiveness also makes it unsuitable for use in hermetic systems.

Methyl Chloride

Methyl chloride is also toxic to humans, having a TLV of 100 ppm. It forms an explosive mixture in air at only 10% concentration. Further, it is highly corrosive, generating hydrochloric acid on contact with moisture rendering it unsuitable for use in hermetic systems. Because of its toxic and explosive properties, as well as its corrosiveness, it is unsuitable for use in household, auto and most building units.



Hydrocarbons

Ethane has been used in some very low temperature systems. However, since a concentration of only about 2% in air is explosive, this material is only suitable for limited uses.

Other Fluorocarbons

There have been reports that other fluorocarbons, particularly those containing more than a single carbon atom and those containing hydrogen atoms, can be used effectively as refrigerants; and that these products, being less stable than Fluorocarbon 11 and 12, would react in the troposphere and not reach the upper stratosphere and cause ozone depletion. It is correct that certain of these types of fluorocarbons can be used effectively as refrigerants, and indeed some are now being used in some types of equipment. These compounds cannot be used to replace the fluorocarbons in existing units (without substantial rebuilding) because they have different physical and thermodynamic properties. Whether these products undergo chemical reaction in the lower atmosphere is unknown. Obtaining this information is part of the current industry program in studying all aspects of the fluorocarbon/ozone issue. Extensive experimental work is required to determine the lifetime of these compounds under tropospheric conditions. Also additional research on the physical and thermodynamic properties of some of these compounds is needed.

Summary - Refrigerants

At present we know of no suitable alternate refrigerant for the vast majority of refrigeration applications employing Fluorocarbon 11 and 12 refrigerants. We at Du Pont, and I believe the fluorocarbon manufacturers generally, are searching for and evaluating other candidates, including other fluorocarbons. To date we have not developed alternatives that are satisfactory in thermodynamic properties, environmental suitability and economic feasibility (which of course includes the feasibility of converting large multimillion dollar plants from production of Fluorocarbon 11 and 12 to production of the alternate).



Aerosol Propellant Alternatives

Fluorocarbon propelled aerosols contain the active ingredient dissolved in a solvent and pressurized by a liquefied fluorocarbon. The fluorocarbon is part of the solvent. Fluorocarbon vapor occupies the space above the liquid phase and forces the active ingredient/fluorocarbon solution out through a spray nozzle. Upon exit the pressure on the solution decreases instantaneously, causing immediate vaporization of the fluorocarbon solvent. This results in bursting of the solution into a fine mist spray pattern with rapid evaporation of the fluorocarbon solvent.

Possible alternatives for fluorocarbon propellants are compressed gases and nonfluorocarbon solvent liquefied gases.

Compressed Gases - (Nitrogen, carbon dioxide, nitrous oxide)

A compressed gas aerosol contains the active ingredient in solution in a relatively nonvolatile solvent, such as alcohol, under pressure of a compressed gas. Nitrogen is frequently suggested as a useful gas aerosol propellant. It is nontoxic and inexpensive. It is essentially insoluble in the active ingredient/solvent portion of the formula. Unlike fluorocarbon propellants which burst from the spray nozzle into fine mist particles, because the nitrogen is not dissolved in the solvent this burst effect is reduced. Consequently, the spray pattern normally consists of big drops of active ingredient, ordinarily in solution in a relatively nonvolatile solution such as alcohol. Typical spray products such as hair spray and anti-perspirant cannot be formulated with nitrogen, not only because of the unsatisfactory coarse spray characteristics but also because the presence of the solvent gives a wet cold spray that is unpleasant to the skin.

A further disadvantage to compressed gas propellants is that the pressure decreases during use resulting in undesirable changes in spray characteristics and excessive amounts of unused product remain after the pressure becomes too low.



Carbon dioxide and nitrous oxide gases share many of the characteristics of nitrogen, but they do provide greater formulating flexibility because of increased solubility in the active ingredient/solvent concentrate. These more soluble gases can be used for aerosol products which do not require fine sprays or careful control of the discharge. Although the gases have greater solubility than nitrogen, still they do not have sufficient solubility to burst the solution into fine spray upon exiting from the nozzle. Products such as furniture polish and windshield de-icer can be formulated successfully with these gases. However, the coarse, cold, wet solvent spray makes these propellants unsuitable for typical aerosol products such as hair spray or anti-perspirant.

In addition to the aforementioned shortcomings, carbon dioxide can cause serious corrosion within the aerosol can if any water is present in the formulation. This results in pinhole leaks in the can and the escape of the propellant.

Soluble Liquefied Gases - (Vinyl chloride,
propane, butane)

Physically these nonfluorocarbon liquefied gas propellants perform much the same as fluorocarbon propellants. However, vinyl chloride is no longer an acceptable propellant because of its recently discovered carcinogenic properties and has been banned by FDA, EPA and CPSC. Propane and butane are highly flammable, and therefore should not be used in personal products because of a potential blow torch effect. Small amounts of these gases have been used successfully in combination with fluorocarbons which suppress the flammability. Also, in certain aqueous products where water suppresses flammability, these gases can be used safely.

Non-Aerosol Packaging

Of course, nonpropellant packages can be used in place of aerosols but generally with recognized disadvantage to the user. For example, mechanical pumping devices can be used for some applications. However, these devices produce very large drops and make ineffective use of the active ingredient. Also, they are ineffective as insecticides because of the large drop



discharge. Pumps are being evaluated for hair sprays, but to date public acceptance has been poor. Pumps also are unsatisfactory where extended exposure of the product to air causes decomposition.

Summary - Propellants

There are alternate propellants acceptable for certain aerosol applications. However, there are no alternate propellants for many of the aerosol uses. Also, there are other packages that can be used in place of certain of the aerosol applications, but for many applications there is no equally effective, efficient and convenient type of package.

II. Could you let the Committee know the amounts you (fluorocarbon manufacturers) are putting into research? (Transcript p. 142, l. 4)

Du Pont's Haskell Laboratory for Toxicology and Industrial Medicine has made an extensive literature study of reports on industry research on the toxicology of fluorocarbons from 1931 to the present time. It estimates that the research described in these reports required expenditures of at least \$2,500,000 (1974 equivalent) by industry worldwide on the study of the toxicity of fluorocarbons.

In addition to the research of the aforementioned reports, the Inter-Industry Committee on Toxicology (aerosols) has expended \$1,600,000 in support of toxicology research on propellants since 1970.

Since 1970, independent of the aforementioned research, Du Pont has spent \$500,000 on fluorocarbon toxicology and ecology research, and we estimate that the remainder of the fluorocarbon producers have spent an equivalent amount during this period.

Since 1971 the fluorocarbon producers in cooperation with MCA have expended \$450,000 in university contracts for research on environmental effects of fluorocarbons.



The total expenditure by the fluorocarbon producers, therefore, is about \$5,050,000 to date. This research, of course, was directed at toxicity, flammability, inhalation and lower atmospheric effects.

The funding of further studies on the environmental effects of fluorocarbons, particularly in the stratosphere is also being planned by the fluorocarbon manufacturers. Contracts for such studies have already been funded at five universities. The funding of five other studies has recently been recommended by the Fluorocarbon Technical Committee of the Manufacturing Chemists Association. The planned expenditure for this future testing is expected to exceed \$1,000,000 in 1975 and remain at this level for several years.

In addition to the aforementioned industry sponsored research, studies currently are being carried out by the National Center For Atmospheric Research, the Environmental Protection Agency, the National Oceanic and Atmospheric Agency, the Naval Research Laboratory, the National Aeronautics and Space Administration and the academic community.

2/7/75



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FROM: Kenneth D. Makovsky

FOR IMMEDIATE RELEASE

INDUSTRY FORMS GROUP TO COORDINATE
OZONE FACTS WITH GOVERNMENT

Research Studies Underway

NEW YORK, Feb. 27 --An industry representative today announced that companies in fluorocarbon and related businesses had formed a group to coordinate "the many industry factors affected by the ozone-fluorocarbon issue" with the government. The group's four-point program and research studies were also cited.

"Our purpose today is to help to develop the means of resolving the ozone-fluorocarbon matter in a rational, orderly fashion based on scientific knowledge," said John W. Dickinson, Jr., vice-president, consumer affairs, Gillette North America, who is chairman of the new industry organization, the Council on Atmospheric Sciences (COAS). His statement was made at a fact-finding meeting of the Federal interagency task force on Inadvertent Modification of the Stratosphere (IMOS).

Mr. Dickinson said the group will also coordinate its program with government and academic scientists to achieve the broader public goal of gaining vitally-needed scientific knowledge of the atmosphere and



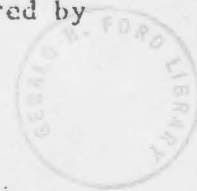
its dynamics.

The specific objective of COAS, the industry chairman stated, is to gather data on the issue "necessary to form the technical basis for legislative and executive decisions in the public interest and to place such data in the hands of government decision makers."

Mr. Dickinson outlined the COAS program as follows:

1. COAS will establish an independent review and advisory panel of competent, well qualified scientists to counsel and to comment freely on industry research programs and be available for counsel on governmental atmospheric research efforts.
2. COAS pledges full cooperation in working with government to establish an effective, well coordinated research program -- with the industry program (augmented or modified as may become necessary) complementing the government program.
3. COAS recommends the designation at the earliest possible time of a federal lead agency to whom the capabilities and hardware of other agencies would be made available.
4. COAS supports the concept of government atmospheric research and urges that adequate funds be provided to carry out such research.

The industry chairman advised that COAS is not a committee of scientists but its resources include the scientific research program of the Fluorocarbon Technical Panel, chaired by Dr. Frank Bower, division head at DuPont's Freon Products Laboratory. The Panel, supported by 19 fluorocarbon manufactueres throughout the world, is being administered by the Manufacturing Chemists Association.



Dr. Bower said in his statement before CIOES that the industry has had "an active program of atmospheric research for several years" and now has directed and enlarged the effort to address the current ozone question.

He identified four important areas where the industry believes additional data and analysis are required:

1. Distribution of chlorine-containing compounds in the atmosphere.
2. Chemistry of chlorine-containing compounds in the stratosphere.
3. The ozone concentration in the stratosphere.
4. Modeling of atmospheric processes.

Five industry research projects are already underway, Dr. Bower said, and are being directed by: Prof. James E. Lovelock, University of Reading, England; Prof. Camille Sandorfy, University of Montreal; Dr. James N. Pitts, University of California; Dr. Douglas Davis, University of Maryland, and Prof. Donald Stedman, University of Michigan. Several other projects are under consideration, Dr. Bower added.

"The potential problems of ozone deterioration are regarded with concern and seriousness by industry which makes or uses fluorocarbons," Mr. Dickinson stressed. "Obviously, industry wishes not to create health hazard consequences which have been described in the theory, if indeed the critical reaction sequences take place. To wish or act otherwise is neither in the public interest or industry's own long-term self interest."

A number of scientists in government and academia have stated that little additional change to ozone -- if any is occurring -- would result from taking the time required for a concentrated effort to obtain meaningful scientific data, he said.



COAS comprises representatives from producers of fluorocarbons, suppliers of other chemicals, aerosol cans and valves, aerosol product fillers and marketers, the air conditioning and refrigeration industry, as well as five major industry trade associations including Air Conditioning and Refrigeration Institute; Can Manufacturers Institute; Chemical Specialties Manufacturers Association; The Cosmetic, Toiletry and Fragrance Association, and National Paint and Coatings Association. COAS is cooperating with the Manufacturing Chemists Association.



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