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This is not a textual record. This is used as an administrative marker by the George Bush Presidential Library Staff.

Record Group/Collection: George H.W. Bush Presidential Records
Collection/Office of Origin: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Global Climate Change Files

OA/ID Number: 62049
Folder ID Number: 62049-003

Folder Title:
Environment: General [5 of 6] [1992]

Stack:	Row:	Section:	Shelf:	Position:
	0	0	0	0

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9203106
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

****

FROM: DANIELSON, PETER: THE UNIVERSITY OF BRITISH COLUMBIA

TO: SUNUNU, JOHN

DATE OF CORRESPONDENCE: 05/13/91

SUBJECT: REQUEST FOR COPIES OF PUBLICATIONS OR SPEECHES ON THE ETHICS OF GLOBAL WARMING.

****

DIRECTORATE ASSIGNED: DIRECTOR'S OFFICE

STAFF ASSIGNED:

ACTION REQUIRED: AS NECESSARY

STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE:

DATE COMPLETED: 07/18/92

STAFF DUE DATE

DATE COMPLETED/DEPT:

****

COPIES TO:

****

WHITE HOUSE TRACKING #:

CONTACT PERSON:

PHONE: EXT:

REMARKS:

OSTP RECEIVED: 06/01/92 P DEPT RECEIVED:

FILE: SUNUNU TRACKING

CENTRAL FILES: ~~P Chron Staff~~ ENV

3106

THE UNIVERSITY OF BRITISH COLUMBIA

Department of Philosophy
1866 Main Mall, E-370
Vancouver, B.C. Canada V6T 1W5

THE CHIEF of STAFF
has seen

Mon May 13 1991

Bromley
Bus

Mr. John Sununu
The White House
Washington, DC

Dear Sir:

In my current research into the ethics of global warming, I have been impressed at your influence. It would be most useful to seen copies of your publications or speechs on this issue.

Sincerely yours,

Peter Danielson
Associate Professor and
Senior Research Fellow
Centre for Applied Ethics

INTERNET: danielsn@unixg.ubc.ca
voice: (604) 822- s4658
FAX: (604) 822-4978

THE WHITE HOUSE

WASHINGTON

July 18, 1991

Dear Dr. Danielson:

Thank you for writing to express your interest in publications and speeches on the issue of global climate. I have been asked to reply to your request.

The attached materials give an overview of the actions taken to address climate change. In addition, I have included a copy of the latest report on the U.S. Global Change Research Program and an article that appeared recently in Issues in Science and Technology, a publication of the National Academy of Sciences.

Again, thank you for contacting us. I trust the attached material will be of assistance and do feel free to contact my office should you need additional information.

Sincerely,

D. Allan Bromley
The Assistant to the President
for
Science and Technology

Professor Peter Danielson
Associate Professor and
Senior Research Fellow
Centre for Applied Ethics
The University of British Columbia
1866 Main Mall, E-370
Vancouver, B.C. Canada V6T 1W5

Attachments

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9201533
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

****

FROM: STARR, Chauncey: EPRI

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 04/24/92

SUBJECT: HE IS ASKING DR. BROMLEY TO FORWARD THE ENCLOSED LETTERS TO PRESIDENT BUSH, URGING HIM NOT TO ATTEND THE UNCED "EARTH SUMMIT" IN BRAZIL.

****

DIRECTORATE ASSIGNED: ENVIRONMENT

STAFF ASSIGNED:

ACTION REQUIRED: AS NECESSARY

STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: 05/13/92 STAFF DUE DATE

DATE COMPLETED: DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley

****

WHITE HOUSE TRACKING #: CONTACT PERSON:

PHONE: EXT:

REMARKS:

Answered by DAB

OSTP RECEIVED: 04/30/92 DEPT RECEIVED:

FILE: P-ENVIRONMENT

CENTRAL FILES:

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9201533
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

****

FROM: STARR, Chauncey: EPRI

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 04/24/92

SUBJECT: HE IS ASKING DR. BROMLEY TO FORWARD THE ENCLOSED LETTERS TO PRESIDENT BUSH, URGING HIM NOT TO ATTEND THE UNCED "EARTH SUMMIT" IN BRAZIL.

****

DIRECTORATE ASSIGNED: ENVIRONMENT

STAFF ASSIGNED:

M - told Nancy that DAB had responded DA 5/7

ACTION REQUIRED: AS NECESSARY

STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: 05/13/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley

****

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:

REMARKS:

OSTP RECEIVED: 04/30/92 DEPT RECEIVED:
FILE: P-ENVIRONMENT

CENTRAL FILES:

EPRI
Electric Power
Research Institute

Leadership in Science and Technology

RECEIVED
92 APR 30 P12 : 38
OSTP
MAIL ROOM

1533

April 24, 1992

Dr. D. Allan Bromely
Assistant to the President
for Science and Technology
Executive Office of the President
Room 358
Old Executive Office Building
Washington, D.C. 20500

Dear Allan:

I would appreciate your arranging to deliver the enclosed letters to President Bush as we don't know who is coordinating the administration's views on the Rio conference in June. We believe it important for the President to be aware that there is a substantial informed opinion that believes he should not attend that conference. Your copies of the letters are also enclosed.

As you probably know, there is considerable professional support for the position that the U.S. program to promote climate research and efficiency is adequate for the present. I know you have been instrumental in organizing this program. Let me know if stronger professional support is needed.

Sincerely,

Chauncey

Chauncey Starr
President Emeritus

Enclosures

CS/dt/Bromley/Rio

Headquarters: 3412 Hillview Avenue, Post Office Box 10412, Palo Alto, CA 94303, USA • (415) 855-2000 • Telex: 82977 EPRI UF • Fax: (415) 855-2954
Washington Office: 1019 Nineteenth Street, NW, Suite 1000, Washington, DC 20036, USA • (202) 872-9222 • Fax: (202) 296-5436

EPRI
Electric Power
Research Institute Leadership in Science and Technology

April 24, 1992

President George Bush
The White House

Subject: Rio Conference in June

Dear Mr. President:

The Fitzwater press conference of April 22 indicated your indecision on attending the Rio conference (Earth Summit). I urge you not to attend.

As a professional analyst of global energy matters and climate change, I can assure you that the agenda of the Rio conference will make little contribution to mitigating a future climate change. Its primary thrust is to enhance the political momentum of the environmental movement, with minimal attention to the impact on the pressing social needs of the world. Global environmental issues do deserve international attention but not in such a biased forum. You should not lend credibility to the Rio meeting by your attendance.

The present U.S. program to encourage efficient and clean energy use, and the U.S. Global Change Program to support climatology research, are the common-sense way to address the very uncertain effects of carbon dioxide on climate change. Of course we should make our technology and experience available to other nations. The vague international agreement proposed for Rio would not constructively help such a program.

Sincerely,

Chauncey Starr

Chauncey Starr
President Emeritus and
Founder

Recipient of the Medal of
Technology 1990

cc: A. Bromley
M. Deland

To: President Bush

CS/dt/President/Global Warming

Headquarters: 3412 Hillview Avenue, Post Office Box 10412, Palo Alto, CA 94303, USA • (415) 855-2000 • Telex: 82977 EPRI UF • Fax: (415) 855-2954
Washington Office: 1019 Nineteenth Street, NW, Suite 1000, Washington, DC 20036, USA • (202) 872-9222 • Fax: (202) 296-5436

EPRI
Electric Power
Research Institute

Leadership in Science and Technology

April 24, 1992

President George Bush
The White House

Subject: Rio Conference in June

Dear Mr. President:

I encourage you not to attend the Earth Summit if there is a chance that the United States would be committed to supporting a limit on carbon dioxide emissions. The present state of knowledge about global warming and its effects is not sufficiently robust to justify such precipitous action by the world community at this time, nor have costs and consequences of such an action been estimated for the United States and the rest of the world.

I suggest that you propose the formation of an International Council of Nations on Global Climate, with a life of ten years. Its normal function will be to coordinate, initiate studies, analyze and make recommendations for appropriate actions as knowledge of global warming increases. The Council would prepare necessary assessments of the environmental, social and economic effects of its recommendations, and present them for action to responsible world leaders.

Very truly yours,

D. Culler for

Floyd Culler
President Emeritus

cc: A. Bromley
M. Deland

FLC/dt/President/Global Warming

Headquarters: 3412 Hillview Avenue, Post Office Box 10412, Palo Alto, CA 94303, USA • (415) 855-2000 • Telex: 82977 EPRI UF • Fax: (415) 855-2954
Washington Office: 1019 Nineteenth Street, NW, Suite 1000, Washington, DC 20036, USA • (202) 872-9222 • Fax: (202) 296-5436

EPRI
Electric Power
Research Institute *Leadership in Science and Technology*

April 24, 1992

President George Bush
The White House

Subject: Rio Conference in June

Dear Mr. President:

I encourage you not to attend the Earth Summit if there is a chance that the United States would be committed to supporting a limit on carbon dioxide emissions. The present state of knowledge about global warming and its effects is not sufficiently robust to justify such precipitous action by the world community at this time, nor have costs and consequences of such an action been estimated for the United States and the rest of the world.

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Very truly yours,

D. Pleasure for

Floyd Culler
President Emeritus

cc: A. Bromley
M. Deland

FLC/dt/President/Global Warming

Headquarters: 3412 Hillview Avenue, Post Office Box 10412, Palo Alto, CA 94303, USA • (415) 855-2000 • Telex: 82977 EPRI UF • Fax: (415) 855-2954
Washington Office: 1019 Nineteenth Street, NW, Suite 1000, Washington, DC 20036, USA • (202) 872-9222 • Fax: (202) 296-5436

THE WHITE HOUSE

WASHINGTON

May 7, 1992

Dear Chauncey:

Many thanks for your letter of April 24 with its enclosed letter to President Bush which I shall certainly pass on to him. The mail has been running at a very high level concerning the UNCED Conference with the Union of Concerned Scientists, for example, delivering 10,000 letters urging the President to attend the conference and a great many others taking precisely the opposite view.

Unhappily, the situation here is a complicated one and the President has not yet made a final decision concerning his participation in the conference. Rest assured, however, that we in the Bush Administration are determined that we will get a resolution at the conference that will avoid the north/south polarization that could be devastating.

The points you make in your letter are well taken and I am sure that the President will consider them very carefully.

With all best wishes,

Sincerely yours,

Allan

D. Allan Bromley
The Assistant to the President
for
Science and Technology

Dr. Chauncey Starr
President Emeritus
Electric Power Research Institute
3142 Hillview Avenue
Post Office Box 10412
Palo Alto, California 94303

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9201488
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS
****

FROM: WOLF, M. David

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 04/19/92

SUBJECT: HE IS WRITING TO ASK FOR SPECIFIC QUESTIONS HE OUTLINED IN A PREVIOUS LETTER TO DR. BROMLEY.

****

DIRECTORATE ASSIGNED: ENVIRONMENT

STAFF ASSIGNED:

ACTION REQUIRED: FOR DAB'S SIGNATURE

STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: 05/11/92

STAFF DUE DATE

DATE COMPLETED:

DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley

****

WHITE HOUSE TRACKING #:

CONTACT PERSON:

PHONE: EXT:

REMARKS:

OSTP RECEIVED: 04/27/92 DEPT RECEIVED:

FILE: P-ENVIRONMENT

CENTRAL FILES:

THE WHITE HOUSE

WASHINGTON

July 15, 1992

Dear Mr. Wolf:

Thank you for your letter of April 19 urging the President to attend the United Nations Conference on Environment and Development in Rio. It was not possible to reply to the crush of correspondence received just prior to the UNCED before that event, but I can assure you that your letter was considered as we prepared for the Conference.

As you know, the President did attend the Earth Summit and brought with him the message of U.S. experience and leadership in environmental policy. That experience has taught that shrill rhetoric can be useless or counterproductive, and that effective and intelligent action through efficiently designed policies is the key to addressing the important and difficult issues of environment and development. If we craft policies carefully, we can have both economic growth and environmental protection, and indeed the two can be mutually reinforcing.

It was in that spirit that the United States brought real actions to UNCED, offered to go beyond abstract diplomatic language and to achieve real results in the near term. These included:

- The "Forests for the Future" Initiative, proposing to double international assistance for conservation of the world's precious and dwindling forests, starting with a U.S. downpayment of $150 million in new forest conservation assistance. Conserving forests is among the Earth's most urgent ecological needs, and one of the best ways to protect biodiversity and provide other environmental and economic benefits.

- A challenge to all countries to develop and publish climate change action plans, as required by the Climate Change Convention signed in Rio. The U.S. published its national action plan in 1991 and updated it in 1992, assembling concrete programs and policies that will limit net U.S. greenhouse gas emissions over the next decade. Meanwhile most other industrialized countries have trumpeted targets but have not backed that rhetoric with real action.

- A new Biodiversity Research and Inventory Initiative. This effort will help identify areas of biological value and thereby assist in the conservation of precious biodiversity.

- A Technology Cooperation Corps to spread U.S. expertise and offer opportunities to developing countries in need of new technologies that integrate development and environmental quality goals.

- Vigorous efforts to promote the economic development that all countries, especially poorer countries, so urgently need if they are to provide for their populations while simultaneously generating the resources that enable environmental protection. These efforts include our perseverant attempts to secure a fair and open world trade system through ongoing GATT talks, and the President's initiative for a North American Free Trade Agreement (NAFTA) joining Canada, the U.S. and Mexico toward greater mutual prosperity.

- An unmatched program of scientific research into the environment. The U.S. Global Change Research Program is the world's largest such investment -- as large as all other countries' global change research programs put together. The Bush Administration has invested $2.6 billion to date in global change research, with an additional $1.3 billion requested for fiscal year 1993.

We appreciate your interest in UNCED and environmental issues. Sound results will come from serious efforts and careful choices.

With the President's best wishes,

Sincerely yours,

D. Allan Bromley

D. Allan Bromley
Assistant to the President
for
Science and Technology

Mr. M. David Wolf
19 High School Court
Los Gatos, California 95120

1488

RECEIVED
92 APR 27 AM : 54
OSTP
MAIL ROOM

April 19, 1992
19 High School Ct
Los Gatos, CA 95120

Dr. D. Allan Bromley
Assistant to the President
for Science and Technology
The White House
Washington, D.C.

Dear Dr. Bromley:

I have your three page letter, dated April 3, 1992, written in response to my letter expressing concern and disappointment for the President's obstructionism regarding UNCED.

On the last page you refer to the conference by telling me of President Bush's cooperation. Then you give the great assurance "that the United States will be well represented." My concern has to do with what those representatives will or will not be doing.

Just respond to two specific questions, if you would.

(1) Why, why will the President not cooperate with the proposals of most other countries to reduce Greenhouse causing gases to 1990 levels?

President Bush opposes that cap even though it is a minimum action. Far greater reductions would be prudent in light of the probability of disastrous results if we do not. It appears short-sighted economic reasons are his rationale.

(2) If he is so committed to the environment and the conference, why is he unwilling to respond to other national leaders who are urging his attendance?

This conference could be (I'm afraid, "could have been") a transitional time in history of humanity. His absence suggests a true lack of concern. With the exception of his recent action having to do with CFC's, most of his "accomplishments," which you delineated, are window dressing and of little long range consequence.

These questions are on the minds of many of us. We take little comfort in what we see and hear.

Truly,

M. David Wolf

cc: Environmental Task Force, 1st UMC of Los Gatos

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9201396
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

****

FROM: WHITE, Gid L.: U.S. ARMY (RETIRED)

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 04/15/92

SUBJECT: HE IS WRITING URGE DR. BROMLEY TO CONVINCE THE PRESIDENT NOT TO ATTEND THE UNCED CONFERENCE IN RIO DE JANERIO.

****

DIRECTORATE ASSIGNED: ENVIRONMENT

STAFF ASSIGNED:

ACTION REQUIRED: DIRECT REPLY

STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: 05/04/92

STAFF DUE DATE

DATE COMPLETED:

DATE COMPLETED/DEPT:

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COPIES TO:

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WHITE HOUSE TRACKING #:

CONTACT PERSON:

PHONE: EXT:

REMARKS:

OSTP RECEIVED: 04/20/92 DEPT RECEIVED:

FILE: P-ENVIRONMENT

CENTRAL FILES:

1396

RECEIVED
92 APR 20 P2:07
OSTP
MAIL ROOM

MSgt Gid L. White
US Army (Retired)
6411 Plank Road
Fredericksburg VA 22407
(703) 786-4906

President's Science Advisor
The Executive Office Building
1600 Pennsylvania Avenue
Washington DC 20016

Dear Sir:

For some time now, I've been wondering when the scientific community was going to finally put an end to some of the appalling excesses of their peers in the "environmentalist" community. There's certainly more than enough information published to refute most of the sillier claims of imminent danger from global warming, the hole in the ozone, CFCs as factor in ozone depletion, ad nauseum -- but it never appears in the mass media as anything other than a very rare footnote such as, "While a few scientists do not completely agree...." In fact, I don't believe I've ever heard a major television network even mention the possibility that any of these Chicken Little theories just might perhaps be wrong.

I understand, I believe, the financial interests behind the multimillion-dollar environmental lobbies (Greenpeace, NRDC, etc), and they do seem to carry a lot of weight with the media, who, of course, couldn't tell a fluorocarbon atom from fluoride toothpaste and, truthfully, find that Chicken Little stories make better copy for their semi-literate audience. However, aside from a few articles in the Washington Times (Dixy Lee Ray's piece today, for example), the scientific community seems to be silently blundering along with the crowd.

With the diverse specializations in the field, I can see how a mathematician or a pathologist might not easily follow the alleged science used to justify some of the crazier proposotions, but where is the great body of atmospheric scientists and molecular biologists who surely can see the flaws?

Twenty years ago, I was an advisor to the Director of the Armed Forces Institute of Pathology, and during a staff meeting in '74 or '75 I humorously suggested that the way to fight back our manpower cuts was to create a "Department of Environmental Pathology" , since it seemed to be the buzzword of the day. We all laughed -- but a few short years later that was exactly what they did. I needn't mention, of course, that it worked. My point being, naturally, that scientists in government (which I sometimes referred to as "parasites in an unnatural host") sometimes develop the unfortunate characteristic of just going along with the program -- a fault, alas, often shared by us military types. My guess would be that NASA fell into that trap a while back when it saw its post-war funding in jeapordy and suddenly got into the act with the non-peer-reviewed "hole in the ozone over Kennebunkport" headline, without mention of the Pinatubo cloud.

In short, I fear President Bush has succumbed to the mass-media hysteria and will fly off to Rio --blowing billions of tax dollars in the process. Please do not let him do this without understanding the fraud involved in this "science."
Thanks, and my sincere best wishes,

Gid L. White US Army (Retired)

"Document Control"

TYPE: MEETING REQUEST DOCUMENT NUMBER: 9201381
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

****

FROM: LAY, Kenneth L.: ENRON CORP.

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 04/09/92

SUBJECT: HE WOULD LIKE TO SPEAK TO DR. BROMLEY REGARDING THE ROLE NATURAL GAS CAN PLAY TO REDUCE AIR POLLUTION AND LOWER CONSUMER ELECTRICITY PRICES.

****

DIRECTORATE ASSIGNED: ENVIRONMENT

STAFF ASSIGNED:

ACTION REQUIRED: AS NECESSARY

STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: 05/01/92 STAFF DUE DATE

DATE COMPLETED: DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley
INTERNATIONAL/POLICY

****

WHITE HOUSE TRACKING #: CONTACT PERSON:

PHONE: EXT:

REMARKS:

OSTP RECEIVED: 04/15/92 DEPT RECEIVED:

FILE: P-ENVIRONMENT

CENTRAL FILES:

1381

ENRON CORP

Kenneth L. Lay
Chairman and
Chief Executive Officer

RECEIVED
92 APR 15 P4:21
MAIL ROOM

P. O. Box 1188
Houston, Texas 77251-1188
(713) 853-6773

April 9, 1992

Dr. D. Allan Bromley
Assistant to President for
Science and Technology
358 Old Exec. Ofc. Bldg.
Washington, DC 20500

Dear Dr. Bromley:

The United Nations Conference on Environment and Development will surely focus the attention of the United States and the world on the global environment, in general, and the relationship between environmental protection and economic development, in particular.

In this connection, I believe the environmental and economic benefits of natural gas-fired electric power generation offers the United States a reasonable and balanced approach to CO_2 emissions reduction. Natural gas-fired electricity generation achieves the twin goals of environmental protection and lower consumer electricity prices.

For example, a new natural gas-fired, power plant produces virtually zero sulfur dioxide emissions (the main cause of acid rain), reduces carbon dioxide emissions by 58 percent (the principal greenhouse gas) and cuts nitrogen oxides by 81 percent when compared with a new coal plant. Of course a gas-fired plant does not produce any solid waste -- ash or sludge.

Natural gas electric power generation is not only cleaner, it is cheaper. At long-term gas prices currently offered by Enron, gas-fired power production is 30 percent less costly over the life of the plant than coal-fired electricity generation.

I have attached a copy of a recent speech I delivered delineating the environmental and economic benefits of natural gas-fired, electric power production. I would be delighted to talk with you regarding the role natural gas can play to reduce air pollution and lower consumer electricity prices.

Sincerely,

Kenneth L. Lay

Attachments

Bush Library Photocopy
Miscellaneous Handwriting

NATURAL GAS: The Power Fuel for the 1990's

By
Dr. Kenneth L. Lay
Chairman and Chief Executive Officer
Enron Corp.

Institute of Gas Technology
Natural Gas for Electric Power Generation Conference
March 9, 1992

NATURAL GAS: THE POWER FUEL FOR THE 1990's

By
Dr. Kenneth L. Lay
Chairman and CEO
Enron Corp.

Institute of Gas Technology
Natural Gas for Electric Power Generation Conference
March 9, 1992

INTRODUCTION

- Let me begin by praising the IGT for sponsoring this important conference. Bringing together representatives from the electric power industry and the natural gas industry serves an extraordinarily valuable purpose. A purpose so vital its importance is difficult to overestimate.

- The purpose of this conference, of course, is to foster mutual understanding between these two important industries. I am convinced mutual understanding — the natural gas industry recognizing the special concerns and needs of electricity producers, our customers; and the electricity generating sector appreciating the natural gas industry's unique capabilities — will form a solid foundation for a very strong, mutually beneficial relationship.

- Our common enemies in this endeavor are myths, misconceptions, and misinformation. Today, I will endeavor to set the record straight with the cold, hard facts.

- My remarks address three areas that are, in my view, critical to understanding and realizing the full potential natural gas can play as a power generation fuel.

  - First, I will briefly outline the prevailing issues related to power production in the 1990's.

  - Second, I will describe the balanced solution and the "Natural Gas Standard."

  - Finally, I will discuss the partnership that must be forged between the natural gas industry, the electric power industry and Federal and state regulators.

AN OVERVIEW: POWER PRODUCTION IN THE 1990's

- I am convinced the macro issues affecting the power production industry include: an increasing concern regarding environmental protection; a continuing commitment to produce electricity efficiently and cost effectively to provide for economic growth, job creation and enhanced industrial competitiveness; and managing the spectre of uncertain demand growth. The key challenge, in my view, will be balancing the twin goals of environmental protection, meaning cleaner power production, and economic growth, meaning low electricity prices.

Environmental Protection

- We cannot discuss electric power production without addressing the "green wave", the environmental movement, that is sweeping America and the globe.

- In fact, I believe the most important factor affecting economic and energy policy in North America and around the world this decade and beyond will be the increasing and intense concern about the environment. And indeed, if anything, that concern is more acute today in parts of Europe and even parts of Asia than it is in North America. But I think it's only a matter of time until we catch up and perhaps even lead the world on this important matter. The 1990's may well be the "green" decade.

- The electric generation sector of our economy contributes a significant portion of man-made air pollution. In 1990, electric power production generated: 66 percent of total SO2 emissions; 37 percent of all NOx emissions and 35 percent of total CO2 emissions. SO2, NOx and CO2 emissions are generally regarded as the air pollutants we are most concerned about.

- In terms of environmental bang for the buck, the electric power sector is a profitable target.

- The Clean Air Act Amendments of 1990 addressed SO2 and NOx emissions while scientific and political interest continues to mount concerning CO2's role in global warming. The United Nations Conference on Environment and Development scheduled for June in Brazil will surely address the CO2 and global warming issue and focus the attention of America, and literally the world, on the environment.

Low Electricity Prices

- Average consumer electricity prices in 1990 (6.58 cents/kwh) were more than four times what they were in 1970 (1.59 cents/kwh). Electricity prices have risen by about 314 percent over the past 20 years. This contrasts to an historic trend of falling electricity prices, from 1930 to 1970 when electricity prices declined by 40 percent.

- It is obviously in the public interest from an American competitiveness perspective and a consumer perspective to produce electricity as efficiently and cost effectively as possible.

- Cheaper electricity means economic growth and job creation.

- For example, a 1 cent/Kwh decline in average consumer electricity prices would put an additional $432 dollars per year into the pockets of an American family of four to save, invest or spend in our economy.

Balancing Environmental Protection and Low Electricity Prices

- As evidenced by the Clean Air Act of 1990's, reliance on market forces rather than a more burdensome and more costly command and control regulatory structure, there is a recognition by policy makers that we need to <u>balance environmental protection with reasonably low electricity prices</u>. Environmental protection and economic growth do not have to be mutually exclusive.

- In fact, pollution prevention is the key to balancing the twin goals of environmental protection and economic growth. In the case of electric power production, cleaner can be cheaper. The old paradigm suggests just the opposite: If you want a cleaner environment, you have to pay for it through higher electricity prices. Not true, cleaner air and lower levels of pollution are "free" when a natural gas fired power plant produces electricity, because natural gas power production is generally 30 percent cheaper, per Kwh, than coal fired power production. A cleaner environment is a byproduct of choosing the least costly economic alternative.

- Natural gas power production is the balanced solution to achieving the twin goals of environmental protection and low electricity prices.

A Balanced Solution: The Natural Gas Standard

- In a special report to the August 1991 edition of Electrical World, Elizabeth Bretz, generation editor, wrote, "Few things in the electric utility industry are as clear as the advantages presented by today's gas-turbine-based combined-cycle powerplants. Their efficiency is substantially better than that of conventional steam/electric units, and they offer modular construction, a relatively low capital cost, small footprint, low emissions, minimal water consumption, and a short construction schedule - two to three years from planning to commercial service compared to five or more for a coal-fired facility."

Gas Fired Plants Produce Cleaner Power

- Natural gas fired power plants significantly reduce harmful environmental damage per unit of electricity generated.

  - A new natural gas combined cycle plant produces virtually zero SO2 emissions.

  - In addition, a gas combined cycle plant reduces NOx emissions by 80 percent when compared with a new coal plant which meets U.S. New Source Performance Standards.

  - With respect to the "greenhouse effect" and global warming, a natural gas power plant cuts 58 percent of the CO2 emissions produced by a comparable coal plant.

  - Of course, a natural gas fired plant produces zero solid waste -- no sludge or ash.

- The Utility Data Institute reports that scheduled U.S. generating capacity additions for the 1990's will be about 97 Gigawatts. If the 24 Gigawatts of planned coal fired capacity were replaced with natural gas fired combined cycle plants, the electric power sector could prevent the annual creation of:

  - 386,000 tons of SO2;

  - 196,000 tons of NOx;

  - 82 million tons of CO2;

  - 16.8 million tons of sludge; and

  - 6 million tons of ash.

- The amount of natural gas required to replace 24 Gigawatts of coal power production would be about 1 Tcf or approximately 5 percent more than 1991 total gas demand of 18.8 Tcf.

- In terms of security of fuel supply, Enron estimates the economically recoverable natural gas resource base in the lower 48 states is about 1,038 Tcf. Adding 160 Tcf of proved reserves, the nation has about a 70 year supply at current levels of consumption, and without any significant technology breakthroughs.

- A National Petroleum Council natural gas study is currently underway that involves the entire gas industry — majors, independents, pipelines, distribution companies, service companies and others. We are still several months away from completing this study, but based on all the preliminary indications, we are going to see increases in the resource potential for the industry from that study. On the top end, numbers are now being analyzed that indicate that the total economically recoverable resource base of North America — Mexico, U.S. and Canada — may be as high as 2400 Tcf. This recoverable resource base is equivalent to approximately 400 billion barrels of oil or about two-thirds of the proved oil reserves in all of the Middle East.

- Technology is driving the growth of the resource base and will continue to do so. We are also convinced supply is responsive to price. Increased supplies will become available if increased demand pushes prices higher.

Gas Fired Plants Produce Cheaper Power

- At Enron's long term, predetermined prices, gas-fired generation has a cost advantage over coal and nuclear power generation. Electricity produced from a new natural gas-fired plant costs about 30 percent less, per kilowatt hour, than power produced from a new coal-fired plant in a baseload mode. The economics of gas are even more compelling when gas fired power plants are compared to nuclear plants. Nuclear power, per kilowatt hour, costs twice as much or more as gas fired, combined cycle power generation.

- A recent Congressional Research Service report, prepared for the U.S. House of Representatives, states, "As long as natural gas continues to cost less than $4.50 per million Btu, gas fired capacity's low capital cost of $300/Kw for simple cycle and $600/Kw for combined cycle gives it a projected cost advantage compared with any supply alternative expected in the short term."

- Historic prices are also instructive. Enron Power, a subsidiary of Enron Corp., operates two combined cycle power plants in Texas and produces electricity at an average cost of 3-4 cents per kwh.

- This generation cost compares very favorably with the generation costs of recently built power plants owned by utilities in Texas. Enron's combined cycle plants produce electricity, on average, about 20 percent cheaper than comparable lignite plants. In Texas, the average cost of nuclear produced power is more than three times the cost of Enron's gas fired power.

- For example, a comparison of the costs of natural gas combined cycle generated electricity and electricity from other technologies is provided by one of Enron's plants in Texas City, Texas, a 440 Megawatt natural gas combined-cycle plant, which started up in 1986. The long-term gas contract was signed in 1985. Today, the gas price into that plant is about 3 times current prevailing gas prices. But even with these higher prices, our plant is generating electricity that costs 20-30 percent less than electricity from new plants burning lignite or coal in Texas that came on line in the '80's. It costs at least 60 percent to 70 percent less than power from nuclear plants that came on stream in the '80's.

- America's consumers and our nation's competitiveness clearly benefit from lower electricity prices resulting from gas fired power production.

Gas Fired Plants Produce Reliable Power

- Although there are many examples of very high availability gas combined cycle systems there is no comprehensive data capturing all plants. NERC is currently studying the reliability of combined cycle units and other types of generation.

- According to GE, over the past five years, their large MS 7001 E and EA gas turbines serving continuous, combined cycle duty have had an availability of 96.6 percent.

- Southern Company Services reports, over the past ten years, their combined cycle plant averaged 8000 hours of operation per year, availability greater than 95 percent and a forced outage rate of less than 0.5 percent. Incidentally, Southern Company Services' expansion plan includes several thousand megawatts of new, gas fired, combined cycle generation capacity.

- According to NERC's generating availability data, nuclear plants had an average availability of 66 percent over the past five years. Coal plants had an average availability of 79 percent over the past five years.

Other Advantages of Gas Fired Generation

- Gas fired plants also afford the power producer: lower capital costs, about 1/3 as much as a new coal plant of similar size; phased construction; shorter siting and construction times, two to three years for gas compared with five to eight years for coal; smaller size and less financial risk vis-a-vis uncertain demand; and enhanced site flexibility.

- Coal gasification technology has significantly improved and can now be retrofit onto gas combined cycle power plants. This coal gasification option effectively provides a utility with a long term cap on fuel prices.

Natural Gas: The Standard To Beat

- The advantages of generating power from a gas fired combined cycle plant are overwhelming: It is cleaner; cheaper; and more reliable than the coal and nuclear options. I propose that electric utilities and state PUCs adopt the "Natural Gas Standard" for power generation capacity additions. This standard should be applied in the following way — no new coal or nuclear power generating stations should be built unless they:

  - produce electricity cleaner than gas combined cycle plants;

  - produce electricity cheaper, per kwh, than gas combined cycle plants;

  - produce electricity more reliably than gas combined cycle plants.

- I am obviously confident natural gas combined cycle power generation will win when all three of these standards are considered.

A PRODUCTIVE PARTNERSHIP

- Whether or not American consumers can benefit from environmentally superior, low cost, efficient, natural gas power production depends on us — the natural gas industry and the electric power producers.

- Enron and the natural gas industry are committed to packaging our product to suit the needs and requirements of the power generation market. We are committed to designing long-term, firm, gas supply and price contracts for power generators. The natural gas industry can meet the special needs of the electric utilities.

- Enron offers a variety of flexible gas packages to meet the needs of utilities. We currently offer firm contracts for up to 15 years for specific volumes at predetermined or fixed prices.

- I repeat, Enron is now prepared to guarantee gas supply and gas price for fifteen years, even under contracts starting two to three years from now.

- Enron has entered into long term gas supply commitments involving 748 MMcf/d and more than 4 Tcf over the life of the various contracts.

A Joint Commitment to Overcome Barriers

- I am convinced we can work together with Federal and state regulators to bring cleaner, cheaper electricity to American consumers. The task ahead is not an easy one, there are many issues that need to be resolved, but if we dedicate ourselves to finding the solutions, I know we can succeed.

- Unfortunately, there are many who look for reasons to fail, look to justify why something won't work. These people are trapped by the conventional wisdom of the day and a static frame of reference. I have participated in too many conferences where the "experts" and "specialists" focus on barriers as insurmountable obstacles, rather than as challenges to be overcome.

- Masaru Ibuka, founder of the phenomenally successful Sony Company, observed, "Specialists are inclined to argue why you can't do something, while Sony's emphasis has always been to make something out of nothing." Mr. Ibuka was commenting on Sony's optimistic, open-minded, creative orientation. We too, must be open-minded and creative when searching for ways to overcome barriers that may limit electric utilities from consuming more natural gas.

- Overcoming barriers may require organizational and institutional change for the gas industry and the electric utility industry. Admittedly, change is difficult; it is wrenching and painful. But like many things in life, change often makes us a better people and leaves in its wake a better way of doing things, a better system or even a better society.

- It takes hard work to challenge the status quo. Let's roll up our sleeves and refuse to look for excuses why something can't be done, and work toward creating solutions and make it happen. Don't be tempted and talked into failure. Challenge the conventional wisdom, ask, "Why can't we do it this way?"

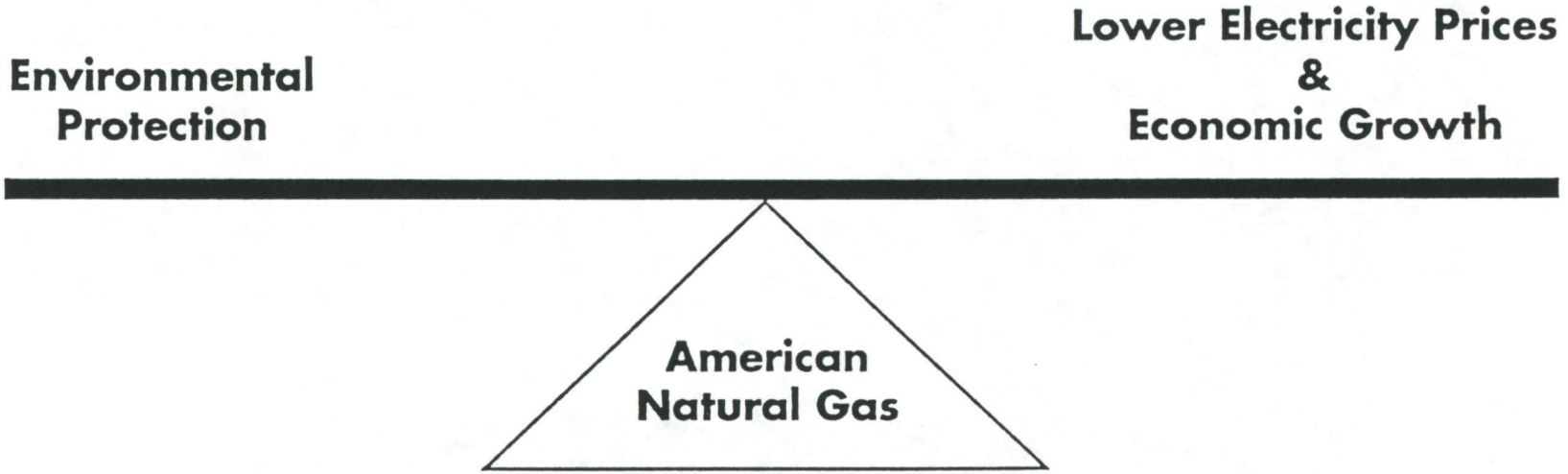
- For centuries, people believed Aristotle was right when he said the heavier the object, the faster it would fall to Earth. Aristotle was regarded as the greatest thinker of all times and surely he could not be wrong. All it would have taken was for one brave person to take two objects, one heavy and one light, and drop them from a great height to see whether or not the heavier object landed first. But no one stepped forward until nearly 2000 years after Aristotle's death. In 1589, Galileo summoned learned professors to the base of the leaning Tower of Pisa. Then he went to the top and pushed off a ten-pound and a one pound weight. Both landed at the same time. But the power of belief in the conventional wisdom was so strong the professors, the "experts", denied what they had seen with their own eyes.

- Indeed, it is difficult to persuade "experts" who are trapped by the conventional wisdom, but Galileo had courage and did not deter from proving Aristotle and eventually the conventional wisdom wrong.

- Let me close by encouraging all of you to do what Galileo did — challenge the long-held beliefs. Refuse to accept the conventional wisdom in your pursuit of the solutions that will enable us to overcome the so called "barriers" to increased gas use by electric utilities.

- I am absolutely certain that if we labor together in partnership with Federal and state regulators, we can overcome any challenge, any barrier and make natural gas the power fuel for the 1990's. Our nation's electricity consumers and our precious environment deserve no less.

Natural Gas: The Balanced Solution



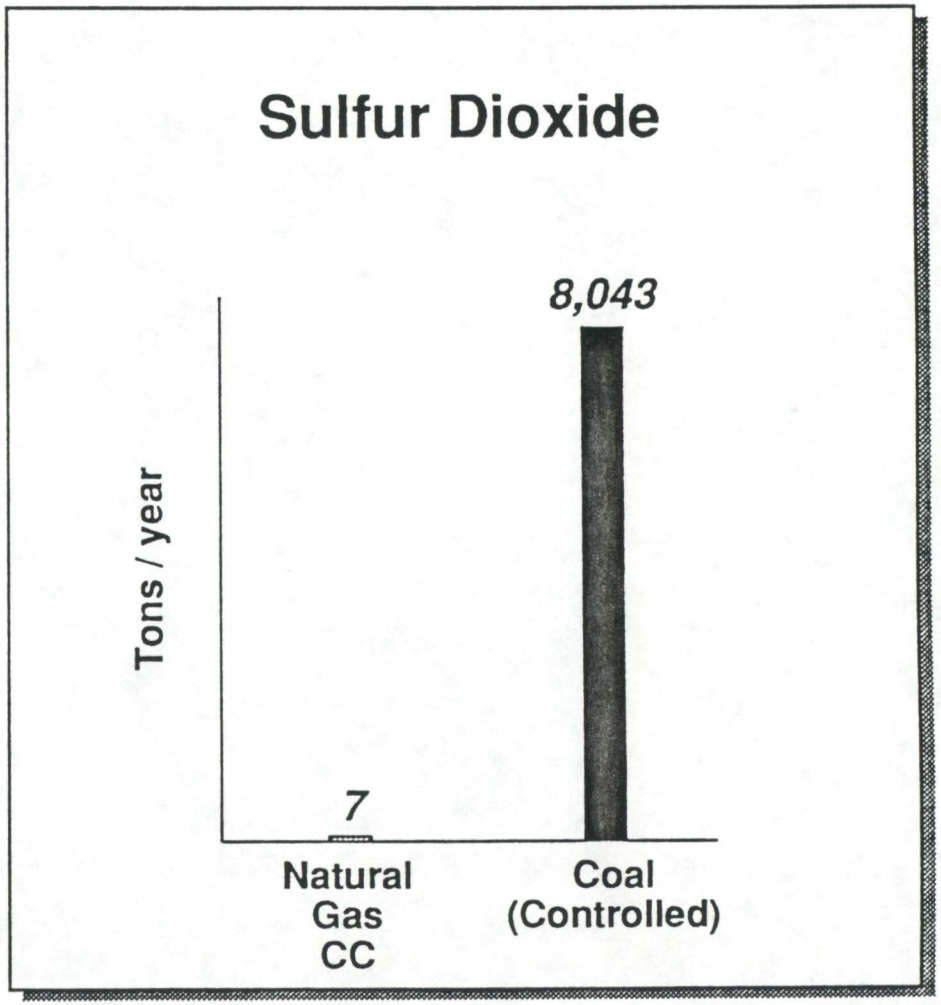
Using domestic natural gas protects our precious environment, lowers electricity prices and creates economic growth

Natural Gas Prevents Air Pollution

New 500 MW Power Plant Comparison

Natural Gas Reduces
Sulfur Dioxide (SO_2) Emissions
By Virtually 100%

Source: U.S. Environmental Protection Agency (EPA) and American Gas Association

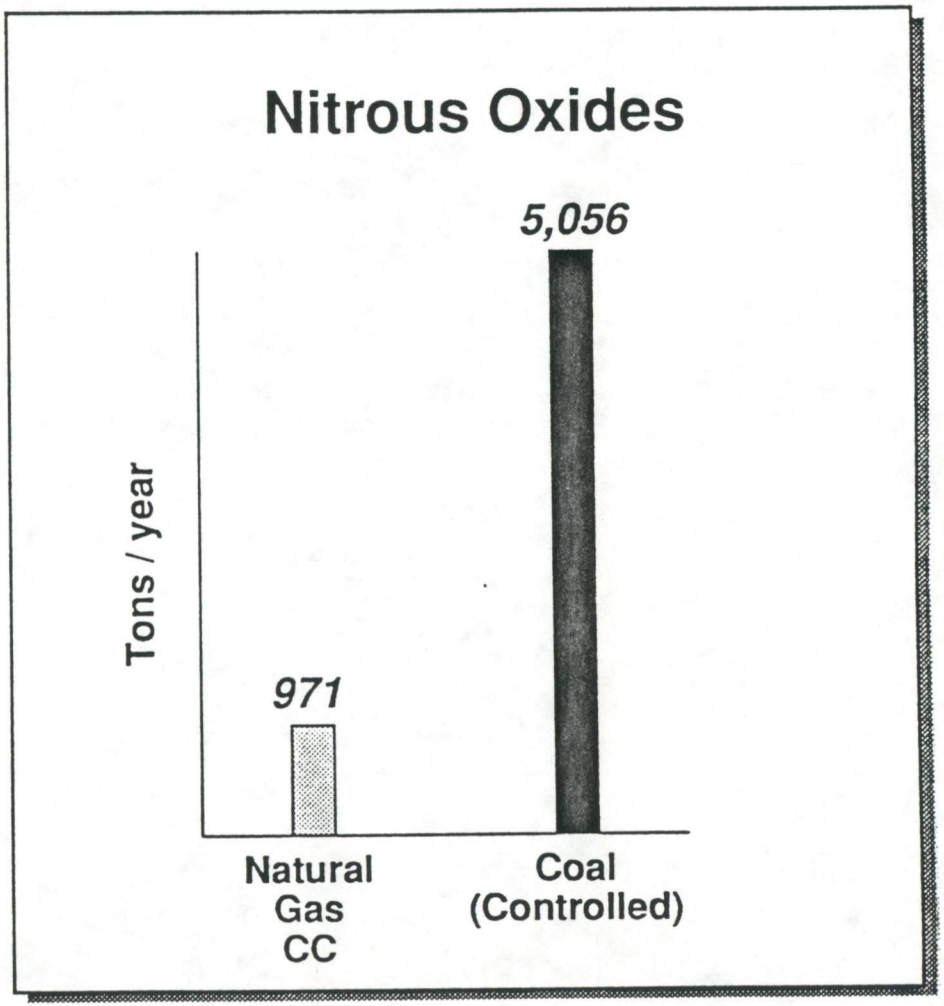


Natural Gas Prevents Air Pollution

New 500 MW Power Plant Comparison

Natural Gas Reduces
Nitrous Oxides (NO_x) Emissions
By 81%

Source: U.S. Environmental Protection Agency (EPA) and American Gas Association

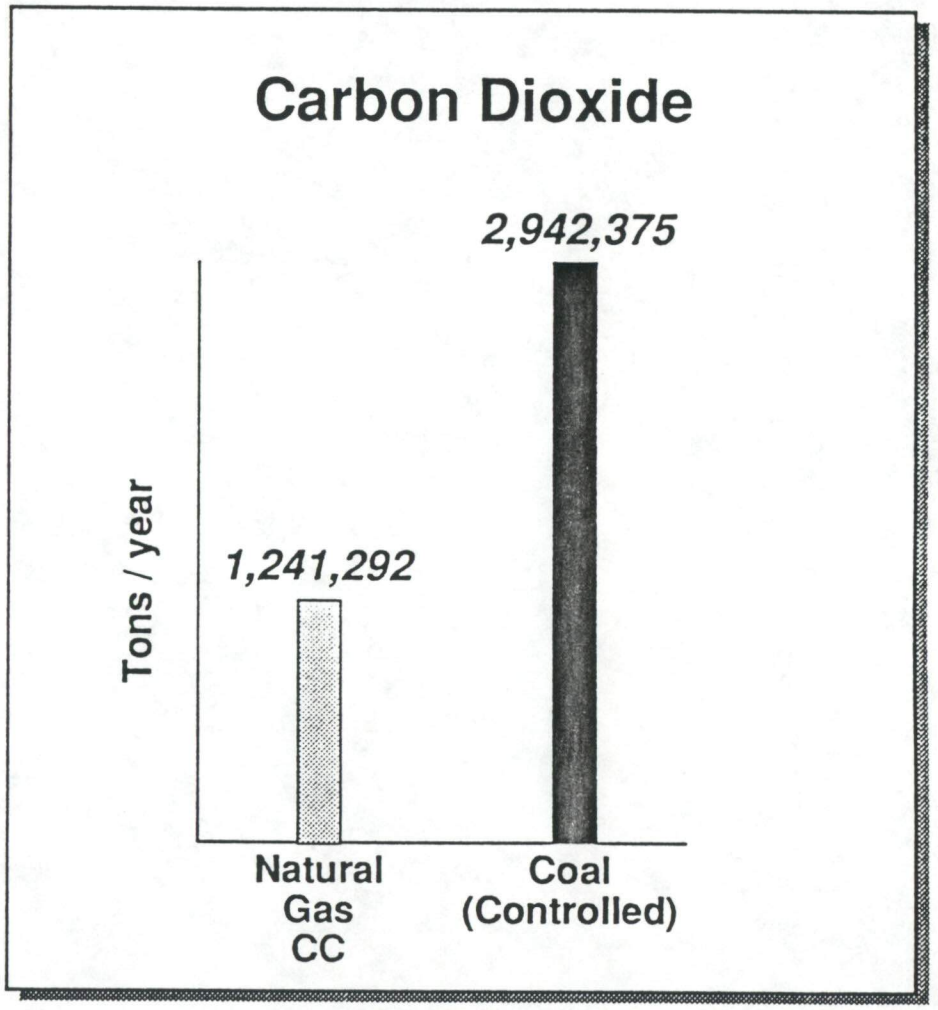


Natural Gas Prevents Air Pollution

New 500 MW Power Plant Comparison

Natural Gas Reduces
Carbon Dioxide (CO_2) Emissions
By 58%

Source: U.S. Environmental Protection Agency (EPA) and American Gas Association



Natural Gas Prevents Pollution

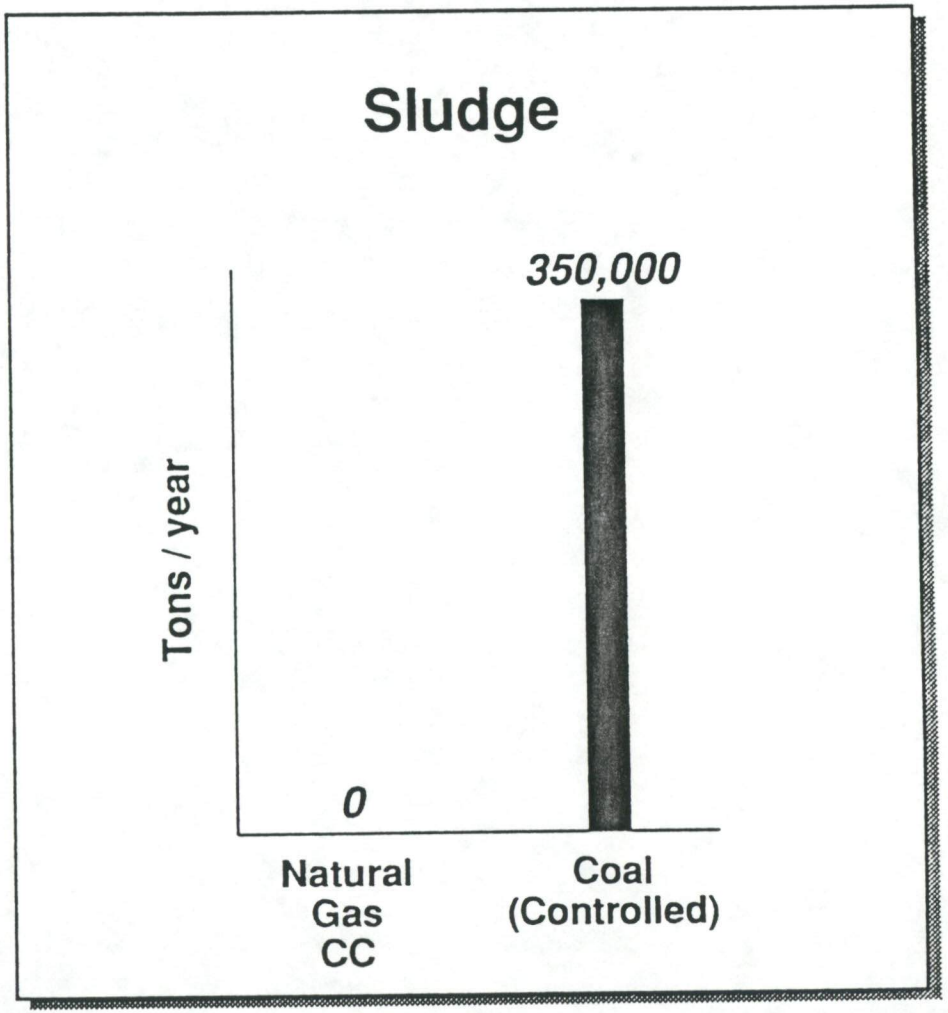
New 500 MW Power Plant Comparison

Natural Gas Eliminates

Sludge

By 100%

Source: U.S. Environmental Protection Agency (EPA) and American Gas Association

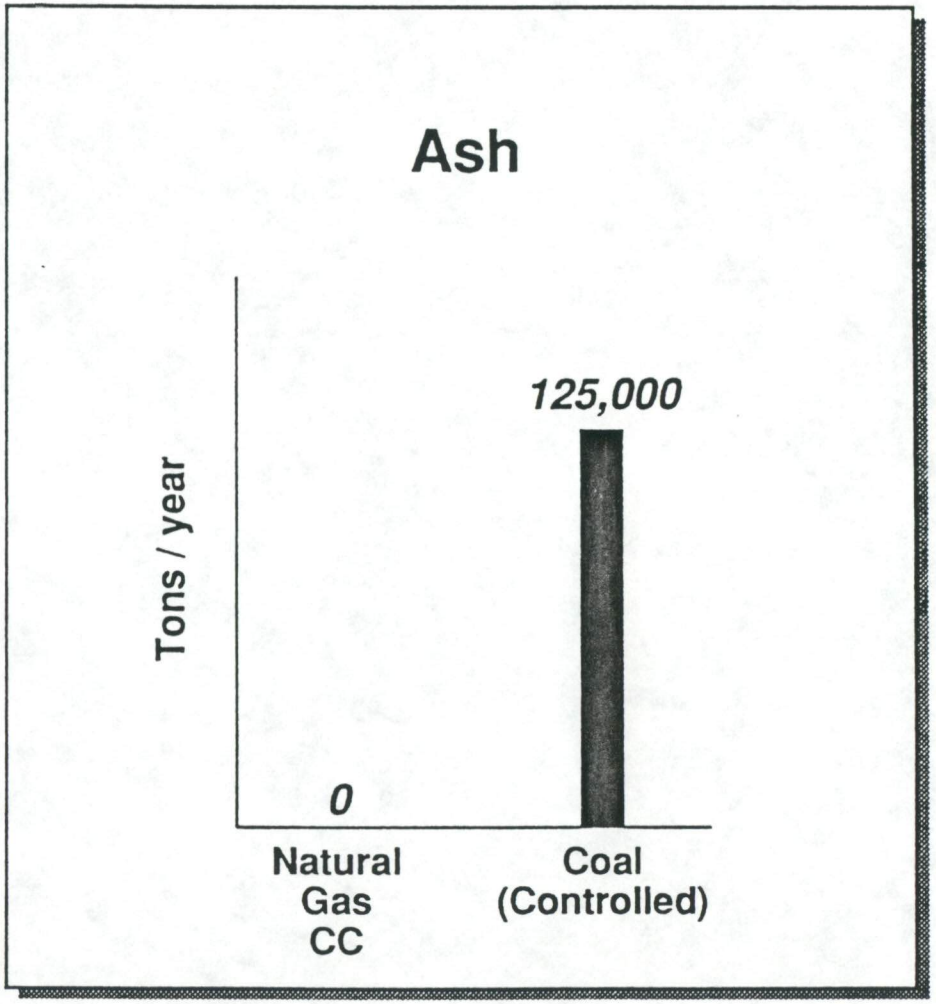


Natural Gas Prevents Pollution

New 500 MW Power Plant Comparison

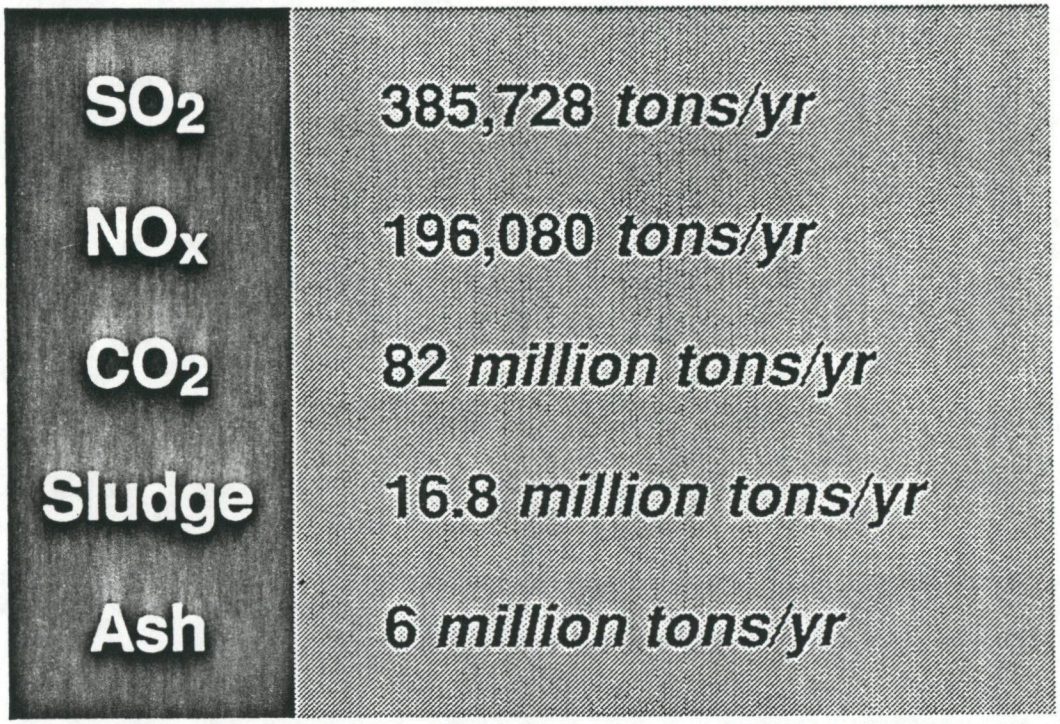
Natural Gas Eliminates
Ash
By 100%

Source: U.S. Environmental Protection Agency (EPA) and American Gas Association



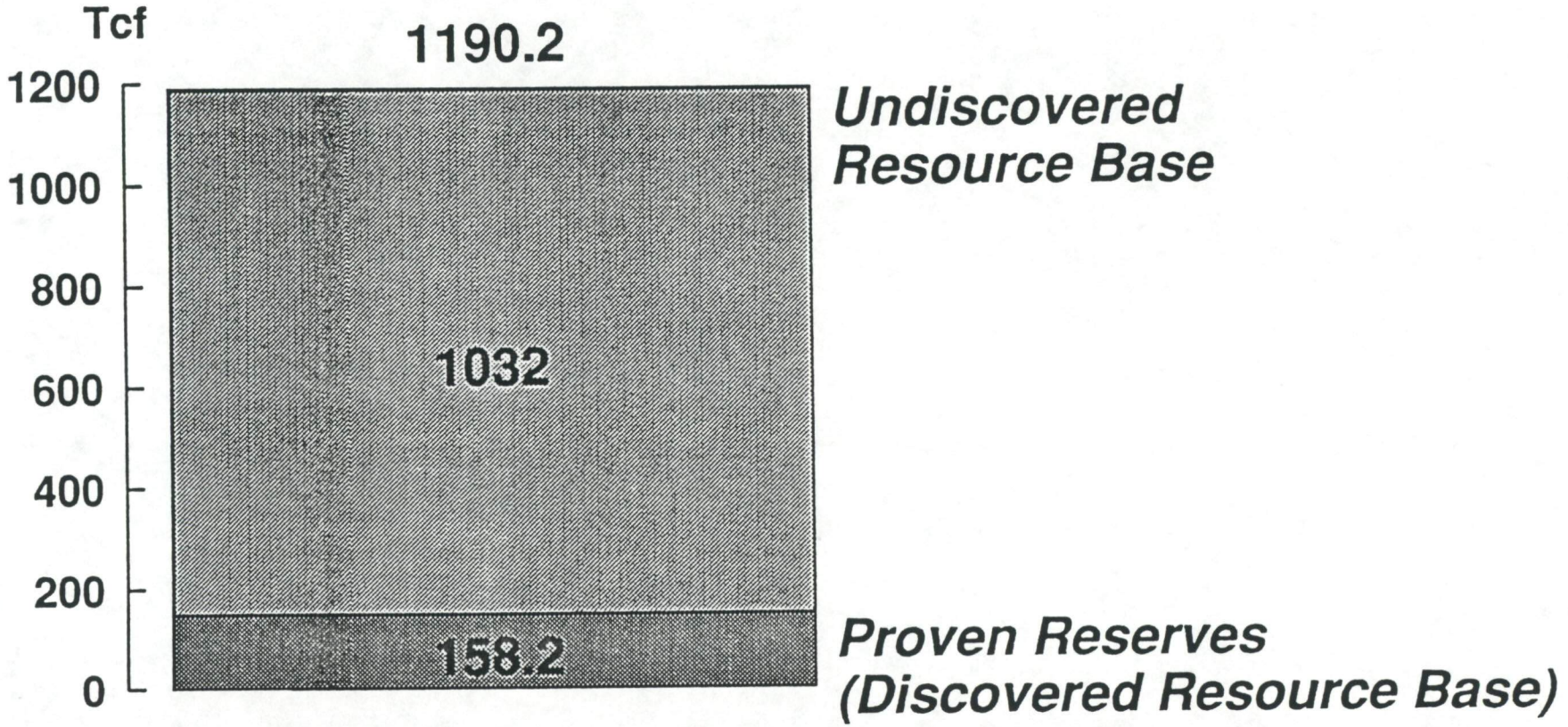
Pollution Prevented In Year 2000

If Expected Coal Capacity (24 GW) Replaced With Gas Fired Capacity

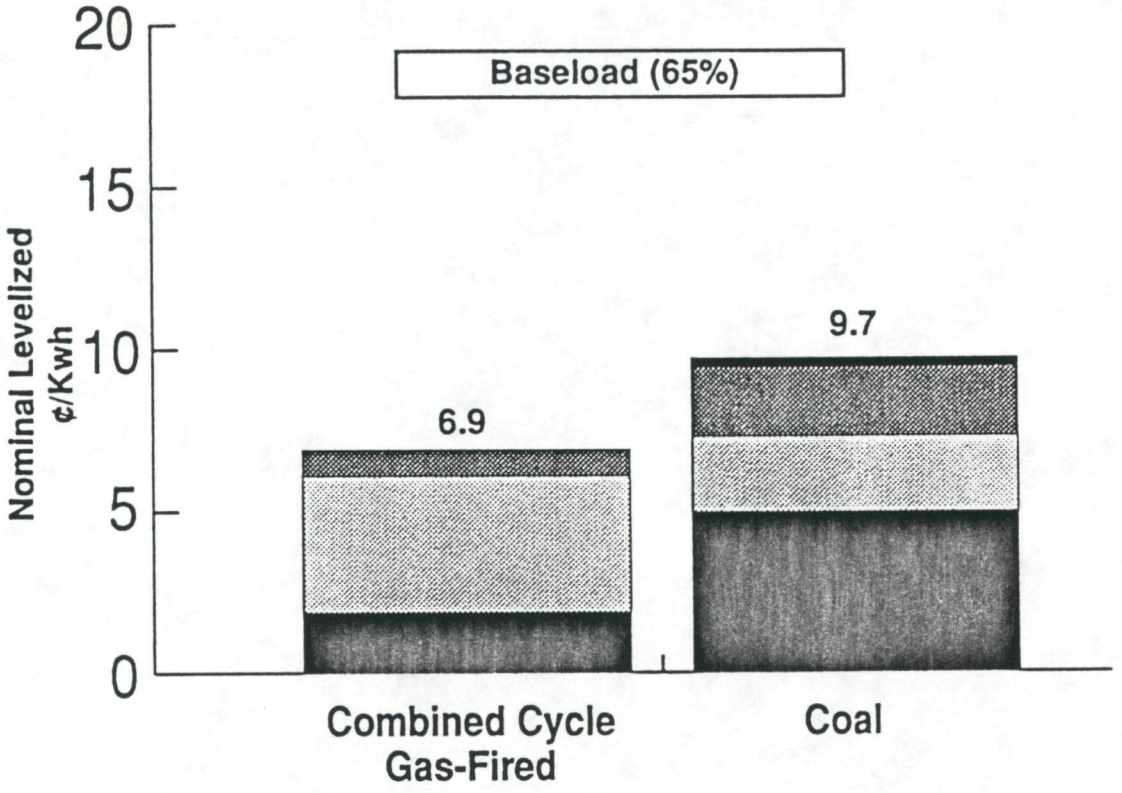


Source: U.S. Environmental Protection Agency (EPA) and American Gas Association

Estimated U.S. Proven & Undiscovered Natural Gas Resources



Gas Fired Electricity Generation Has Cost Advantage Over Coal Fired Electricity Generation



Yields 29% Cost Reduction

1/ - Gas price based on Enron fixed long-term price

Source: ICF

Gas Powerplant Options are Less Costly Than Coal (Nominal Levelized ¢/Kwh)

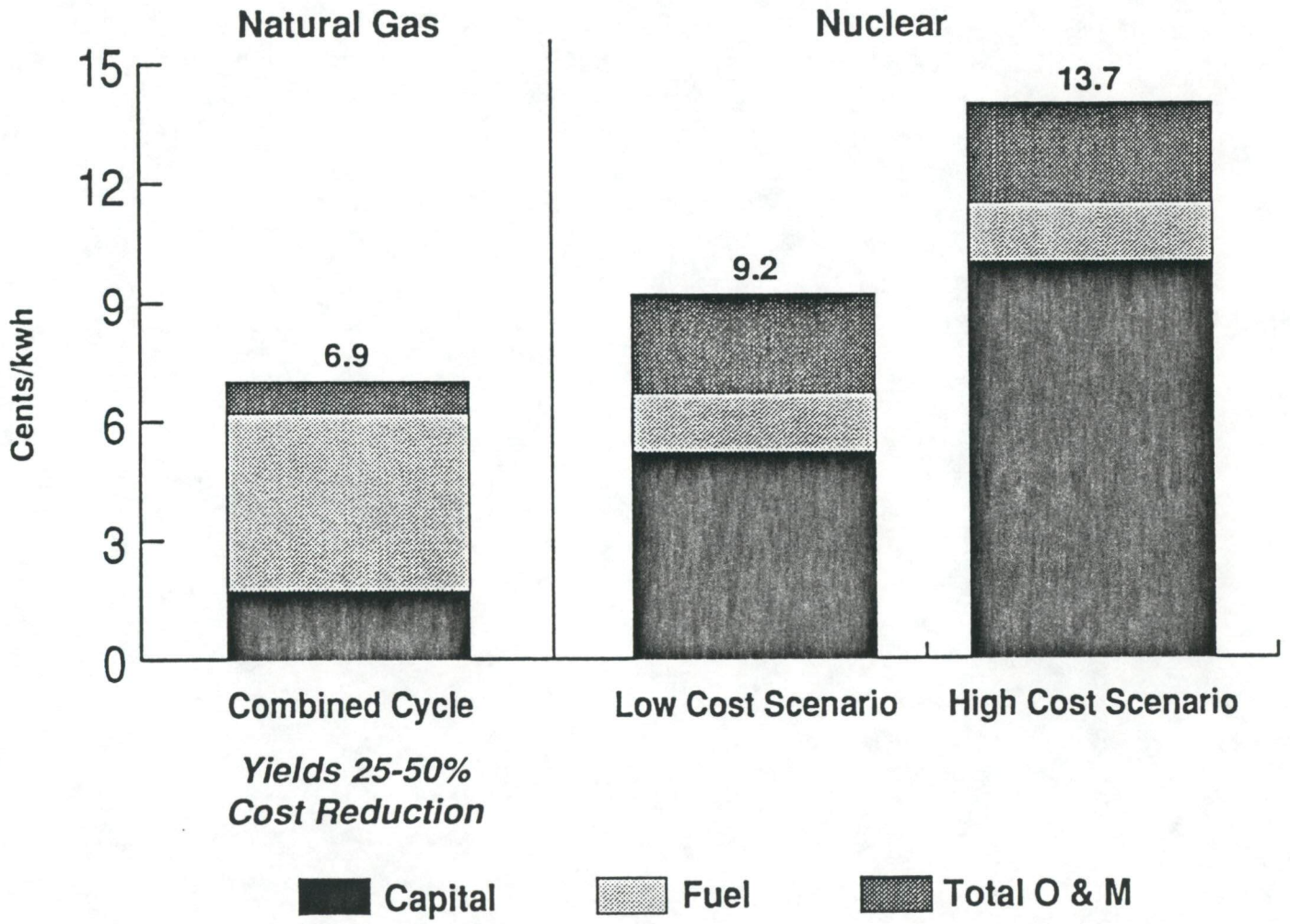
Baseload (65%)

	Natural Gas Combined Cycle	Coal
Capital	1.86	4.95
Fuel	4.21	2.33
Total O & M	.80	2.18
SO_2 Allowance	---	.23
Total	**6.87 ¢/Kwh**	**9.69 ¢/Kwh**

Yields 29% Cost Reduction

Source: ICF

Gas Fired Electricity Generation Has Cost Advantage Over Nuclear Power



Source: ICF

Gas Powerplant Options are Less Costly Than Nuclear (Nominal Levelized ¢/Kwh)

	Natural Gas Combined Cycle	Nuclear EPRI TAG	Nuclear High Cost
Capital	1.86	5.40	9.93
Fuel	4.21	1.45	1.45
Total O & M	.80	2.29	2.29
SO_2 Allowance	---	---	---
Total	6.87¢/Kwh	9.14 ¢/Kwh	13.67¢/Kwh

Yields 25-50% Cost Reduction

Source: ICF

The Natural Gas Standard

No New Coal or Nuclear Power Generating Stations Should Be Built Unless They:

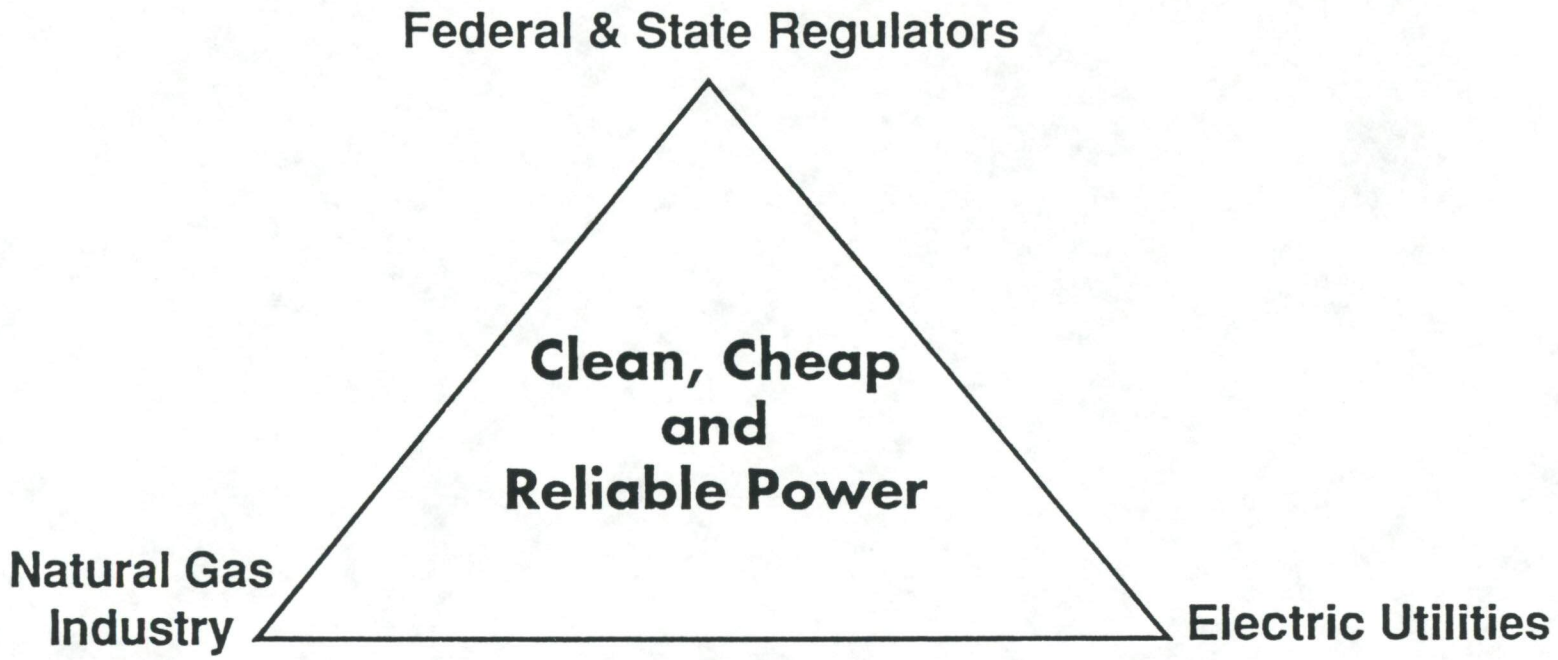
- Produce electricity cleaner than gas combined cycle plants
- Produce electricity cheaper, per kwh, than gas combined cycle plants
- Produce electricity more reliably than gas combined cycle plants

The Enron Experience
Major Long Term Commitments to Electric Generation Market

Date	Customer	Term (Years)	Daily (MMcf/d)	Total (Bcf)
1989	Florida Power and Light	15	343	1,877
1990	New York Power Authority	23	34	284
1987	Clear Lake Cogeneration	15	46	250
1989	Texas City Cogeneration	10	45	171
1987	TBG Cogen Partners	15	12	66
1988	Trigen Cogeneration	15	12	66
1989	Orlando Utilities Commission	8	16	44
1991	EEA 1	15	15	80
1991	EEA 2	15	15	80
1992	EEA 3	15	15	80
1992	Sithe	20	195	1,424
		N/A	748	4,422

**Provides fuel for approximately 3,500 MW in baseload operation*

A Joint Commitment



Natural gas electric power production is the balanced solution to environmental protection and low electricity prices.

Natural gas fired electricity generation is cleaner and cheaper than coal fired electricity production.

ENVIRONMENTAL PROTECTION

A natural gas combined cycle power plant *prevents pollution* compared with a coal plant:

- Reduces CO_2 emissions by 58%
- Reduces SO_2 emissions by virtually 100%
- Reduces NO_x emissions by 80%
- Reduces water consumption by 50%
- Eliminates solid waste — zero ash or sludge

LOW ELECTRICITY PRICES

At Enron's long term, predetermined gas prices, gas fired generation has a cost advantage over coal and nuclear power generation:

- 30% lower cost, per kwh, than coal
- 30% - 50% lower cost, per kwh, than nuclear

OTHER ADVANTAGES OF GAS FIRED POWER GENERATION

- Lower capital costs, about $^1/_3$ as much as a new coal plant
- Shorter siting and construction times, two to three years for gas, compared with five to eight years for coal
- Smaller size and less financial risk vis-a-vis uncertain demand
- Enhanced site flexibility

ENRON CORP

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P. O. Box 1188 Houston, Texas 77251-1188

News Release

For Further Information Contact:
Diane Bazelides
Director, Media Relations
(713) 853-6285

ENRON CHAIRMAN KEN LAY PROPOSES NATURAL GAS STANDARD
FOR ELECTRIC UTILITIES AND STATE PUBLIC UTILITY COMMISSIONS

FOR IMMEDIATE RELEASE: Monday, March 9, 1992

HOUSTON -- Speaking at an Institute of Gas Technology Conference today, Enron Chairman and CEO Kenneth L. Lay proposed a "Natural Gas Standard" for electric utilities and state public utility commissions.

Lay noted that today's power generation industry faces increasing environmental concern and a continuing commitment to produce electricity cost effectively in order to stimulate economic growth, create jobs, enhance industrial competitiveness and manage uncertain demand growth.

"The challenge will be balancing environmental protection, meaning cleaner power production, with economic growth, meaning low electricity prices," Lay said. "I believe the solution is the "Natural Gas Standard," which simply means no new coal or nuclear power generating stations should be built unless they produce electricity cleaner, cheaper or more reliably than gas combined cycle plants."

One of the most important factors affecting economic and worldwide energy policy this decade, and one that is expected to continue, is the intense concern about the environment. The United Nations Conference on Environment and Development in June will surely focus the world's attention on global warming and CO_2 emissions, Lay noted.

-more-

Electric generation contributes a significant portion of manmade air pollution. In 1990, electric power production generated 66 percent of total sulphur dioxide (SO2) emissions, 37 percent of all nitrogen oxides (NOx) emissions and 35 percent of total carbon dioxide (CO2) emissions.

"In terms of environmental bang for the buck, the electric power sector is a profitable target and one to which the "Natural Gas Standard" can provide an important solution," Lay said.

A new natural gas combined cycle plant produces virtually zero SO2 emissions; reduces NOx emissions by 80 percent, when compared with a new coal plant which meets U.S. New Source Performance Standards; and cuts 58 percent of the CO2 emissions produced by a comparable coal plant.

Environmental protection and economic growth do not have to be mutually exclusive, Lay noted.

"In the case of electric power production, cleaner can be cheaper. Natural gas power production is generally 30 percent cheaper, per kilowatt hour, than coal fired power production. Nuclear power costs twice as much or more, per kilowatt hour, than gas fired combined cycle power generation."

According to the Edison Electric Institute average consumer electricity prices in 1990 were more than four times what they were in 1970. A decline in these rates would benefit both the consumer and the American economy, Lay said.

-more-

"A 1 cent/kilowatt hour decline in average consumer electricity prices would put an additional $432 dollars per year into the pockets of an American family of four to save, invest or spend in our economy," he noted.

Gas fired electric power plants are built at about 1/3 of the cost of a new coal plant and can be constructed in two to three years compared to five to eight years for coal.

In terms of reliable natural gas supplies, Enron estimates the economically recoverable natural gas resource base in the lower 48 states at about 1,038 trillion cubic feet (Tcf). Adding 160 Tcf of proved reserves, the nation has about a 70 year supply at current levels of domestic production and without any significant technology breakthroughs.

Lay noted that gas combined cycle plants have recorded very high levels of performance reliability and availability. Gas combined cycle power plants have reported availability in excess of 95 percent during the last five years. According to the North American Electric Reliability Council, nuclear plants had an average availability of 66 percent over the past five years, and coal plants had an average availability of 79 percent.

"Whether or not American consumers can benefit from environmentally superior, low cost, efficient natural gas power production depends on us -- the natural gas industry and the electric power producers," Lay said. "Enron is committed to packaging our products to suit the needs and requirements of the

power generation market. We have successfully offered long-term, fixed price gas supply and price contracts for up to 15 years, and we have entered into long-term gas supply commitments involving more than 4 Tcf of natural gas over the life of the contracts."

Enron Corp., America's largest integrated natural gas company with more than $13 billion in annual revenues and $10 billion in assets, operates the nation's largest natural gas transmission system; markets natural gas, gas liquids, crude oil and refined products nationally and worldwide; owns 84 percent of Enron Oil & Gas Company, one of the country's largest independent (non-integrated) natural gas exploration and production companies; is one of the largest independent developers and producers of electricity in the United States and the United Kingdom, with extensive experience in combined heat and power installations; and is a leading non-regulated purchaser and marketer of long-term natural gas supplies. Enron is traded under the ticker symbol "ENE".

-##-

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9201333
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

****

FROM: CRANDALL, Candice C.: SCIENCE AND ENVIRONMENTAL POLICY PROJECT

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 04/07/92

SUBJECT: SHE IS WRITING TO URGE DR. BROMLEY TO ADVISE THE PRESIDENT NOT TO ATTEND THE UNCED "EARTH SUMMIT".

****

DIRECTORATE ASSIGNED: ENVIRONMENT STAFF ASSIGNED:

ACTION REQUIRED: FOR DAB'S SIGNATURE STAFF ACTION:

****

SENDER'S DUE DATE:
OSTP DUE DATE: 04/29/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley
INTERNATIONAL/POLICY

****

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:

REMARKS:

OSTP RECEIVED: 04/10/92 DEPT RECEIVED:
FILE: P-ENVIRONMENT

CENTRAL FILES:

1333

SCIENCE AND ENVIRONMENTAL POLICY PROJECT

Candace C. Crandall, Editorial Director

92 APR 10 A10 : 08

OSTP
MAIL ROOM

April 7, 1992

Dr. D. Allan Bromley
The White House
1600 Pennsylvania Avenue, NW
Washington, D.C. 20500

Dear Dr. Bromley:

I hope you will join us in urging President Bush *not* to attend the UN Conference on the Environment and Development, the so-called "Earth Summit." Going to Rio would put the prestige of the United States behind the rush to impose global controls on energy that will have a calamitous impact on jobs, technological progress, and standards of living worldwide.

Consider these unfounded "claims" trotted out by environmental activists to support a climate treaty:

"Scientific consensus" on catastrophic global warming: untrue. The Science & Environmental Policy Project has demonstrated in two surveys of atmospheric scientists that if there is any "consensus," it is that current catastrophic global warming predictions are *unsupported* by the scientific evidence. An overwhelming majority of the scientists responding agreed that the predictions are based on theoretical climate models that cannot be relied upon and are not validated by the climate record.

More recently, a Gallup poll, commissioned by The Center for Science, Technology & Media, showed that among scientists actively involved in global warming research, 53 percent do not believe human-induced global warming has occurred and 30 percent don't know. Only 17 percent think human-induced global warming has occurred.

For the survival of the planet, governments must take action now: untrue. Even Greenpeace couldn't nail this one down. Only 15 percent of the atmospheric scientists surveyed by Greenpeace in Jan/Feb 1992 felt that there was a probable point-of-no-return, *at some [unspecified] time in the future*, at which continued business-as-usual policies risked a runaway global warming. According to prominent climate modeler Michael Schlesinger of the University of Illinois, who conducted research on this particular question, a 10-year delay in controlling greenhouse gas emissions would have negligible consequences on climate developments of the next century.

1015 18th Street, NW, Suite 300, Washington, D.C. 20036 • Tel: 703-503-5064 • FAX: 703-503-2857

Environmental pressure groups have strong public support and can influence votes: highly debatable. Membership in these organizations is down; grassroots financial support is way down.

More important, we have only to look at the results of the 1990 state ballot initiatives to see where public sentiment really lies. In that election, more than 200 environmental initiatives went down to defeat, including California's "Big Green," which the Bush Administration opposed, and which lost by a margin of more than 2 to 1.

The fact is that if you ask Americans a general question about supporting a clean environment, they nod "yes." But show them a 39-page, single-spaced, regulation horror like Big Green, and they vote "No."

Environmental pressure groups put forth a massive effort to get those 1990 environmental initiatives passed. After the election--distrustful of democracy, confused about the role of science, and willing to substitute rhetoric for progress--these groups gave up on the voters and turned all of their attention on Washington. That strategy has proven extremely effective.

Now environmental activists see an even greater opportunity in the proposals put forth for the UNCED. They see a chance to put America's energy policy--and economic future--in the hands of UN functionaries, not elected by and not accountable to the American people.

Dr. Bromley, Americans won't get a chance to see this regulation horror until it shows up at the gas pump, in their electric bill, or on a pink slip. Please urge President Bush *not* to attend this conference. There is nothing to be gained by caving in to extremists whose predictable response will be to demand more, more, more.

Yours sincerely,

Candace C. Crandall
Editorial Director

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9201132
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

****

FROM: DELAND, Michael: CEQ

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 03/31/92

SUBJECT: HE REQUESTS DR. BROMLEY'S ASSISTANCE IN FINDING INNOVATIVE PROGRAMS THAT BEST CHARACTERIZE THE SPIRIT OF ENVIRONMENTAL ENTREPRENEURSHIP.

****

DIRECTORATE ASSIGNED: ENVIRONMENT

STAFF ASSIGNED:

ACTION REQUIRED: AS NECESSARY

STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: 04/20/92 STAFF DUE DATE

DATE COMPLETED: DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley

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WHITE HOUSE TRACKING #:

CONTACT PERSON:

PHONE: EXT:

REMARKS:

OSTP RECEIVED: 04/06/92 DEPT RECEIVED:

FILE: P-ENVIRONMENT

CENTRAL FILES:

1132

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON, D.C. 20500

RECEIVED
92 APR 6 A9:51
OSTP
MAIL ROOM

Michael R. Deland
Chairman

(202) 395-5080

March 31, 1992

The Honorable D. Allen Bromley
Assistant to the President
for Science and Technology
The White House
Washington, DC 20506

Dear Dr. Bromley:

This week, President Bush is announcing the second annual President's Environment and Conservation Challenge Awards. The awards recognize and champion outstanding solutions to our Nation's environmental concerns.

The Council on Environmental Quality (CEQ) would certainly appreciate your leadership in finding innovative programs that best characterize the spirit of environmental entrepreneurship. This program is open to all U.S. individuals, organizations and groups, including state and local governments. Although Federal agencies are not eligible, groups working in partnership with the Federal government are eligible.

The President's environmental awards program is administered by CEQ, in partnership with the National Geographic Society, The Hearst Corporation, The Business Roundtable and the World Wildlife Fund. An independent Selection Committee representing environmental, conservation, business, academic, and professional fields will judge the nominations.

Attached is a copy of the awards application. The program deadline is May 22, 1992. Recipients will be highlighted at ceremonies this fall and listed in a national database of environmental programs. Please call Ben Jarratt or Marla Donahue at (202) 395-1154, if you have questions or need more applications.

Once again, thank you for your assistance in this presidential initiative. With best regards.

Sincerely,

Michael Deland

Recycled Paper

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release March 31, 1992

The President today announced the second annual President's Environment and Conservation Challenge Awards program.

U.S. Presidents have long honored Americans for excellence in the arts, humanities, sciences, and world affairs. In keeping with this tradition, the Presidential medals for environmental achievement established under this program represent the Nation's highest honor in this field. The President's Environment and Conservation Challenge Awards recognize U.S. citizens and organizations who have made outstanding contributions to the Nation's environmental quality.

In October 1991, the President presented the first Presidential medals for environmental excellence to nine honorees. In addition, 23 organizations received citations for their outstanding environmental achievements. The Award recipients exemplify the cooperative, innovative spirit of a new era of environmental entrepreneurship. They are forming diverse alliances to tackle ecological problems, integrating environmental values into economic decisions, pioneering cleaner products and technologies, and instilling a conservation ethic across the country.

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Up to three medals will be presented in each of the four categories:

1) PARTNERSHIP: awarded for fostering cooperative coalition building approaches toward environmental quality enhancement.

2) ENVIRONMENTAL QUALITY MANAGEMENT: awarded for incorporating sound environmental practices into management decisions.

3) INNOVATION: awarded for developing novel technologies and programs that are environmentally sensitive and economically sensible.

4) EDUCATION AND COMMUNICATIONS: awarded for educational programs that raise the country's environmental literacy and contribute to the development of a conservation ethic.

Up to 20 Presidential citations will be presented to finalists who demonstrate notable achievements in their Award categories.

Additional information and 1992 application forms may be obtained from:

The President's Environment and
Conservation Challenge Awards
Council on Environmental Quality
722 Jackson Place, NW
Washington, DC, 20503

Phone: (202) 395-1154

Five copies of completed applications must be postmarked no later than May 22, 1992. Recipients will be notified in the Fall of 1992 of their award and listed in a national database of environmental initiatives.

The following individuals comprise the Selection Committee for the President's Environment and Conservation Challenge Awards program:

John H. Adams, Executive Director of the Natural Resources Defense Council, Inc., and an Adjunct Professor of Law at New York University in New York, NY.

Frank A. Bennack, Jr., President and Chief Executive Officer of The Hearst Corporation in New York, NY.

Dr. Cheryl Charles, Executive Director of Project WILD in Boulder, CO. Project WILD is a 1991 Presidential medal recipient.

Dr. Anthony D. Cortese, Dean of Environmental Programs at Tufts University in Medford, MA. Tufts Environmental Literacy Institute is a 1991 Presidential medal recipient.

Michael R. Deland, Chairman of the Council on Environmental Quality, Executive Office of the President, in Washington, DC.

Gilbert M. Grosvenor, President and Chairman of the Board of the National Geographic Society in Washington, DC.

Dr. Bernadine Healy, Director of the National Institutes of Health, Department of Health and Human Services, in Bethesda, MD.

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David Rockefeller, Jr., Chairman of the Rockefeller Financial Services in New York, NY.

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Franklin A. Thomas, President of The Ford Foundation in New York, NY.

Dr. Keith Thomson, President of the Academy of Natural Sciences of Philadelphia, PA.

Russell E. Train, Chairman of the Board of Directors of the World Wildlife Fund in Washington, DC.

# # #

The President's 1992 Environment and Conservation Challenge Awards

"These outstanding Americans have given us cleaner technologies and products, better ways to manage natural areas, and a greater capacity for environmental problem-solving. They are working to improve the quality of life for all Americans through a safe and healthy environment."

President George Bush
October 31, 1991

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9201132
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS C

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FROM: DELAND, Michael: CEQ

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 03/31/92

SUBJECT: HE REQUESTS DR. BROMLEY'S ASSISTANCE IN FINDING INNOVATIVE PROGRAMS THAT BEST CHARACTERIZE THE SPIRIT OF ENVIRONMENTAL ENTREPRENEURSHIP.

****

DIRECTORATE ASSIGNED: ENVIRONMENT

STAFF ASSIGNED: Nancy Maynard

ACTION REQUIRED: AS NECESSARY

STAFF ACTION: As Necessary

****

SENDER'S DUE DATE:

OSTP DUE DATE: 04/20/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT: 05/11/92

****

COPIES TO: D. Allan Bromley

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WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:

REMARKS: No Resposne Necessary

OSTP RECEIVED: 04/06/92 DEPT RECEIVED:
FILE: P-ENVIRONMENT

CENTRAL FILES:

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9201132
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS
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DIRECTORATE ASSIGNED: ENVIRONMENT STAFF ASSIGNED:

ACTION REQUIRED: AS NECESSARY STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: 04/20/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley

****

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:

REMARKS: No response necessary

OSTP RECEIVED: 04/06/92 DEPT RECEIVED:
FILE: P-ENVIRONMENT

CENTRAL FILES:

1132

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON, D.C. 20500

RECEIVED
92 APR 6 A9:51
OSTP
MAIL ROOM

Michael R. Deland
Chairman

(202) 395-5080

March 31, 1992

The Honorable D. Allen Bromley
Assistant to the President
for Science and Technology
The White House
Washington, DC 20506

Dear Dr. Bromley:

This week, President Bush is announcing the second annual President's Environment and Conservation Challenge Awards. The awards recognize and champion outstanding solutions to our Nation's environmental concerns.

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Franklin A. Thomas, President of The Ford Foundation in New York, NY.

Dr. Keith Thomson, President of the Academy of Natural Sciences of Philadelphia, PA.

Russell E. Train, Chairman of the Board of Directors of the World Wildlife Fund in Washington, DC.

# # #

"Document Control"

TYPE: INFORMATION DOCUMENT NUMBER: 9201206
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

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FROM: HABICHT, F. HENRY: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 03/31/92

SUBJECT: THANK YOU FOR SENDING "CLIMATE PROJECTIONS: RISK AND STRATEGIES."

****

DIRECTORATE ASSIGNED: STAFF ASSIGNED:

ACTION REQUIRED: STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

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COPIES TO: D. Allan Bromley
ENVIRONMENT

****

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:

REMARKS:

OSTP RECEIVED: 04/08/92 DEPT RECEIVED:
FILE: P-ENVIRONMENT

CENTRAL FILES:

1206 7

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 3 1 1992

OFFICE OF
THE ADMINISTRATOR

D. Allan Bromley
Assistant to the President
for Science and Technology
The White House
Washington, D.C. 20500

Dear Allan:

I wanted to convey a belated thank you for sending over a copy of the paper entitled Climate Projections: Risk and Strategies by Chauncey Starr and for your kind wishes. Both were sincerely appreciated.

Starr offers a very constructive discussion in his paper that contributes positively to the debate on addressing global climate change. The literature grows continuously and I appreciate your passing along any items you think are significant. Thanks for your leadership.

Our emphasis here on a sound science base continues as a priority. We appreciate the working relationship

Sincerely,

F. Henry Habicht II
Deputy Administrator

"Document Control"

TYPE: INFORMATION DOCUMENT NUMBER: 9200911
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

****

FROM: PORTER, KATHRYN C.: CONSERVATION INTERNATIONAL

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 03/20/92

SUBJECT: CONSERVATION INTERNATIONAL ANNUAL REPORT, 1991 - TROPICUS TO SERVE AS A SNAP SHOT OF ON-GOING EFFORTS.

****

DIRECTORATE ASSIGNED: STAFF ASSIGNED:

ACTION REQUIRED: STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

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COPIES TO: D. Allan Bromley
ENVIRONMENT

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WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:

REMARKS:

Brochure - returned for files!

OSTP RECEIVED: 03/23/92 DEPT RECEIVED:
FILE: P-ENVIRONMENT

CENTRAL FILES:

911

I

CONSERVATION INTERNATIONAL

March 20, 1992

Allan D. Bromley
Science Advisor, White House
358 Old Executive Office Bldg
Washington, DC 20500

RECEIVED
92 MAR 23 AM 7:07
OSTP
MAIL ROOM

Dear Allan:

Thought you might be interested in our latest activities.

Enclosed is a copy of Tropicus. This edition serves as our annual report and a snap shot of our on-going efforts.

I hope our paths cross again soon.

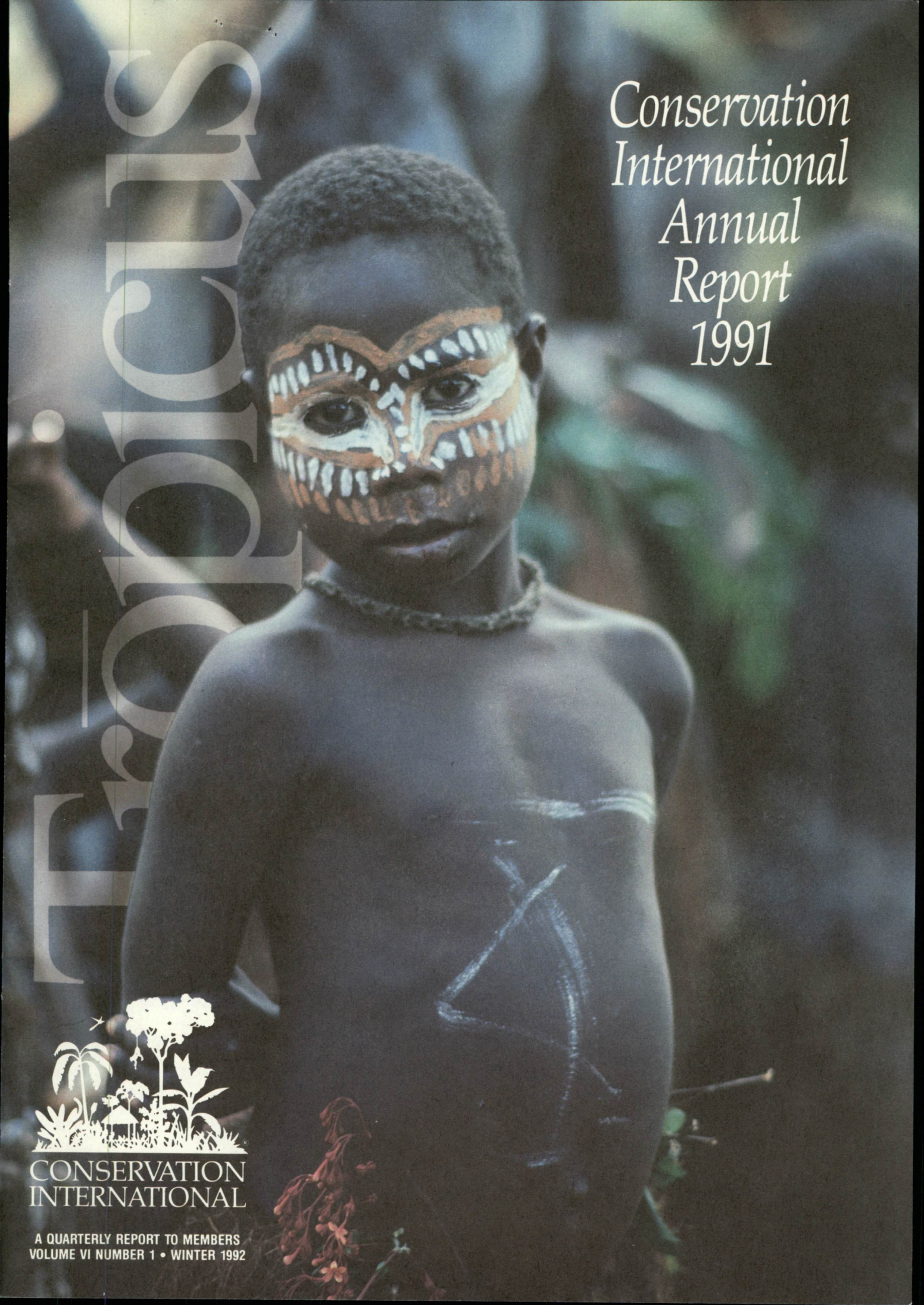
Warm regards.

Sincerely,

Kathryn

Kathryn Cameron Porter
Director of
Policy and Governmental Affairs

1015 18TH STREET, NW, SUITE 1000, WASHINGTON, DC 20036 202.429.5660 FAX 202.887.5188



Tropicus

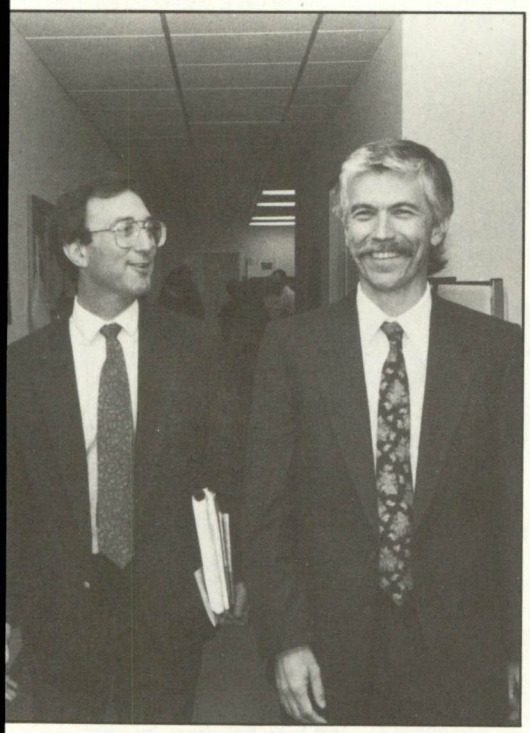
Conservation International Annual Report 1991

CONSERVATION INTERNATIONAL

A QUARTERLY REPORT TO MEMBERS
VOLUME VI NUMBER 1 • WINTER 1992

CI's First Five Years

On the Cutting Edge: Where Conservation Meets Development



Haroldo Castro

Board Chairman Peter Seligmann (left) and President Russell Mittermeier in CI's Washington, DC office.

It has now been five years since CI was created, and as we look back we feel that we have accomplished a great deal in our short existence. Recognizing that we must move very quickly to reverse the destructive forces threatening our planet, we have developed innovative approaches to conservation that are in tune with the realities of our rapidly changing world.

At the heart of CI's programs is a strategy for **ecosystem conservation** that integrates biological preservation with economic opportunities in local communities throughout the tropics. Ultimately, we believe we must demonstrate that contemporary human societies are capable of blending ecological stability with social and economic fulfillment.

This fundamental insight forms the basis for all of CI's work, regardless of the many moral, aesthetic, and scientific reasons for saving rain forests. The principle behind CI's mission is the recognition that it is not just plants and animals that are at risk of extinction. People are at risk as well.

Every day, misguided development and destructive land-use decisions consume more and more tropical habitats while further impoverishing rural communities. Small countries with large populations and reduced resource bases—like Haiti, Ethiopia, El Salvador, and Nicaragua—are the first to feel the consequences of habitat loss. The symptoms appear in the form of political destabilization, economic imbalances, and environmental refugees.

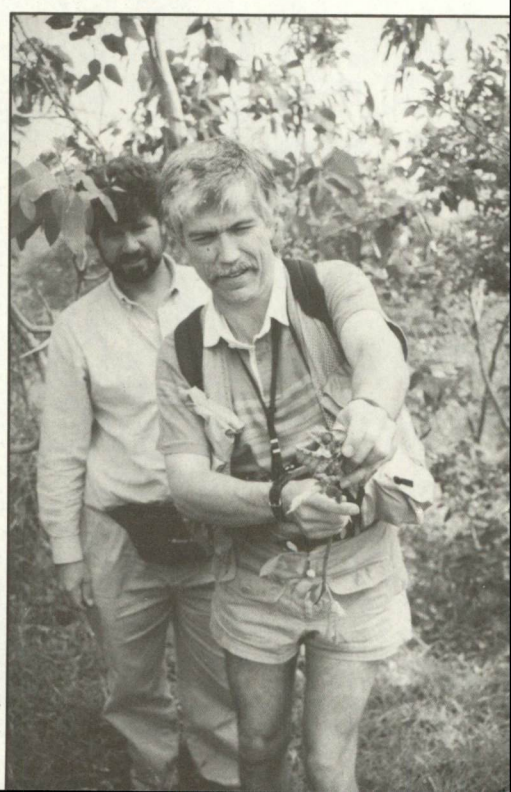
During the last year, another 50 million acres of tropical forest were destroyed. Two years ago, we said that events of the 1990s would determine whether these magnificent manifestations of life on earth could be saved. This decade may also determine whether the growing economic gap between tropical and industrial nations can be closed. Our programs are designed to show ways in which this might be done.

CI's development projects target sustainable harvesting of nontimber forest products as a way of both protecting habitats and generating income for rural families. Our science program provides the technology and training—ranging from biological research stations to apprenticeships for future tribal shamans—for understanding biodiversity and making conservation and land-use decisions about it. Our communications program works within local cultural traditions to select the right medium for building public awareness, and also offers training in modern technologies like radio production. CI's work on national and international policies is reflected in the lives of people far removed from government.

The success of CI's approach is reflected in the expanded range and influence of our programs:

- **Debt-for-Nature Swaps:** Since CI pioneered the first debt-for-nature swap in Bolivia in 1987, other nongovernmental organizations (NGOs) and governments have followed suit. In all, more than 16 debt swaps valued at more than $100 million have been negotiated in 11 other countries;
- **Rapid Assessment Program:** CI's biological science team made its first survey of the Alto Madidi region of Bolivia in 1990. Large areas of that previously unknown territory are now being proposed for protection on the basis of that research, and the RAP team has moved on to explore other threatened regions;

CI President Russell Mittermeier examines a chameleon with board member Noel Perry in Madagascar.



Serge Rajaobelina

Cover photo: Girl from Tannanibit village, Karawari River, Sepik region, Papua New Guinea.

Russell Mittermeier

Russell Mittermeier

CI Chairman Peter Seligmann photographing caimans (*Caiman yacare*) in Pantanal, Brazil.

- **CI/SIG:** CI's Geographic Information System, a powerful, user-friendly computer technology, compiles maps and other spatial data for conservation planning. Already used to help planners and scientists establish conservation priorities in Amazon Basin countries, CI/SIG will be used to analyze similar data for Colombia, Papua New Guinea, Guatemala, and other regions of the world;
- **Tagua Initiative™:** When CI embarked on its first project in Ecuador to market tagua—ivory-like palm nuts—as buttons to international clothing manufacturers, just two companies were interested. Now the communities of Esmeraldas, Ecuador have sold over 200 tons of tagua to more than 20 button and clothing manufacturers. In addition, CI's Seed Ventures™ program has branched out to market other nontimber forest products;
- **Biosphere Reserves:** Five years ago, CI worked in just two biosphere reserves. Now we have established programs in nine reserves worldwide. Our aim is to integrate ecosystem conservation, scientific research, and local economic development for the communities in these multipurpose areas;
- **"Hotspots":** Using a concept first developed by British conservationist Norman Myers, CI produced *The Rain Forest Imperative*, identifying the earth's most threatened and biologically richest rain forest ecosystems and developing conservation priorities for the next decade. Now we plan to develop similar strategies for dry forests, Mediterranean systems, and other ecosystems as well.

CI's goal is to create new models for conservation and development. Our greatest strength lies in our ability to leverage our ideas; to generate more and better conservation through the creation of imaginative solutions.

One organization can only accomplish so much by itself. But by sharing our ideas and joining forces with local partners and international NGOs, community leaders and national governments, we can move more rapidly toward our dream: a world in which people everywhere realize that the best hope for achieving true progress lies in sustaining nature, not destroying it.

Peter Seligmann
Chairman and CEO

Russell A. Mittermeier, Ph.D.
President

Like our philosophy of ecosystem conservation, our Annual Report is organized by its cornerstones. In the sections that follow, we illustrate some of the ways that our programs address our conservation objectives through pragmatic problem-solving with local partners.

Conservation International's Mission and Cornerstones

Conservation International frames its mission in these words:

To conserve ecosystems, biological diversity, and the ecological processes that support life on Earth, with special emphasis on building local capacity.

Through a strategy of "ecosystem conservation," CI seeks to integrate biological conservation with economic development for local peoples and thus to demonstrate a new model for sustainable development.

Ecosystem conservation rests on six cornerstones:

Scientific understanding through biological inventories, species and ecosystem research and monitoring, studies of human ecology, information management, and technology development;

Protected area management using methods that include the design and implementation of multipurpose protected areas and other means of maintaining ecological processes, to conserve the full array of species and human communities within priority ecosystems;

Conservation-based development through traditional land-use practices and ethnobiology; application of innovative approaches in forestry, agriculture, fisheries and watershed management; ecotourism, multiple-use forest management, and market development for sustainably harvested nontimber forest products;

Conservation communications through public education programs and media outreach;

Training through specialized programs aimed at increasing the number of local conservation professionals at all levels;

Policy design through work with local and national governments, NGOs, and international agencies.

Scientific Understanding

Defining the Landscape

Botanists Al Gentry and Carmen Josse prepare *Gongora* orchid specimen for RAP inventory, Ecuador.

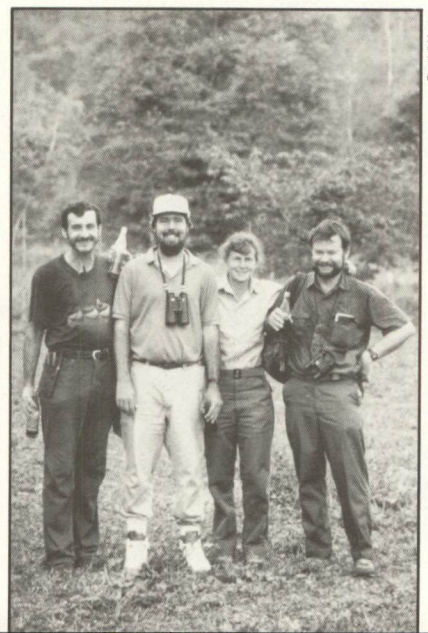
Randall Hyman

The goal of CI's conservation science program is twofold: to create innovative, applied technologies for understanding rain forest ecosystems and to transfer those technologies to the people in the tropics—be they academic scientists, conservationists, or government planners—who use science to make decisions affecting the environment.

CI's Science and Technical Cooperation Department has developed programs in biodiversity assessment, regional conservation analysis, economics of conservation, and sustainable management of natural resources. CI staff scientists perform biological inventories, species and ecosystem research and monitoring, studies in human ecology, information management, and technology development. The range of studies and technical tools we have developed is designed to both manage and integrate existing information and fill in gaps in our knowledge of rain forest ecosystems.

One useful way to look at CI's science department is through its Rapid Assessment Program and Geographic Information System. While the former adds to our knowledge of ecosystems and their biodiversity, the latter enables scientists to analyze the data at hand and make strategic decisions for environmental planning.

CI field scientists pause for refreshment on RAP trip in western Ecuador. From left: Al Gentry, Ted Parker, Louise Emmons, and Robin Foster.



Randall Hyman

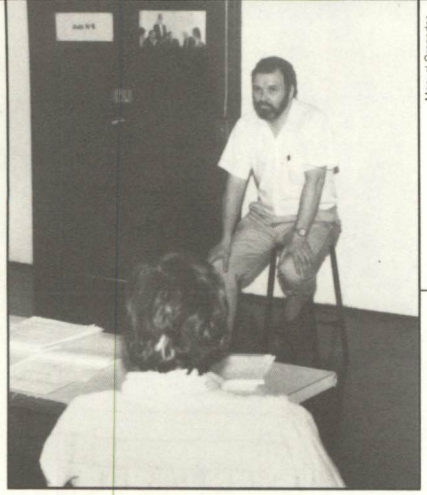
CI's RAP Team Identifies New Conservation Priorities

by Brent Bailey

When CI's field scientists set out on their first Rapid Assessment Program (RAP) expedition in May 1990, they targeted a corner of northwest Bolivia that met RAP's primary criteria: The area was virtually unknown to science and was not protected by conservation measures of any kind. But the RAP team was also following a hunch that the Alto Madidi region would contain great natural diversity, given the area's rich mix of habitats covering the foothills of the Andes and the lowlands of Amazonia.

For CI's RAP team members (who have an accumulated 100 years of professional field experience among them), a "hunch" can be defined as a highly informed intuition. After spending four weeks in the field with Bolivian colleagues documenting species and identifying habitats, the team members acknowledged that their findings surpassed their expectations. The Alto Madidi is one of the most biologically diverse regions on the planet. As such, it represents one of the world's highest priorities for scientific study and conservation.

But what next? Dusty reports with valuable scientific information clutter shelves worldwide. Delivering the right information to the right people is one of CI's highest priorities.



Manuel Granados

Vice President for Science and Technical Cooperation Silvio Olivieri answers questions during CI/SIG training session in Heredia, Costa Rica.

Soon after the trip concluded, the team prepared its preliminary results and circulated them to Bolivian NGOs, conservation groups, and funders in the United States. International press coverage of the team's findings drew worldwide attention to this previously unexplored region.

The Bolivian National Fund for the Environment (FONAMA) and the Ministry of the Environment were able to use the RAP findings to propose the Alto Madidi region as a priority area for conservation by the Bolivian government. In Washington, the World Bank's Global Environment Facility is using the results in its proposal for a project to provide technical studies and infrastructure support for Alto Madidi as a conservation area.

But long-term protection for the Alto Madidi is not yet ensured. Ironically, as the momentum builds to conserve the Madidi forests, a drive for oil exploration threatens the area with road construction, drilling, and blasting. A coordinated effort will be necessary to establish the legal base and financial security for protecting the ecological integrity of this biologically rich region.

Recognizing the region as a priority, however, was the first step. CI's experienced field team was critical to evaluating the region and framing its importance in an international context. A strong push from Bolivian NGOs coupled with RAP's sound scientific reporting offers a model for linking research and conservation efforts around the world.

Brent Bailey is Director of CI's Biological Programs.

CI/SIG: A High-Tech Tool for Grassroots Conservation

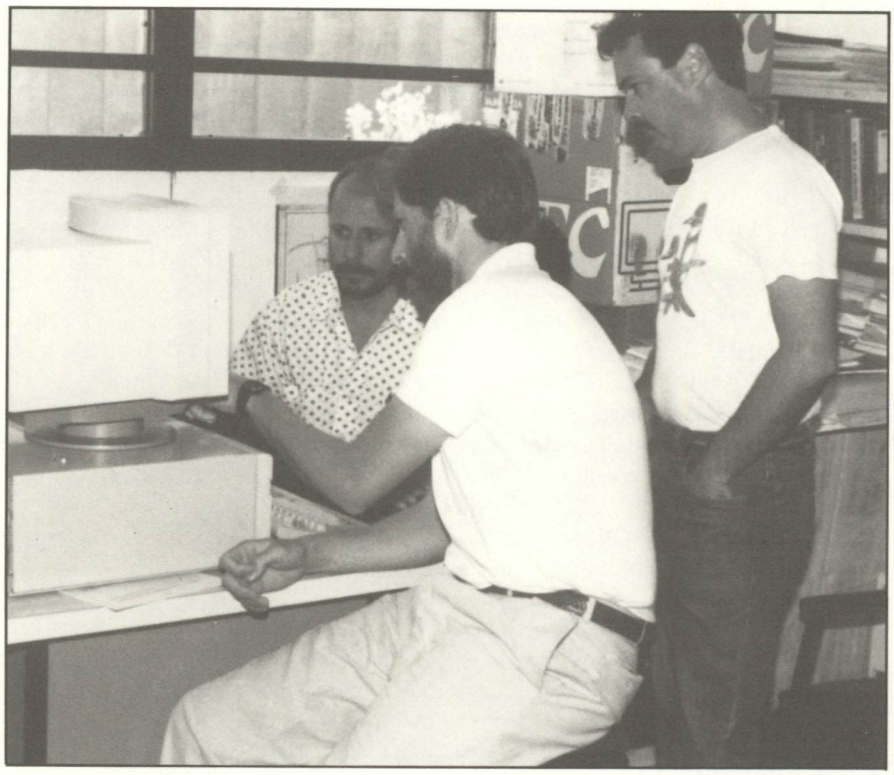
by Silvio Olivieri

Computer technology is a powerful tool in natural resource management, and CI has come up with a new way to integrate that technology with scientific decision-making. CI has just produced and published a 1-to-5-million scale map, "Biological Priorities for Conservation in Amazonia," which represents the first comprehensive conservation strategy for the Amazon Basin. [See back cover.] It is a landmark accomplishment for CI's Science and Technical Cooperation Department, culminating two years of work on conservation recommendations following **Workshop 90**, held in Manaus, Brazil in January 1990. That meeting brought together nearly 100 scientific experts on the Amazon Basin to develop a consensus on land-use priorities for the nine countries of the 7.7 million square kilometer Amazon region.

CI's Science and Technical Cooperation Department provided the computer technology that made this historic cooperative venture in conservation possible. Through CI's new computer software—CI Geographic Information System (CI/SIG)—experts on Amazonian ecosystems are able to assimilate a data base of over 30 map layers, including information on vegetation, soils, land use, hydrography, and species distribution.

Geographic information systems (GIS) are computer tools that have become, over the past decade, fundamental for environmental assessment, regional analysis, planning for ecosystem conservation, and the management of natural resources. With GIS, the analysis of biological and ecological data can be integrated with social, economic, and physical

Ed Backus, Regional Conservation Analysis Program Director, consults with CI/SIG users, Heredia, Costa Rica.



Silvio Olivieri

environment data to better understand the issues of conservation and sustainable development.

CI makes this technology available to environmental planners through CI/SIG, a PC-based, multilingual software. It is easily used and maintained, and available to government, academic, and nongovernmental institutions in developing countries. Most important, CI backs up its CI/SIG program with technical assistance.

Even before CI's Amazon priority map was officially released, the recommendations of Workshop 90 had substantial impact on conservation in the Amazon Basin. Six state forest reserves were established in 1991 in the Brazilian state of Amazonas, with boundaries that were based on Workshop 90 recommendations. In addition, the Brazilian Institute for Geography and Statistics is currently using Workshop 90 statistics as the basis for a complete socioecological zoning of Brazil's Amazon territory, which will ultimately generate more environmentally sound national land-use policies. Finally, the World Bank, the United Nations Development Programme (UNDP), the InterAmerican Development Bank, numerous conservation groups, and government agencies are using Workshop 90 results to guide their policies in the region.

Hilary Simon

Marine turtles are routinely captured and killed for their valuable shells and other products, placing entire species at risk of extinction. Roderic Mast, Vice President for Old World Operations, inspects turtle shells in a Malagasy market.

Silvio Olivieri is Vice President of the Science and Technical Cooperation Department. Roderic B. Mast, Vice President for Old World Operations, Charles Hutchinson, the Science Department's Coordinator of Asia and Africa Initiatives, and Carlos A. Miller, Director of Vitoria Amazonica Foundation in Manaus, Brazil, contributed to this report.

Impact of GIS

- CI/SIG will have an impact far beyond the Amazon Basin. The system will be used to build consensus on conservation priorities in other regions of the world as well, including Papua New Guinea, Colombia, the Brazilian cerrado, the Central African rain forest region, and tropical marine ecosystems.
- CI/SIG has been distributed to users in Bolivia, Brazil, Chile, Colombia, Costa Rica, Madagascar, Mexico, the Philippines, and the United States.
- CI/SIG users form the first multilingual network with access to critical conservation planning information in Latin America.
- CI/SIG is designed for users in developing countries: It is multilingual, affordable, and will function on the most inexpensive computers. It gives local planners an opportunity to identify their own conservation priorities.

SPECIES CONSERVATION

Fundamental to the success of CI's ecosystem conservation stratetgy is support for species at risk in the priority ecosystems we have identified. Endangered species, especially prominent and "charismatic" animals, are often the best means for capturing public interest, thereby broadening people's understanding of the need for more comprehensive approaches to conservation.

CI has activities ranging from scientific research to public awareness campaigns to help ensure the continued existence of species and their tropical ecosystems. Endangered primates have been the focus of CI's activities in the four countries richest in those species—Madagascar, Zaire, Indonesia, and Brazil. In the interest of preserving sea turtles, CI has become involved in local, regional, and international research and conservation efforts to preserve marine and coastal ecosystems in Mexico, Belize, Costa Rica, Panama, and Colombia.

Other species conservation programs include a campaign to protect the kagu, an endemic bird family of New Caledonia, support for the Botswana Wild Dog Research Project, and CI's new "Flagship Species Program" in collaboration with the Philadelphia Zoo (see p. 21).

—John L. Carr, CI Research Scientist

Protected Area Management

Biosphere Reserves as Models for Development

Protected areas form the logical setting for CI's programs. But simply recognizing park boundaries does not solve the very complex and dynamic problems of human habitation in the biological world. Any plan to protect biodiversity, even in the most remote wildernesses of the planet, must blend conservation with sustainable economic activities to help people establish secure livelihoods in harmony with their surroundings.

"Protected areas management" refers to CI's strategy of promoting effectively managed, locally run networks of ecosystem reserves that cover a representative cross-section of a country or region's biodiversity.

In the past year, CI has worked with government agencies and local NGOs to assess existing protected areas, to identify critical habitats needing protection, and to develop management plans for protected areas in Belize, Bolivia, Botswana, Colombia, Costa Rica, Guatemala, Indonesia, Madagascar, Panama, Papua New Guinea, Peru, and the Philippines.

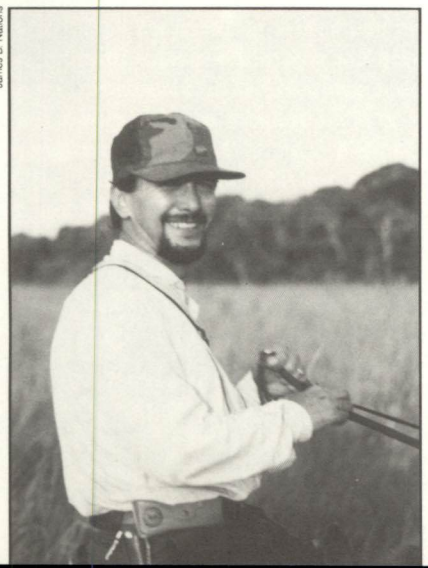
Patricio Robles Gil

CI President Russell Mittermeier officially opens the Chajul Scientific Station at the Montes Azules Biosphere Reserve in southern Mexico.

Biosphere reserves have offered CI the greatest opportunities for implementing its unique brand of conservation because they include areas for strict protection, limited use, human settlements, scientific programs, and recreation. It might be said that biosphere reserves embody a geographic expression of CI's program goals.

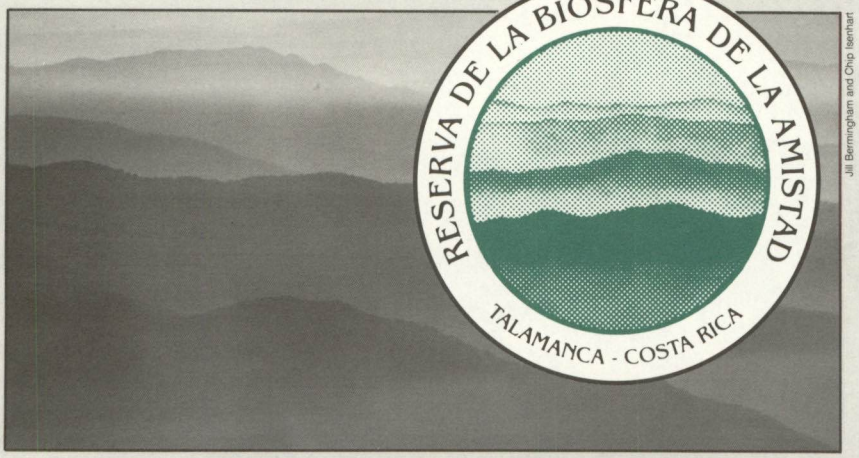
From an initial concept created in 1968 for blending wilderness areas with scientific research and economic development, 293 biosphere reserves have been established in 74 countries around the world since 1976. CI board member Michel Batisse, Senior Environmental Advisor to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), was instrumental in creating the original biosphere reserve concept as well as UNESCO's Man and the Biosphere Programme.

CI currently operates progams in nine biosphere reserves, including the Beni Biosphere Reserve in Bolivia, La Amistad in Costa Rica and Panama, Maya Biosphere Reserve in Guatemala, Montes Azules in Mexico, Sierra Nevada de Santa Marta in Colombia, Siberut in Indonesia, and Manu in Peru. Because of their balance of conservation, scientific research, and sustainable economic activities that address local conditions, CI's programs share the enthusiastic support of nearby communities for the management of their reserves.



James D. Nations

Guillermo Rioja, Bolivia Program Director, in the Beni Biosphere Reserve, Bolivia.



Jill Bermingham and Chip Isenhart

La Amistad Biosphere Reserve: A Model of Effective Conservation Management

La Amistad Biosphere Reserve will be featured as a model of biosphere reserve management at the World Parks Congress in Caracas, Venezuela in February 1992 and at UNCED in Rio de Janeiro in June 1992. This recognition of La Amistad's programs is a source of pride for CI staff, because our most comprehensive protected area management program is with the communities in and around La Amistad Biosphere Reserve.

La Amistad covers 1.5 million acres in the remote Talamanca Mountains of southeastern Costa Rica and is considered the most biologically and culturally diverse region of the country. But the region is under increasing threat from illegal logging, pressure for mineral and oil exploration, and agriculture. Plans for a number of new hydroelectric power plants within the reserve pose environmental hazards as well.

Since 1988, CI has worked with La Amistad's Coordinating Commission and a regional network of conservation organizations on a range of projects that balance economic interests of the indigenous peoples and communities within the reserve with habitat protection of core wilderness areas.

Programs currently include:

- support for La Amistad Coordinating Commission in the development of management plans;
- conservation-based development in local communities for sustainable enterprises, agroforestry, and agricultural projects;
- implementation of CI/SIG (see p. 5) to produce maps of population and land-use patterns in the biosphere reserve;
- initiatives with Soswek, a Bribri Indian group, to restore cultural values and traditions through reforestation, medicinal gardens, ecotourism, and craft production;
- community outreach projects to develop educational tools ranging from a television PSA and other audiovisual materials on La Amistad to workshops for communities on local conservation issues.

In addition, CI is collaborating with the Asociación Nacional para la Conservación de la Naturaleza (ANCON), the Organization of American States, and Panama's Ministry of Planning to draw up a similar management plan for La Amistad Biosphere Reserve in Panama, representing the first attempt at producing a binational strategy for a border park.

The Ecological Committee of Fila Pinar

by Edward C. Wolf

From the hillside above the new community center, the landscape around the rural settlement of Fila Pinar is a colorful mosaic of coffee plantations. But just a few steps away, a wild spring-fed stream winds through primary tropical rain forest.

Unlike other remnant forest patches found in the fertile farming regions on Costa Rica's Pacific slope near La Amistad Biosphere Reserve, this one still stands because the people of Fila Pinar have chosen to keep it. Through a remarkable community effort, Fila Pinar's "biosphere reserve in miniature" has become a resource for environmental awareness and a source of pride to residents.

Founded in 1965 as part of a government-sponsored farming settlement known as the Gutierrez Braun Colony, Fila Pinar is home to some 70 families dependent on farming for their livelihoods. At the time of the original land grant, the government demarcated a 16-hectare (40 acre) parcel for community use. While surrounding communities quickly subdivided and cleared their communal plots, the residents of Fila Pinar decided to preserve their forest.

In 1990, residents formed the Ecological Committee of Fila Pinar and joined a regional conservation organization called APRENABRUS (Association of Protectors of the Natural Resources of Coto Brus), based in nearby San Vito. Through APRENABRUS, CI has supported the Ecological Committee's effort to develop a management plan for the communal land and to demonstrate new farming and agroforestry techniques that can help rural Costa Ricans improve their lives.

Today, the forest parcel at the heart of Fila Pinar includes a wild core of 4

hectares (10 acres), through which the Ecological Committee has laid a system of interpretive trails used by two community schools. With assistance from the Organization for Tropical Studies, the Committee plans to enrich plantings of two useful species that grow wild in the forest: a vine (*Arrabidaea stinofolia*) from which baskets for coffee harvesting are made and a wild palm (*Prestoea allenii*) gathered for hearts of palm.

Residents of Fila Pinar are also becoming interested in alternatives to coffee production. With depressed world coffee prices, farmers are receptive to nontraditional crops and agroforestry methods that combine trees and food crops. Areas of the communal parcel have been set aside to demonstrate these alternatives and promote more diversity in the region's agriculture. The Committee has also established a community tree nursery in which trees native to the Coto Brus region will be propagated for reforestation and agroforestry projects.

Haroldo Castro

Fila Pinar residents tend saplings in a community reforestation nursery.

The wild forest at the heart of Fila Pinar has become a focal point for community activities and a place to explore environmentally sound alternatives for the community's future. Fila Pinar's Ecological Committee shows how people in La Amistad's buffer zone have begun to balance their needs with the ecosystem that supports them.

Edward C. Wolf is former editor of Tropicus.

James D. Nations

Leaders of the Chimane Council in San Borja, Beni Province, Bolivia.

From the beginning, CI has advocated a policy of support for indigenous peoples that is reflected in its country programs. CI's work with the Chimane Indians of Bolivia's Beni Province indicates the scope and variety of our projects, including funding for the Center for Indigenous Peoples of the Beni, scientific training for members of the Chimane Council forestry committee, and support for Chimane participation in the regional economy through marketing jatata, *used for palm thatch. CI also supported the successful "March for Dignity and Peace" last September, when Chimane and Moxeño Indians trekked to La Paz to demand native rights over their lands. As a result, the Bolivian government officially granted territory in the Beni to the Chimane and recognized the legal standing of their traditional leaders.*

Conservation-based Development

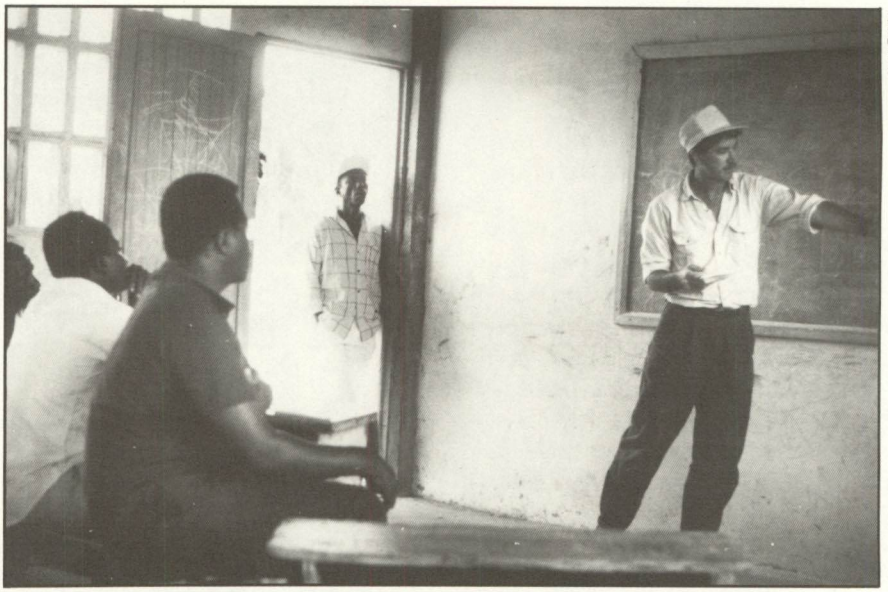
Balancing Economics and Ecosystem Preservation

Ecosystem economics is an essential ingredient in CI's conservation strategies because the economic needs of millions of rural people in developing countries form the greatest pressures on habitats and their biodiversity. In fact, economic considerations may ultimately determine the survival prospects of both human populations *and* ecosystems in the tropics.

One of CI's guiding principles is that conserving ecosystems and meeting human needs are not mutually exclusive goals. Our conservation-based development work includes programs in traditional land-use practices and ethnobotany, agriculture, forestry, fisheries, and watershed management. First and foremost, however, is identifying sustainable economic development opportunities for local people.

To meet that goal, CI has focused over the past year on finding markets for sustainably harvested nontimber forest products. Through Seed Ventures™ (Sound Environmental Enterprise Development), CI staff members have developed international markets for tagua, the ivory-like palm nuts harvested by communities in Esmeraldas, Ecuador.

Spurred by the success of the Tagua Initiative™, Seed Ventures™ plans to introduce two new nontimber forest products annually over the next five years. Already, CI has an extractive program for three traditional forest products—xate, chicle, and allspice—as part of ecosystem conservation efforts in Guatemala's Maya Biosphere Reserve (*Tropicus*, Fall 1991). For their next enterprise, Seed Ventures™ is exploring markets for wild palm oils and cacao.



Laura Tangley

Jim Nations, Vice President for Latin America, speaks at a meeting of local government officials in Ecuador's Comuna Rio Santiago Cayapas last fall.

Esmeraldas at the Crossroads

by Laura Tangley

On a typical, steamy morning last October, the one-room schoolhouse of northwestern Ecuador's Selva Alegre was host to a highly atypical event. Instead of children, grown men sat concentrating in its small, wooden desks. At the blackboard, the "teacher"—dressed in dusty khakis and a bright, yellow baseball cap—explained the important role tropical forests play in protecting biological diversity and regulating global climate. As Jim Nations, Vice President for Latin America, spoke, a steady stream of spectators wandered in and out of the room. Others leaned in the windows to see what was going on. Outside the open door, skinny dogs lounged in the hot sun, and chickens scratched through the dirt for scraps of food.

Belying its informality, this gathering was on the verge of making conservation history. By the end of the meeting, the five official representatives of Comuna Rio Santiago Cayapas—a 63,000-hectare region that includes Selva Alegre and 51 other communities—had agreed to set up and protect a reserve along the comuna's border with Cotacachi-Cayapas Ecological Reserve. The purpose is to buffer the larger reserve from the pressures the comuna's rapidly growing population will place on it in the future. The move is particularly significant because Cotacachi-Cayapas is the only protected area within this "hotspot" region of the western Andes, home to some of the most diverse—and most endangered—tropical forests in South America.

But there was something even more unusual than the setting for this important meeting. Why had the comuna's leaders, whose people face a slew of such pressing, immediate problems as unemployment, poverty, high

Liliana Madrigal

Mark Plotkin, Vice President for Plant Conservation, addresses the Panama Workshop on nontimber forest products.

infant mortality, and malnutrition, decided to invest scarce resources in a project whose benefits are primarily long term? And why were they paying so much attention to the words of a white foreigner?

At least part of the answer had become obvious to Nations and to Karen Ziffer, CI's Director of Seed Ventures™, over the previous few days. The two had come to the Esmeraldas province of Ecuador to evaluate the impact of the Tagua Initiative™ (*Tropicus*, Spring 1991) on the project's one-year anniversary. Accompanied by Rodrigo Calero of CIDESA, the Quito-based community development group that coordinates the project in Esmeraldas, Nations and Ziffer spent a week traveling up and down the comuna's rivers by motorized dugout—visiting small communities and talking to people about tagua, the ivory-like palm nut that CI's business partners are turning into buttons, jewelry, watches, carvings, and a variety of other products.

Everywhere they went, Nations and Ziffer were pleased to see signs of the project's success: big sacks of tagua piled high along the riverbanks awaiting pickup; more than a dozen warehouses brimming with harvested nuts; and healthy tagua groves whose trees were weighted down by more nuts ready for harvest. Statistics in CI's Washington, DC office support this good impression. Since the Tagua Initiative™ began in September 1990, the comuna has delivered more than 200 tons of tagua nuts directly to factories up the coast, by-passing intermediaries who once monopolized the market. These direct sales, combined with increased demand created by the project, have more than doubled tagua's price.

"Thanks to these tangible results, and the fact that CI has been willing to both listen to what people want and make a long-term commitment to the region, the comuna now knows and trusts us," says Ziffer. That trust helps explain the meeting that took place in Selva Alegre last fall. It also has important implications for future projects that aim to link conservation and development. Says Ziffer, "The Tagua Initiative™ has clearly demonstrated that a successful development project can provide conservationists leverage in local policymaking."

In Esmeraldas, this leverage is coming just in the nick of time. Although most of the comuna today is forested, these rich tropical forests are threatened by two road construction projects. The first, already half complete, is connecting several comuna towns that were once accessible only by water. To finance the project, the comuna is selling some of its forests' high-value hardwoods. Meanwhile, the roads are making more and more forest vulnerable to loggers, whose bulldozers—

PANAMA WORKSHOP DECLARATION

Conservationists agree that harvesting nontimber forest products offers an alternative to logging that is not inherently damaging to ecosystems. Yet serious questions remain concerning the best ways to bring those products to local, national, and international markets. What species offer the greatest promise? What levels of harvest are sustainable? How can indigenous peoples best be compensated for their knowledge, as well as their labor?

In order to answer these and other questions, CI and the Asociación Nacional para la Conservación de la Naturaleza (ANCON) invited experts from around the world to a meeting held in Panama City in June 1991. The conference was among the first in which indigenous peoples met with conservationists, academic researchers, and businessmen to share experiences and ideas.

The CI-sponsored conference pulled together a wide range of information on the potential utility of rain forest plants. But the most significant results of the conference came at its conclusion, when the participants drew up a set of guidelines on how new products can be brought to market in an ethical and ecologically sustainable manner. A summary of the recommendations contained in the Panama City Declaration include:

- assuring that forest dwellers' botanical knowledge be accorded the status of intellectual property;
- easing trade restrictions and regulatory barriers to the introduction of tropical products in international markets;
- developing strategies for harvesting and marketing new products that reflect the ecology of tropical forest plants;
- respecting and gradually enhancing the development needs and management capacities of forest communities so as to minimize the risk of disruption posed by rapid economic change;
- increasing efforts to support the self-determination of indigenous forest dwellers and to link product development to existing and newly initiated conservation programs in critical rain forest areas.

Sustainable Harvest and Marketing of Rain Forest Products, the papers and proceedings from the Panama City Workshop, is edited by Mark Plotkin and Lisa Famolare. It will be available in April 1992 through Island Press.

—Mark Plotkin, Vice President, Plant Conservation

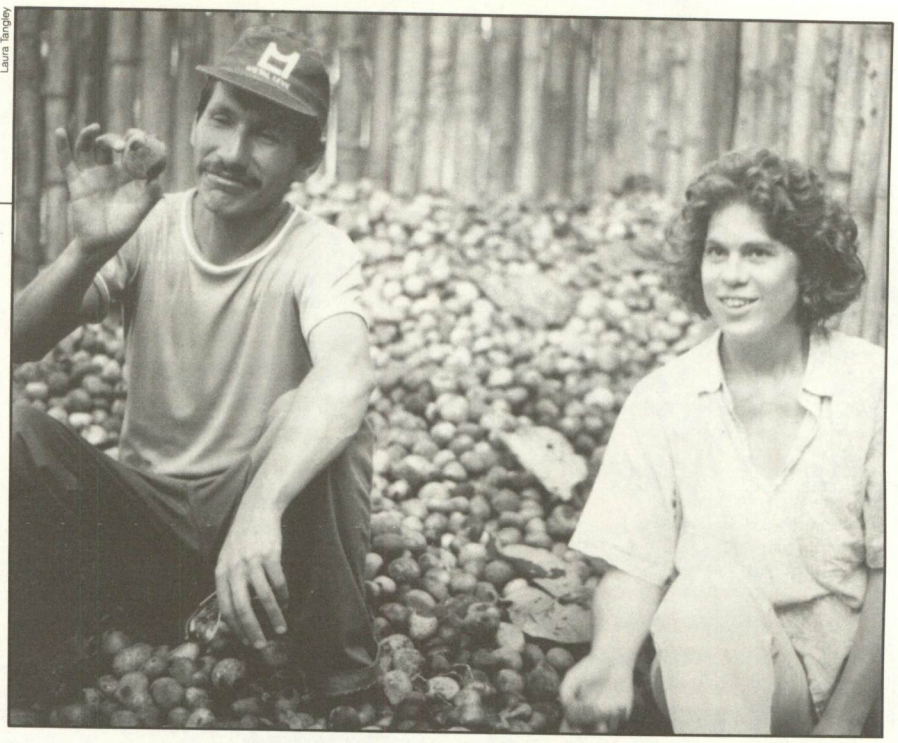
floated downriver on rafts—have already ravaged all primary forests near the rivers.

Financed by the Ecuadoran government, the second road may bring even more trouble—both to the comuna's forests and to Cotacachi-Cayapas Ecological Reserve. Running along the Colombian border from San Lorenzo to Ibarra (just north of the comuna and the ecological reserve), this road, too, will expose once-inaccessible forests to loggers. Far more serious, however, the road will open those forests to a flood of landless colonists fleeing deforestation and land degradation in other parts of the country.

The comuna's new reserve would represent just a first step toward fighting these powerful socioeconomic forces. But Calero believes this first step will not be the last. He finds it encouraging that the start-up money CI has given the comuna so far differs fundamentally from donations received from other groups in the past. "In this case, the comuna is deciding for itself how to use the funds," he says. Calero hopes this is the beginning of a process that, "como una cadena sin fin"—like an unending chain—spins off many other conservation projects that come from within rather than outside the comuna.

Laura Tangley is a Senior Writer with CI's Communications Department.

Laura Tangley

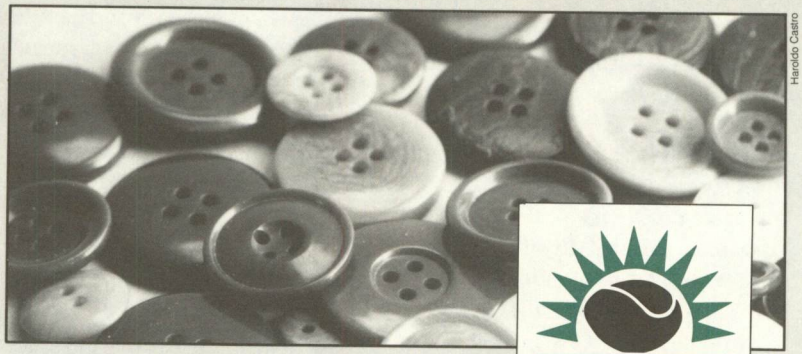


Rodrigo Calero of CIDESA, which coordinates the Tagua Initiative™ in Ecuador, sits on a pile of tagua nuts with Karen Ziffer, Director of Seed Ventures™.

Haroldo Castro

Refining chicle in the Maya Biosphere Reserve, Guatemala.

Haroldo Castro



The Economics of Tagua

The Tagua Initiative™ began when CI negotiated with two companies to buy tagua for one million buttons. Since then, Seed Ventures™ has expanded the program to include:

- 20 additional garment manufacturers purchasing buttons, and another 40 companies interested in tagua products;
- 200 tons of tagua sold at more than twice the original price;
- $75,000 in revenues for Esmeraldas generated to date;
- 16 community members receiving training in accounting and business management;
- negotiations under way for the establishment of conservation zoning in the tagua-harvesting region of Esmeraldas.

The Tagua Initiative™ has served as a model for a similar CI-supported program in Colombia's biologically rich Choco region with our partner organization, Fundacion Inguedé.

"Communications and Environment"—CI's new publication series provides a vehicle for sharing information and ideas with CI country programs around the world. Logo design by Carlos Arrien.

Communications

Developing Tools to Raise Conservation Awareness

In the world of conservation, changing attitudes is the first step toward changing policies. The need to build public awareness of ecosystem conservation is especially critical in tropical countries. Often communications programs begin with grassroots public education campaigns built around "flagship" species symbolizing the habitats in which they live. Local and national media campaigns that focus on larger conservation concerns also can be effective, but in many tropical countries few journalists have the background to cover environmental issues effectively. Journalist training programs can acquaint influential reporters with conservation problems and solutions, and build national networks of media professionals who share contacts and story ideas. Of growing promise are radio, television, and video productions designed to involve local people and to meet local needs for conservation education.

Almost since its beginning, CI has teamed up with local partners to develop a range of communications tools that work for conservation. The goal: to create and test new approaches that local organizations can use in their public efforts to gain support for the environment. During 1991, CI added significantly to its growing list of successful communications experiments and began the important task of sharing ideas and work plans not only with neighboring countries but across continents.

- In rural Coto Brus, Costa Rica, two dozen local communicators and journalists gathered at the Robert and Catherine Wilson Botanical Garden to discuss designing conservation messages that meet local needs. It was the third in a series of regional seminars cosponsored by CI during the past three years.
- In Brazil, CI launched its first educational video, "Um Grito pela Vida" ("A Cry for Life"), at an Earth Day news conference in São Paulo. Up to nine million Brazilians saw excerpts on television, and CI now is distributing the video to schools, environmental organizations, and other local institutions.
- In Bolivia, more than 50 local filmmakers responded to a conservation video contest, cosponsored by CI and several Bolivian environmental organizations, requesting original ideas for works on environmental education. Five prize-winning videos were presented at an exhibit in La Paz last fall, then aired on television and shown at town meetings and festivals around the country.

Of special interest this past year was the development of a conservation radio series supported by CI and produced by Chimane Indians in the Beni region of Bolivia. Working with local radio experts, aspiring Chimane communicators participated in two training workshops to learn radio production techniques. As a result, 15 Chimanes developed ten radio programs of 6-7 minutes in length to create the final series, "Our People." Segments were aired twice weekly during a four-month period last fall and winter, reaching the broad area surrounding the Beni Biosphere Reserve.

A communications committee of Chimanes now seeks to develop video production skills so their issues and concerns can be transmitted via television as well as through educational video uses.

—Patricia B. Kelly
Vice President, Communications

In Papua New Guinea, CI supports conservation awareness through the Awareness Community Theater Program. Traveling to remote villages, theater troupes present conservation messages framed in traditional stories, songs, and humor. In performances like "The Chainsaw," these troupes highlight the need for conservation in Popondetta, where rampant logging and plantation agriculture threaten the only habitat of the world's largest butterfly, the Queen of Alexandra's birdwing (*Ornithoptera alexandrae*).

Tim Werner

Debt-for-Nature Swaps

CI's initial debt swap converting unpaid foreign debt to conservation investments has led to another 16 similar swaps valued at $100 million in 11 countries. CI debt swaps to date:

- **Bolivia**
- **Costa Rica**
- **Madagascar**
- **Mexico**

CI/SIG

CI's multilingual geographic information system provides easy access to spatial data. Already used to establish conservation priorities for the Amazon Basin, CI/SIG will help build consensus in other regions of the world as well. CI/SIG distributed in:

- **Bolivia**
- **Brazil**
- **Chile**
- **Colombia**
- **Costa Rica**
- **Madagascar**
- **Mexico**
- **Philippines**
- **United States**

Top Conservation Priorities

HOTSPOTS

1. Chocoan Forest
2. Atlantic Forest (Brazil)
3. Madagascar
4. Indonesia
5. Philippines
6. Middle American Forests
7. Tropical Andean Slopes
8. Upper Guinean Forests
9. Eastern Arc Mountains (Tanzania)
10. Western Ghats (India)
11. Sinharaja Forest (Sri Lanka)
12. Eastern Himalayas
13. Peninsular Malaysia
14. Northern Borneo
15. Melanesia

TROPICAL WILDERNESS AREAS

16. Northern and Western Amazonia
17. Congolian Rain Forest Block
18. The Island of New Guinea

TEMPERATE RAIN FORESTS

19. Pacific Northwest Coastal Rain Forest
20. Southern Chile Temperate Rain Forest

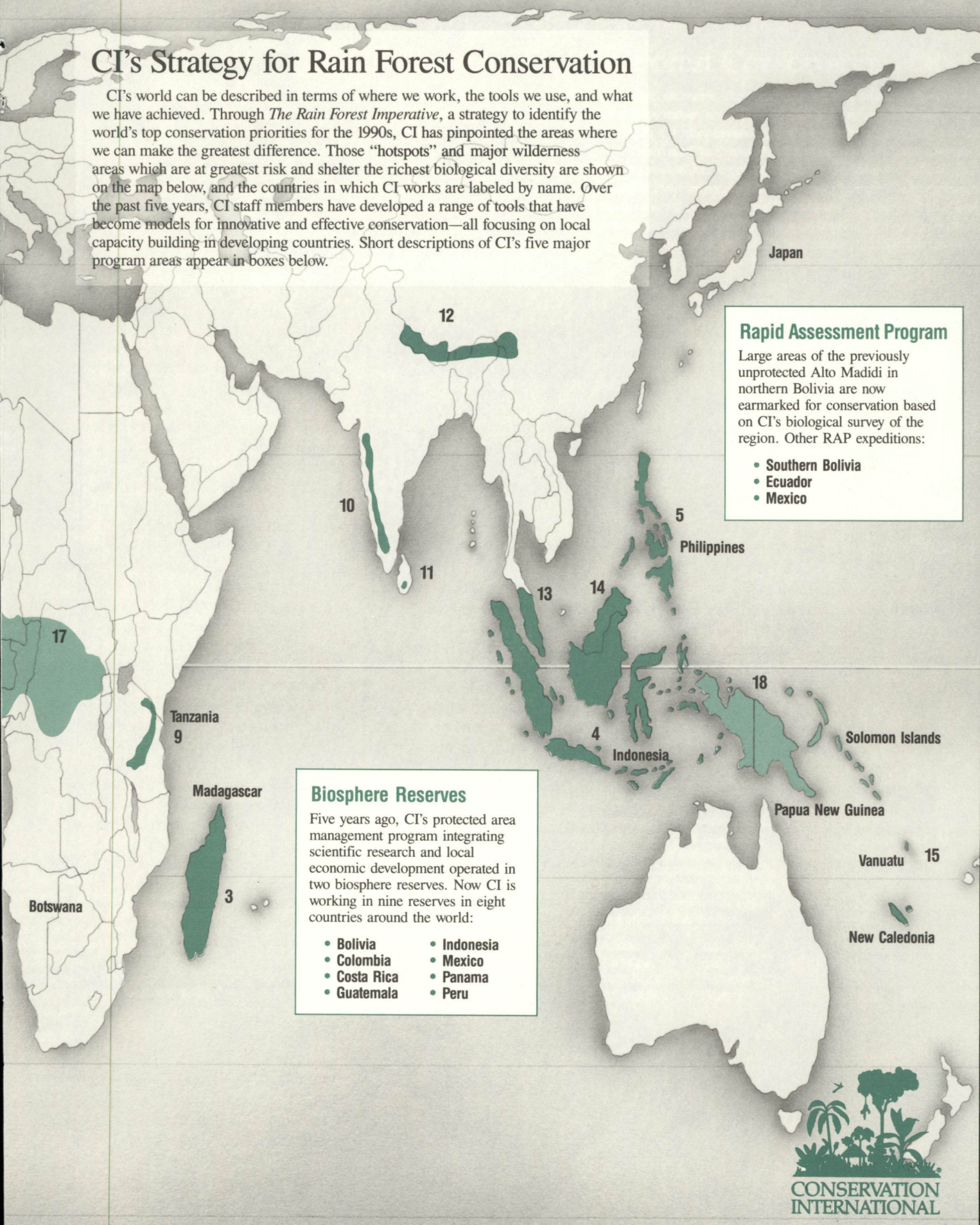
Rain Forest Products

CI's first project to market sustainably harvested nontimber forest products began with sales of tagua palm nuts from Ecuador to two button manufacturers. Now over 200 tons of tagua have been exported worldwide. CI is developing markets for other forest products from:

- **Bolivia**
- **Colombia**
- **Guatemala**
- **Indonesia**

CI's Strategy for Rain Forest Conservation

CI's world can be described in terms of where we work, the tools we use, and what we have achieved. Through *The Rain Forest Imperative*, a strategy to identify the world's top conservation priorities for the 1990s, CI has pinpointed the areas where we can make the greatest difference. Those "hotspots" and major wilderness areas which are at greatest risk and shelter the richest biological diversity are shown on the map below, and the countries in which CI works are labeled by name. Over the past five years, CI staff members have developed a range of tools that have become models for innovative and effective conservation—all focusing on local capacity building in developing countries. Short descriptions of CI's five major program areas appear in boxes below.



Rapid Assessment Program

Large areas of the previously unprotected Alto Madidi in northern Bolivia are now earmarked for conservation based on CI's biological survey of the region. Other RAP expeditions:

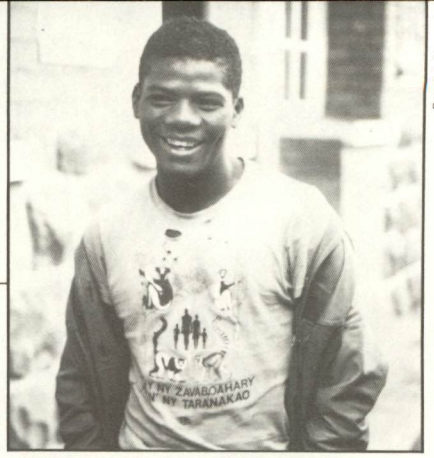
- Southern Bolivia
- Ecuador
- Mexico

Biosphere Reserves

Five years ago, CI's protected area management program integrating scientific research and local economic development operated in two biosphere reserves. Now CI is working in nine reserves in eight countries around the world:

- Bolivia
- Colombia
- Costa Rica
- Guatemala
- Indonesia
- Mexico
- Panama
- Peru

CONSERVATION INTERNATIONAL



Young Malagasy in a well-worn CI T-shirt sporting the message, "Protect nature for your descendants."

Training

Educational Initiatives in Madagascar and Colombia

by Roderic B. Mast and Cristián Samper

One of the most striking differences between industrialized temperate nations and the tropical south is their capacity for conservation. Whether measured in terms of scientists and students or technology and training, the resources are clearly weighted toward the temperate zone. Considering the threat that human disturbance poses to tropical forests today, there is an urgent need for conservation training in the tropics.

Two different programs—one in Madagascar and one in Colombia—show how CI is responding to local training needs through education, field instruction, and public awareness initiatives.

Madagascar

Perhaps the greatest long-term threat to Madagascar's biodiversity is the breakdown of the traditional practices and customs that formerly had regulated forest use. Only now, as the country tries to save what little remains of its rich and unique biodiversity, has the need for enhanced public education become clear.

CI has implemented a number of programs to promote conservation training and foster environmental consciousness in Madagascar. These include co-designing (in collaboration with the government and local NGOs) university-level programs to train decision-makers, wildlands managers, and development specialists; encouraging Malagasy students to pursue conservation careers by sponsoring participation in work-study programs in the United States; and financing the publication of educational materials such as Patryck Vaucoulon's book, *Lemurs in Peril*, in French and Malagasy.

In Colombia's Páramo de Cumbal, students participate in a CI-sponsored tropical ecology course.

Colombia

In contrast to Madagascar, Colombia already possesses a number of university-level training programs in the natural sciences that provide students with the theoretical underpinnings for careers in conservation.

Yet until recently, Colombia's educational system offered its students few opportunities to gain experience in practical, hands-on research. Through a grant from the John D. and Catherine T. MacArthur Foundation, and in cooperation with the Fundación FES in Cali, Colombia, CI sponsored the first annual Field Course in Tropical Ecology and Conservation Biology at La Planada Reserve in July 1991.

Inspired by successful courses offered by the Organization for Tropical Studies in Costa Rica, the goal of this intensive, one-month course was to teach young biologists and professional conservationists how to design field experiments in ecology. Students participated in 60 field research projects on such diverse topics as avian social systems, insect diversity in altered habitats, limnology, and palm demography.

This year's success has prompted CI and FES to guarantee support for the course over the next two years. In addition, we are exploring the possibility of an endowment fund at FES for future courses that would make training available for many more young conservationists throughout the Andean region.

Roderic B. Mast is Vice President for Old World Operations and Director of the Colombia and Madagascar Programs. Cristián Samper is a Colombian doctoral candidate at Harvard University and Coordinator of the La Planada course.

Liliana Madrigal

Kathryn Cameron Porter, Policy Affairs Director, works with Antonio Telesca (of ANCON in Panama) at a seminar on solar box cookers. Catalysis headquarters in Stockton, California.

Policy Design

Building National Support for Local Programs

by Kathryn Cameron Porter and Ian Bowles

Forming effective national and international policy ensures the success of CI's conservation programs at the local and regional levels. Particularly by addressing the range of problems that cut across both environmental and economic issues—including population, women's and indigenous people's rights, and energy use—CI's efforts in policy-making can help support local capacity building. Policy initiatives can also open new avenues for conservation.

By bringing the experience of CI's country programs to policy-makers, the Policy Affairs Program leverages CI's success on the ground and helps forge policies that shape the environment. Such policies may take many different forms—national legislation, bilateral assistance programs, and recommendations growing out of international conventions.

In 1991, CI worked with six other organizations, including the Natural Resources Defense Council, the Nature Conservancy, and the World Wildlife Fund, to contribute to the Enterprise for the Americas Initiative, a U.S. government program that provides for the creation of conservation funds and the reduction of bilateral debt in Latin America.

CI has also urged the U.S. government to promote the creation of trust funds and a "small grants" fund through the new multinational Global Environment Facility (GEF). Because GEF represents the largest sum of money available for biodiversity to date, how it allocates these funds is crucial. GEF could set a critical precedent by giving small but manageable sums to local NGOs for targeted projects—a significant departure from the customary multimillion dollar World Bank programs.

The legal status of indigenous peoples in developing nations is often closely linked to the conservation of their territorial rights. Building on an initiative in the U.S. Senate, CI organized a coalition of nine NGOs to urge the U.S. Congress to include the status of indigenous peoples of Latin America in the annual U.S. State Department Human Rights Report.

Over the past year, CI's Policy Department also concentrated on efforts related to the United Nations Conference on Environment and Development (UNCED) that will take place in Rio de Janeiro in June 1992. UNCED, perhaps the most important conference on the environment to date, has become the focal point for a host of policy issues, including international conventions on global climate change and biological diversity. CI has been working with the U.S. Congress and Administration as well as the U.S. Citizens Network on UNCED to influence U.S. policy for this critical "Earth Summit." We remain hopeful that several strong conventions, including one on biodiversity, will be completed by the time of this unique forum.

Kathryn Cameron Porter is Director of Policy and Governmental Affairs, and Ian Bowles is Associate for Policy and Conservation Finance.

Dayak women study forest recovery through a CI project in Sungai Barang, Indonesia.

Cynthia Mackie

CI Sponsors Tri-national Conference on the Maya Forest

by James D. Nations

"This has been a historic meeting—the first time these three countries have come together to discuss environmental problems across their borders."

With these words, the Honorable Glen Godfrey, Belize's Minister of Tourism and the Environment, summed up the Workshop on Frontier Protected Areas of Mexico, Belize, and Guatemala, held in Belize City in August 1991. Sponsored by CI in conjunction with the Central American Commission on the Environment and Development (CCAD), the three-day meeting brought together 44 representatives of government agencies and NGOs from the three neighboring countries.

Representatives of Mexico's Secretariat of Urban Development and Ecology (SEDUE), Guatemala's National Commission on the Environment (CONAMA), and Belize's Ministry of Natural Resources and Ministry of Tourism and the Environment proposed solutions to mutual problems of illegal logging, river contamination, and wildlife poaching in the Maya tropical forest on the common borders of the three countries.

James D. Nations

Representatives of Belize, Guatemala, and Mexico discuss their mutual interest in frontier protected areas in Belize City.

"We need established mechanisms to control these problems across borders," stated María José Gonzales of CONAMA. "This meeting will help move us in that direction."

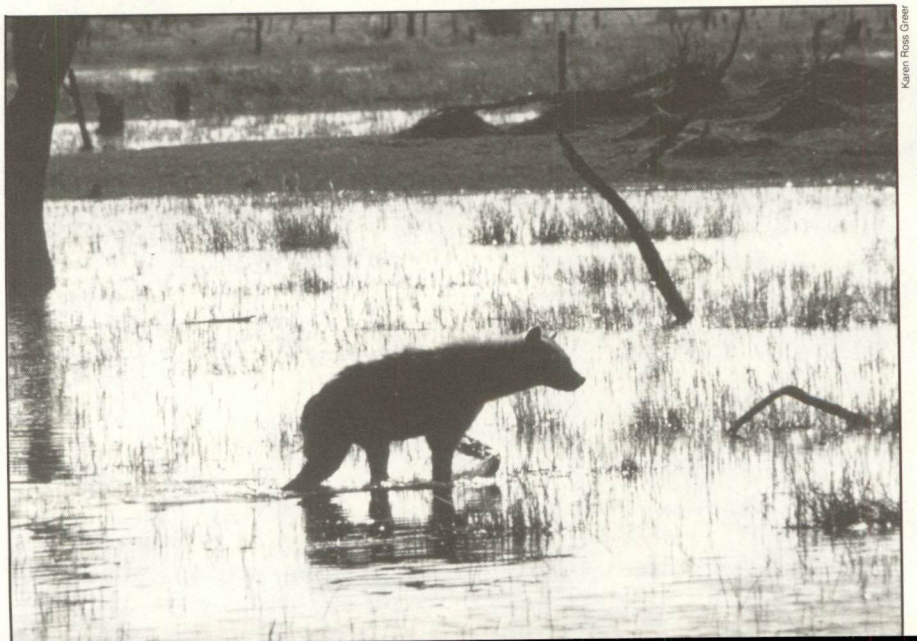
The meeting was an opportunity for conservationists and government representatives from all three nations to reiterate the benefits of frontier protected areas. Establishing protected areas on the borders of neighboring countries expands the size of wildlife habitat under protection, giving plant and animals a better chance for survival. The larger the habitat, the larger the population of wild species.

Conservationists from Mexico, Guatemala, and Belize are now united in protecting the crucial biological and cultural resources they share in the Maya tropical forest.

Postscript: On December 6, 1991, the Deputy Prime Minister and Minister of Natural Resources of Belize signed a decree creating the Chiquibul National Park, protecting 108,000 hectares of lowland tropical forest along Belize's border with Guatemala. This new national park mirrors the Chiquibul Special Protection Area on the Guatemalan side of the border, an area now being considered for national park status by the Guatemalan National Council of Protected Areas.

James D. Nations is Vice President for Latin America Programs.

Spotted Hyena (*Crocuta crocuta*) in Botswana's Okavango flood plains. As part of a U.S. AID-funded project, CI is working with communities in Wildlife Management Areas to develop conservation-based livelihoods, including ecotourism, game ranching, and use of plant and animal products for crafts.



Karen Ross Greer

Innovations in Conservation Finance Move beyond Debt-for-Nature Swaps

by Steve Rubin and Ian Bowles

Conservation programs cannot be implemented without funding. By directing local financial resources toward the creation and management of protected areas, training programs, and other conservation activities in the countries where we work, CI helps to guarantee the commitment of governments to the policies they espouse.

In 1987, CI pioneered the area of conservation finance with the first ever debt-for-nature swap, a financial transaction that allows an organization to purchase (at a discounted rate) part of a developing country's foreign debt and convert that debt into local currency to be used for conservation. Since then, we have continued to develop cutting-edge financial mechanisms to fund conservation activities. A sampling of our activities over the past year follows.

Mexico

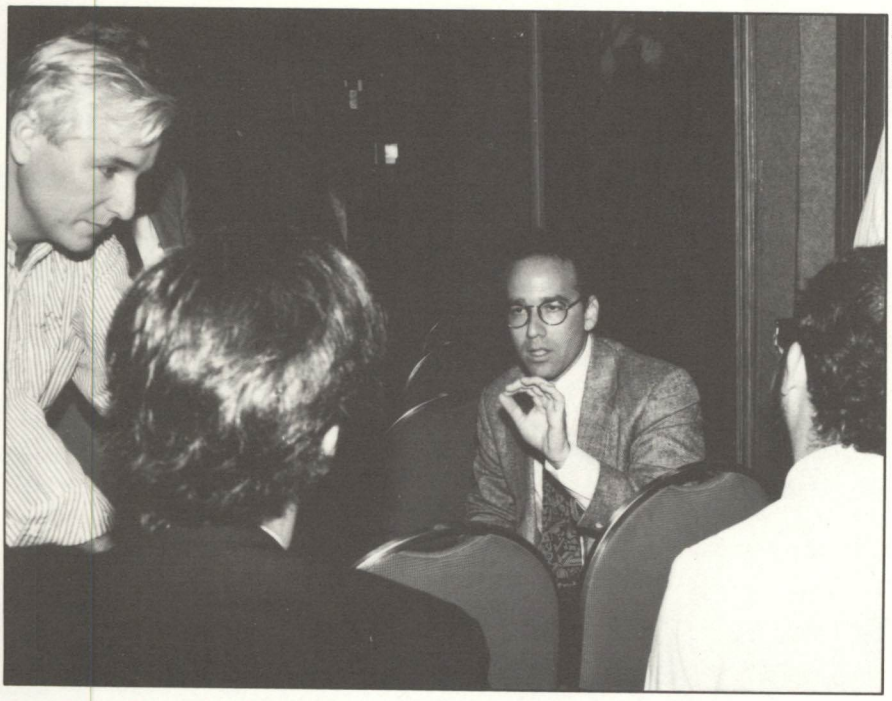
In 1991, CI completed the first debt swap with the government of Mexico, using bonds created by a debt-restructuring scheme called the Brady Plan. The swap provides for the conversion of up to $4 million dollars worth of debt, and was made possible through financial support from U.S. AID and a multimillion-dollar donation from the Bank of America. This four-year agreement has been widely acclaimed by senior Mexican and U.S. officials, and will be used for conservation activities in Montes Azules Biosphere Reserve and CI's programs in the Sea of Cortez.

Madagascar

Through a ground-breaking debt-for-nature swap in Madagascar, CI is authorized for the first time by the Malagasy Central Bank to use trade credits owed to companies—debt that often trades at a deeper discount than bank debt. CI is hoping to take full advantage of this innovation, pending funds from several donors, including UNDP and U.S. AID.

Japan

In 1991, CI also began to cooperate with interested Japanese institutions in the area of conservation finance. CI will participate in a Japanese Environmental Agency-sponsored information network on debt-for-nature swaps. In addition, we will work with Keidanren, Japan's leading corporate donor consortium, on further cooperation with the Japanese private sector in conservation finance activities. CI's full-time representative in Tokyo, Fumiko Fukuoka, has launched a program to develop public awareness of Japan's conservation decisions.



Marianne Gatty

Steve Rubin, Director for Conservation Finance, discusses the Bank of America debt transaction with Brazilian journalists. At left is Haroldo Castro, Director for International Communications Projects.

Leveraging Conservation through Finance

CI's original debt-for-nature swap in 1987 eliminated $650,000 worth of Bolivian debt and paved the way for:

- NGOs and governments financing 16 additional debt-for-nature swaps in 11 countries;
- $100 million in debt-for-nature transactions to date;
- further innovations in conservation finance, including swapping trade credits and cancelling blocked funds;
- debt-swap mechanisms included in official debt-reduction initiatives;
- major banks donating debt in developing countries for conservation activities;
- offshore trust funds to endow protected area systems.

Other Initiatives

CI's Policy and Conservation Finance Departments have both worked with the U.S. Congress, the Bush Administration, and Latin American governments on developing key components of the "Enterprise for the Americas Initiative" (EAI), which seeks to eliminate several billions of dollars of debt and create new resources for conservation in Latin America. CI staff helped draft portions of this document, which has reduced Bolivia's external debt by more than 10 percent and created more than $2 million designated for conservation in that nation.

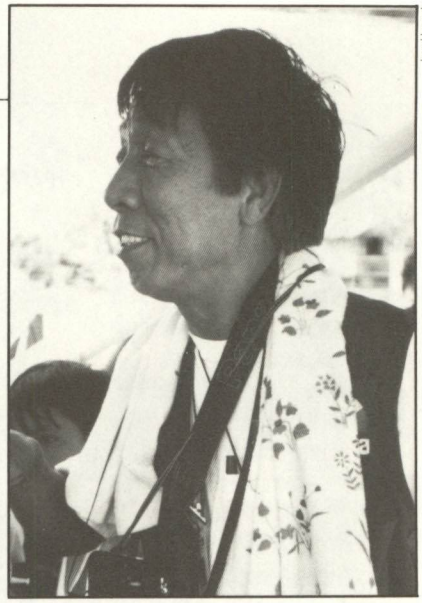
CI has provided technical advice to GEF, which is administered by the World Bank, United Nations Environment Program (UNEP), and UNDP. One of CI's accomplishments through GEF has been the design of a national trust for biodiversity in Peru. The fund, which will be held in dollars to hedge against devaluation and inflation, will finance a variety of conservation activities in Peruvian protected areas, including Machu Pichu and Manu Biosphere Reserve.

Future protection of natural habitats will depend on expanding the scale of our initiatives, and that hinges on finding new sources of funding. CI has begun to work with a consortium of organizations on identifying blocked funds (corporate currency surpluses that the host government is unable or unwilling to convert into foreign exchange for repatriation) for conservation programs in developing countries as well. This is an area CI intends to explore more thoroughly in the coming year. Only by continuing to identify new conservation finance mechanisms and cooperating on multilateral policy initiatives like GEF and EAI, will we be able to change the face of conservation efforts worldwide.

Steve Rubin is Director for Conservation Finance and Ian Bowles is Associate for Policy and Conservation Finance.

Fumihiko Yoshida

CI's Japan Representative Fumiko Fukuoka's goal is to direct Japan's political and financial resources toward ecosystem conservation.


Lee Hannah

Philippine In-Country Representative Vic Milan is working with provincial officials in Luzon to protect the Palanan Wilderness.

SAMPLE TRANSACTIONS

Mexico

Transaction:	Commercial Debt Conversion (Series A Mexican Brady Bonds)
Amount:	US $4 million
Market Price:	$0.70–$0.75 per dollar
Funding:	Several charitable foundations, U.S.AID, Bank of America debt donation
Purpose:	• Conservation of the Selva Lacandona and Montes Azules Biosphere Reserves; • Support for three private Mexican conservation organizations—PRONATURA, Miguel Aleman Foundation, and FUNDAMAT; • Support for communication and education programs in Chiapas and other states.

Madagascar

Transaction:	Commercial Debt of Trade Credit Conversion
Amount:	US $5 million
Market Price:	Commercial debt: approx. $0.50 per dollar Trade credits: $0.25–$0.50 per dollar
Funding:	Several charitable foundations, pending UNDP, U.S.AID
Purpose:	Ecosystem management programs for four protected areas in collaboration with local communities and organizations, and the Malagasy Ministry of Water and Forests; other training and conservation-based development programs.

Collaborating to Advance Conservation

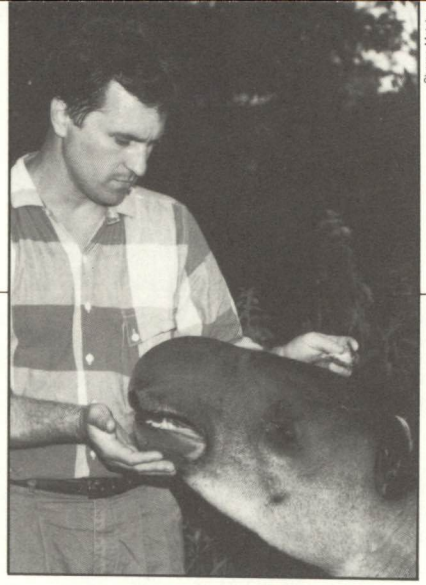
by Roderic B. Mast

By joining forces, conservation groups can increase their impact and effectiveness, and CI frequently collaborates with other institutions. In each case, we seek to work with organizations whose skills complement our own.

CI maintains close ties with the Species Survival Commission (SSC) of the International Union for the Conservation of Nature and Natural Resources (IUCN), which maintains a global network of more than 3,000 species conservation specialists. CI President Russell Mittermeier serves as a member of the SSC Steering Committee and Chair of its Primate Specialist Group, while many other CI staff actively participate in other SSC program areas.

CI science staff also participate in consortia like "Partners in Flight"—a group of U.S. federal agencies and nonprofit organizations trying to conserve the dwindling population of migratory birds that winter in rain forest habitats.

Collaborating with other NGOs offers another way of attaining our program goals. CI has joined forces with Wildlife Conservation International (WCI) in Papua New Guinea by funding the work of Bruce Beehler, a world-renowned expert on PNG's birds of paradise. As a priority for our joint in-country activities, Beehler's most ambitious project in the coming years will be to help define PNG's conservation priorities through a biological assessment of its natural habitats.



Sharon Matola

Flagship Species Program Director Bill Konstant with "April," a Central American tapir at the Belize Zoo.

CI's new Director for Species Conservation, Bill Konstant, will help CI reach out to conservationists in the U.S. and international zoo communities through a joint project with the Philadelphia Zoo. In an effort to muster support for ecosystem conservation programs worldwide, Konstant's "Flagship Species Program" also aims to educate zoo-goers about the importance of preserving natural habitats if endangered species are to survive in the wild.

CI's Science and Technical Cooperation Department also relies on many scientific institutions to implement its programs. The RAP team's biological assessments would not be possible without access to the reference collections of the Field Museum in Chicago. But CI also works closely with other institutions to develop new applications for technology. CI is currently cooperating with the University of California in Riverside on the development of our laser video library, a project that will facilitate the use of computer video technologies for training and information transfer in developing countries.

For CI staff, collaboration goes both ways, and we actively assist other organizations in meeting their program goals. Last year, CI was asked to "loan" staff members to the Smithsonian Institution to teach courses in biodiversity. CI staff also responded to a request from the World Bank for assistance in reviewing their environmental project proposals.

Through partnerships and consortia with international groups, CI has been able to accomplish broad objectives that go well beyond what could be achieved working in isolation.

Roderic B. Mast is Vice President for Old World Operations and Director of Colombia and Madagascar Programs.

CI CREATES NEW AFFILIATES

In 1991, CI decided to bring home some important lessons learned in the tropics and began working to protect endangered temperate rain forests on our own continent. Two new affiliate organizations—Ecotrust, headed by CI co-founder Spencer Beebe, and CI Canada, led by Adrian Forsyth—have been established to link economics and ecology in promoting ecosystem conservation in the Pacific Northwest.

In their first collaborative effort, CI, Ecotrust, and CI Canada worked together on a public campaign to preserve the Kitlope watershed. As a result of CI's recommendations to the British Columbia Ministry of Forests, logging has been deferred in that region until it can be studied further, and CI Canada has been invited by Haisla Indian elders from the Kitlope to help increase Canadian interest in preserving the region.

CI Canada's main objective is to increase Canadian public awareness and support for preserving biodiversity, both at home and abroad. "Bring Back the Birds" is the organization's first popular campaign to link the two by focusing public attention on the threat to Canadian songbirds that winter in tropical forests.

Through collaborative efforts including public education, scientific research, and programs involving local communities, both of CI's new affiliates aim to protect North America's last remaining temperate rain forests and draw attention to the larger issue of preserving biodiversity worldwide.

Financial Report

July 1, 1990 through June 30, 1991

by Robert McMinn, Director of Finance and Administration

For the fiscal year ended June 30, 1991, Conservation International had revenues of $9,821,536, and expenses of $10,066,664, resulting in an excess of expenses over revenues of $245,128, or about 2.5% of revenues. Total revenues for the year were up 18.5% over the previous year, but expenses climbed 22.4%.

Program expenses grew by 34.7%, and accounted for 83.1% of our total expenses. Support expenses (Management and General, Development, and Membership Fundraising) decreased by 15.3% and represented 16.9% of our total expenses. Our fund balance for the year was $1,178,921 as shown on the Balance Sheet.

The figures presented here are derived from the audited financial statements of Conservation International Foundation for the year ended June 30, 1991. A complete report of the financial audit performed by Deloitte & Touche will be made available on request.

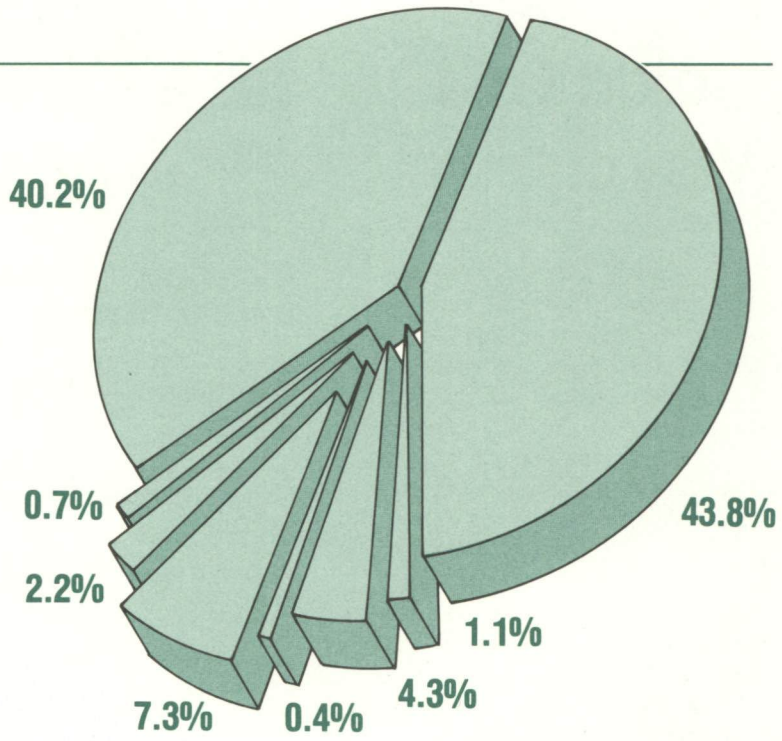
Balance Sheet

	June 30	
	1991	**1990**
Assets		
Current Assets:		
Cash and cash equivalents	$1,005,896	$2,084,404
Temporary investments	144,194	95,000
Accounts receivable	129,589	32,744
Prepaid expenses and other assets	60,657	43,027
Total Current Assets	1,340,336	2,255,175
Furniture and Equipment, Net	286,350	204,373
Investments	591,091	597,764
Deposits	35,334	37,745
	$2,253,111	3,095,057
Liabilities and Fund Balance		
Current Liabilities:		
Accounts payable and accrued expenses	$ 280,964	$ 244,282
Loans payable	—	90,000
Accrued vacation	120,425	59,230
Deferred rent liability, current portion	43,309	40,151
Deferred grant revenue	625,883	1,181,097
Capital lease obligations, current portion	—	9,330
Total Current Liabilities	1,070,581	1,624,090
Deferred Rent Liability	3,609	46,918
Fund Balance:		
Operating:		
Board-designated for endowment and financing	1,000,000	1,000,000
Undesignated	72,073	316,964
Endowment—Peruvian scholarships	106,848	107,085
	1,178,921	1,424,049
	$2,253,111	3,095,057

Activity Summary

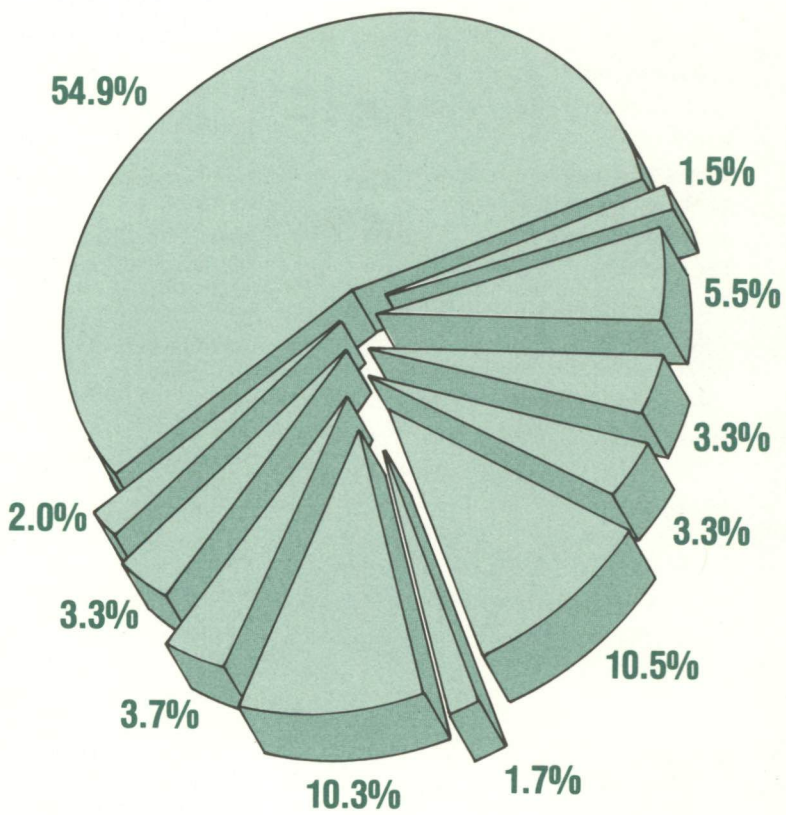
Income: $9,821,536

Foundation Grants	40.2%
Individual Gifts and Contributions	43.8%
Membership Dues	7.3%
Corporate Gifts and Contributions	4.3%
Other Gifts and Contributions	0.4%
Government Contracts	1.1%
Interest Income	2.2%
Other Income	0.7%
Total Income	100.0%



Expenses: $10,066,664

Programs:	
Country Programs	54.9%
Science	10.5%
Plant Conservation	3.7%
Species Conservation	3.3%
Communications	5.5%
Public Education	1.7%
Conservation Policy	2.0%
Member Services	1.5%
Total Programs	83.1%
Support:	
Management and General	10.3%
Development	3.3%
Membership Fundraising	3.3%
Total Support	16.9%
Total Expenses	100.0%



Directors Guide CI's Vision

Haroldo Castro

CI board members and staff, from left: Andrés Sada, Gordon Moore, Cristina Mittermeier, Noel Perry, Russell Mittermeier, and Vice President for Communications Patricia Kelly.

CI's Board of Directors forms our core strategists. These men and women have contributed their accomplishments and range of experience to guiding our programs, policies, and economic growth. In 1991, CI board members have concentrated their efforts on CI's organizational development, helping us to draw up the guidelines and criteria by which we evaluate the impact of our projects. They have also had a critical involvement in the committees that oversee our programs, and have directed a strategic planning process that will refine our objectives and scientific rationale.

This year, we are pleased to welcome five new board members:

Adam Albright, private venture capitalist with a strong commitment to conservation;

Lewis W. Coleman, Vice Chairman of Bank of America, who brings his vast expertise in international business and finance;

Nini de Berger, Special Advisor on the Environment to Guatemalan President Jorge Serrano and long-time Guatemalan conservationist;

Harrison Ford, actor, who will work with CI to bring the message of conservation to the public;

Lynda Rae Resnick, Vice Chairman of the Franklin Mint, who brings her experience in business and the arts.

Conservation International Board of Directors

Peter Seligmann, Chairman
Chairman and Chief Executive Officer, CI
Washington, D.C.

Dr. José Sarukhán K., Vice Chairman
Rector, National Autonomous University of Mexico (UNAM)
Mexico City, Mexico

Kenneth F. Siebel, Jr., Vice Chairman
President, Siebel Capital Management, Inc.
San Francisco, California

Charles Hedlund, Chair, Executive Committee
Founding Chairman of Conservation International
Chairman, Board of Trustees, American University in Cairo
Short Hills, New Jersey

F. Noel Perry, Chair, Nominating Committee
Private Investor
San Francisco, California

Skip Brittenham, Co-Chair, Development Committee
Senior Partner, Ziffren, Brittenham & Branca
Los Angeles, California

Alan J. Hirschfield, Co-Chair, Development Committee
Director, LIVE Entertainment and Motown Records
Jackson, Wyoming

Christine Jurzykowski, Chair, Program Committee
President, Fossil Rim Foundation
Glen Rose, Texas

Andrés Marcelo Sada, Chair, Communications Committee
CEO and Chairman, CYDSA, S.A.
Monterrey, Mexico

Alan N. Weeden, Chair, Finance and Investment Committee
Chairman, Q.V. Trading Systems, Inc.
President, The Frank Weeden Foundation
New York, New York

Adam Albright
Venture Capitalist
Williston, Vermont

R. Stanton Avery
Founder, Avery Dennison International
Pasadena, California

Michel Batisse
Senior Environmental Advisor, UNESCO
Paris, France

Yvon Chouinard
Founder and Chairman, Patagonia
Ventura, California

Lewis W. Coleman
Vice Chairman, Bank of America
San Francisco, California

Nini de Berger
Special Advisor to the President on the Environment
Guatemala City, Guatemala

Damaris D. W. Ethridge
Owner, Landmark Vineyards;
Partner, Grand Detour Associates
Palm Beach, Florida

Hon. Fabio Feldmann
Congressman, São Paulo
Brasilia, Brazil

Harrison Ford
Actor
Jackson, Wyoming

William T. Hutton
Partner, Howard, Rice, Nemerovski, Canady, Robertson & Falk
San Francisco, California

José Koechlin
Businessman and Philanthropist
Lima, Peru

Gordon E. Moore
Chairman, INTEL Corporation
Santa Clara, California

Paulo Nogueira-Neto
Private Agriculturalist and Educator
São Paulo, Brazil

Léon Rajaobelina
Economist
Antananarivo, Madagascar

Lynda Rae Resnick
Vice Chairman, Franklin Mint
Franklin Center, Pennsylvania

William D. Rogers
Partner, Arnold & Porter
Washington, D.C.

Hon. Rodolfo Silvo
Special Representative in Mexico of the Inter-American Development Bank
San José, Costa Rica

Francis X. Stankard
Chairman (retired), Chase Manhattan Overseas Banking Corp.
Middletown, New Jersey

Peter W. Stroh
CEO and Chairman, Stroh Brewing Company
Detroit, Michigan

Emeritus

Hon. Miguel Alemán Velásco
Senator, Veracruz
Mexico City, Mexico

Chairman's Council

Our Chairman's Council is a group of CI friends and supporters who provide advice and support in every aspect of CI operations. Led by John Young, President and CEO of Hewlett-Packard Company, these men and women have contributed their hard work and expertise to making CI an organization of stature in the conservation community.

Chairman
John Young

Henry Arnhold
Peter S. Bing
Allen Brown
Laurel Burch
Louis W. Cabot
Edwin C. Cohen
Susanna Colloredo-Mansfeld
Louise Davies
David L. Douglas
Peggy Dulany
Roy Eisenhart
Sophie Engelhard-Craighead
Melanie Griffith
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Donald Kennedy
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John B. Oakes
Gilman Ordway
Julie Packard
Kenneth R. Pelletier
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Peter H. Raven
Edward Rensi
Claude Rosenberg, Jr.
George F. Russell, Jr.
Charles Schwab
Kenneth M. Simon
Anne Stone
Claire Stone
Angie Theiriot
Hon. Paul Tsongas
Hon. Jack H. Vaughn
Jean Vollum

CI board member Damaris Ethridge.

Russell A. Mittermeier

Corporate Partnerships

Over the past year, the corporate community has supported CI's programs in many new ways. Some have participated in our conservation finance initiatives, directly supporting our in-country programs. Others have launched corporate sponsorship and brand promotional campaigns to increase public awareness about rain forest preservation. Still others have made a commitment to using nontimber rain forest products as a way of creating marketable alternatives to logging and other environmentally destructive practices.

CI's marketing department is working with corporations to develop new initiatives to leverage corporate promotional advertising and marketing dollars while at the same time, communicate to the public about the critical need for conservation.

McDonalds' "Happy Meals" Working with CI, McDonalds created a series of "Discover the Rain Forest" activity books for children that were given out with their "Happy Meals" last September. Through the national fast-food chain, 36 million children learned about the importance of preserving biodiversity. McDonalds and CI also developed an educational program on conservation distributed to over 2,000 teachers nationwide.

Natural Wonders, an environmental gift-store chain, has joined with CI in a special "Partners in Conservation" program. Through in-store displays, hang-tags and special products, Natural Wonders promotes conservation initiatives and CI memberships to its customers, and a portion of the proceeds of sales on select store merchandise is donated to CI.

Businesses can invest in CI's approach to conservation-based development as well, as demonstrated in the growing number of partnerships for Seed Ventures™ (see p. 11).

Patagonia, Smith & Hawken, and many others have made the Tagua Initiative™ possible through participation in licensing agreements for buttons. As more nontimber forest products become available, we will rely on the support of ecologically sensitive companies to help us pioneer new products.

—Lindsey Lambert
Director of Marketing

Bank of America: A new corporate ethic

In June 1991, Bank of America committed $3 million to CI's debt-for-nature program in Latin America. The first portion went to activities in Selva Lacandona, Mexico's last large rain forest.

Bank of America's environmental commitment runs through all levels of its organization. Its partnership with CI is part of a broad ethic of corporate responsibility. It includes new bank programs in source reduction, recycling, energy conservation, ride sharing, and consumer education.

Recently, Bank of America inaugurated an ambitious campaign to build awareness of the crisis in the tropics through the "Vanishing Rain Forest Program." In addition to offering four million customers a check series featuring rain forest habitats, species conservation, and indigenous peoples, the bank will designate a portion of the proceeds from the check purchases to CI. The bank is also designing a traveling exhibit to be displayed in bank branches as a way of promoting customer awareness and participation in critical conservation programs.

Special Thanks

Foundations

The Allequash Foundation
The Andreas Foundation
The Arcadia Foundation
Aspen Airport Business Center Foundation
J.M.R. Barker Foundation
The James F. Bell Foundation
Beneficia Foundation
The Sydney S. Byers Charitable Trust
Centennial Foundation
The Chatlos Foundation, Inc.
The Community Foundation of Greater Washington, Inc.
Compton Foundation, Inc.
Conanima Foundation
Herman Crown Grandchildren Trust
The Douroucouli Foundation
The Durfee Foundation
Echoing Green Foundation
The Charles Engelhard Foundation
The Ettinger Foundation, Inc.
Fair Play Foundation
Fair Share Foundation
Fanwood Foundation
Flintridge Foundation
Forest Foundation
Hellmut and Claudine Gerson Philanthropic Fund
Goldman Environmental Fund
Hajim Family Foundation
John Hay Charitable Trust
Clarence E. Heller Charitable Foundation
Homeland Foundation
The Horn Foundation
Emil F. and Muriel S. Hubka Foundation
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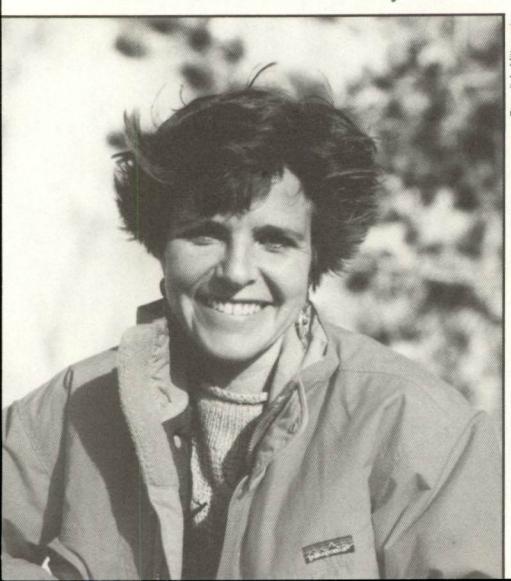

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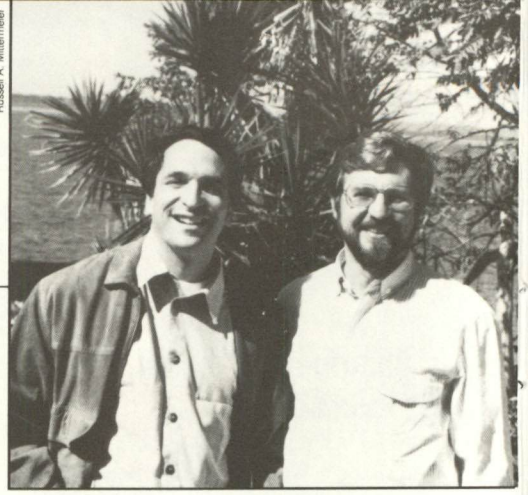

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Publications Director

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International Communications Projects Director

Laura Tangley
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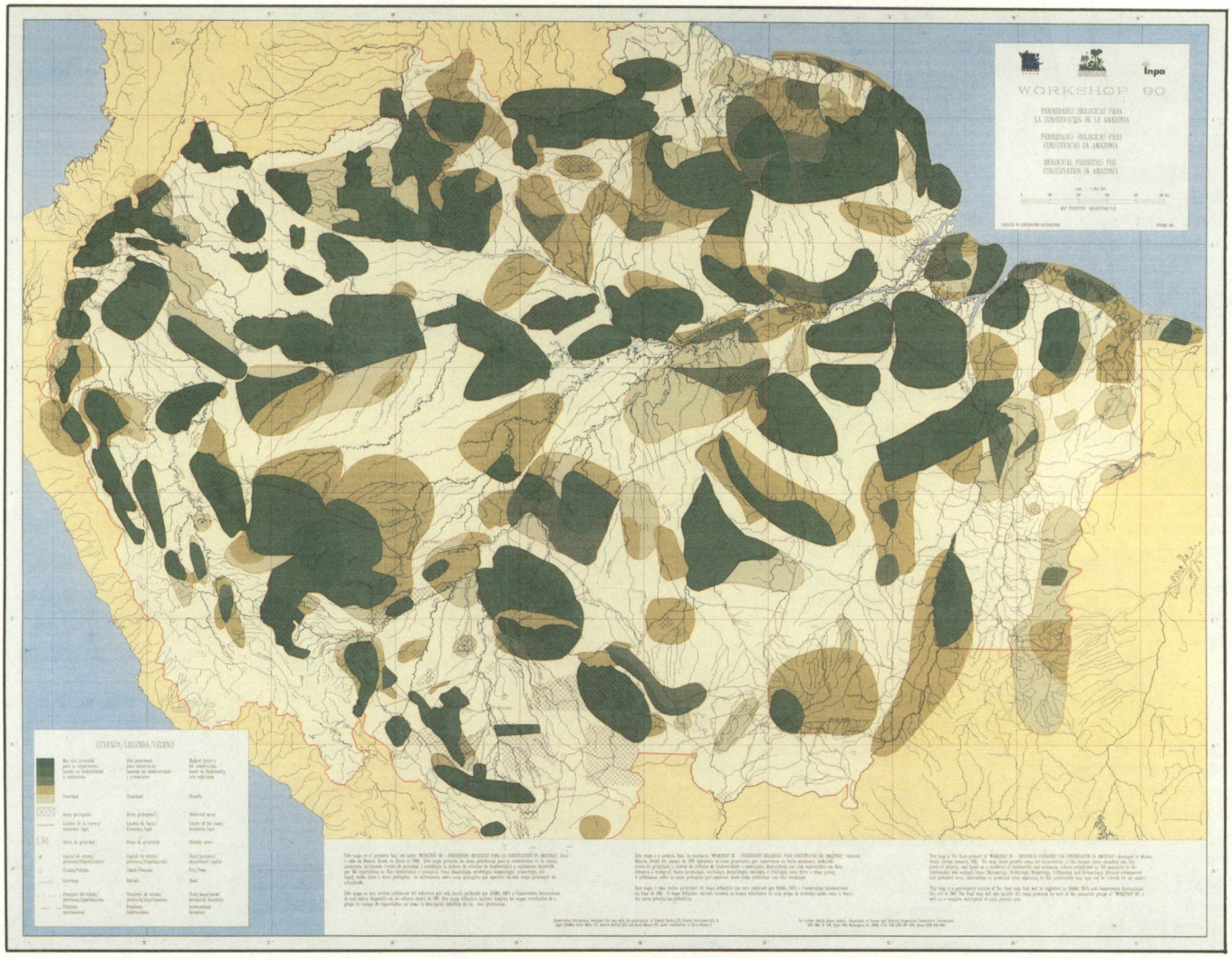

Released in 1991, this map is the final product of "Workshop 90—Biological Priorities for Conservation in Amazonia," held in Manaus, Brazil, during January 1990. Using maps produced by CI's Geographic Information System—CI/SIG—100 specialists in flora, fauna, physical environment, and protected areas classified priority areas for conservation in the Amazon Basin, based on a synthesis of biodiversity and endemism criteria. Available from CI for $14.95. Write to: Conservation International, Science and Technical Cooperation Department, 1015 18th St., N.W., Suite 1000, Washington, DC 20036.

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T0192

Membership—Practicing What We Preach

This year, CI disbanded its direct mail program for attracting new members. The only conservation organization to take this course, CI is examining a wide range of fundraising alternatives to develop a core of public support for our programs.

In the wake of CI's decision, our current membership has rallied to our support, indicating their approval of a choice we made to give up this environmentally destructive practice. We thank all our members for investing in our work. In the coming months, we will work hard to solidify this partnership and take advantage of the wide range of resources that our members have so generously offered us.

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TYPE: INFORMATION DOCUMENT NUMBER: 9200917
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FROM: SHORTREED, JOHN: INSTITUTE FOR RISK RESEARCH

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 03/13/92

SUBJECT: COPY OF THE CANADIAN STANDARD FOR RISK ANALYSIS AND MANAGING RISK IN THE PUBLIC INTEREST.

****

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INSTITUTE FOR RISK RESEARCH

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March 13, 1992

D. Allan Bromley
Science Advisor To The President
The White House
Washington DC

Dear Allan:

It was a pleasure meeting you at Queen's last month. I found your talk on global warming very stimulating. I promised to send a copy of the Canadian Standard for Risk Analysis (enclosed). It provides for common risk terminology for health, environment, power, chemicals, etc. It may assist you with your need to find a common basis for risk management. Niels Lind, one of our members, was the chair of the Standards Committee.

I also enclose a copy of Managing Risk in the Public Interest by Niels Lind and others. It proposes an approach to risk management which is consistent with the U.S. policy on global warming which you discussed in your talk.

If Niels or I can be of further service, please let us know.

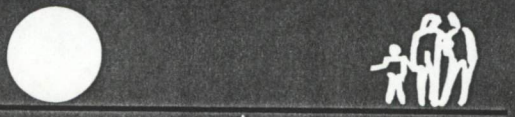
Yours truly,

John Shortreed
Director
Institute for Risk Research

JS/cm

cc: Dr. N. Lind

University of Waterloo, Waterloo, Ontario, Canada N2L 3G1 (519) 885-1211, ext. 3355; Telex 069-55259; Fax 519-888-6197



MANAGING RISKS IN THE PUBLIC INTEREST

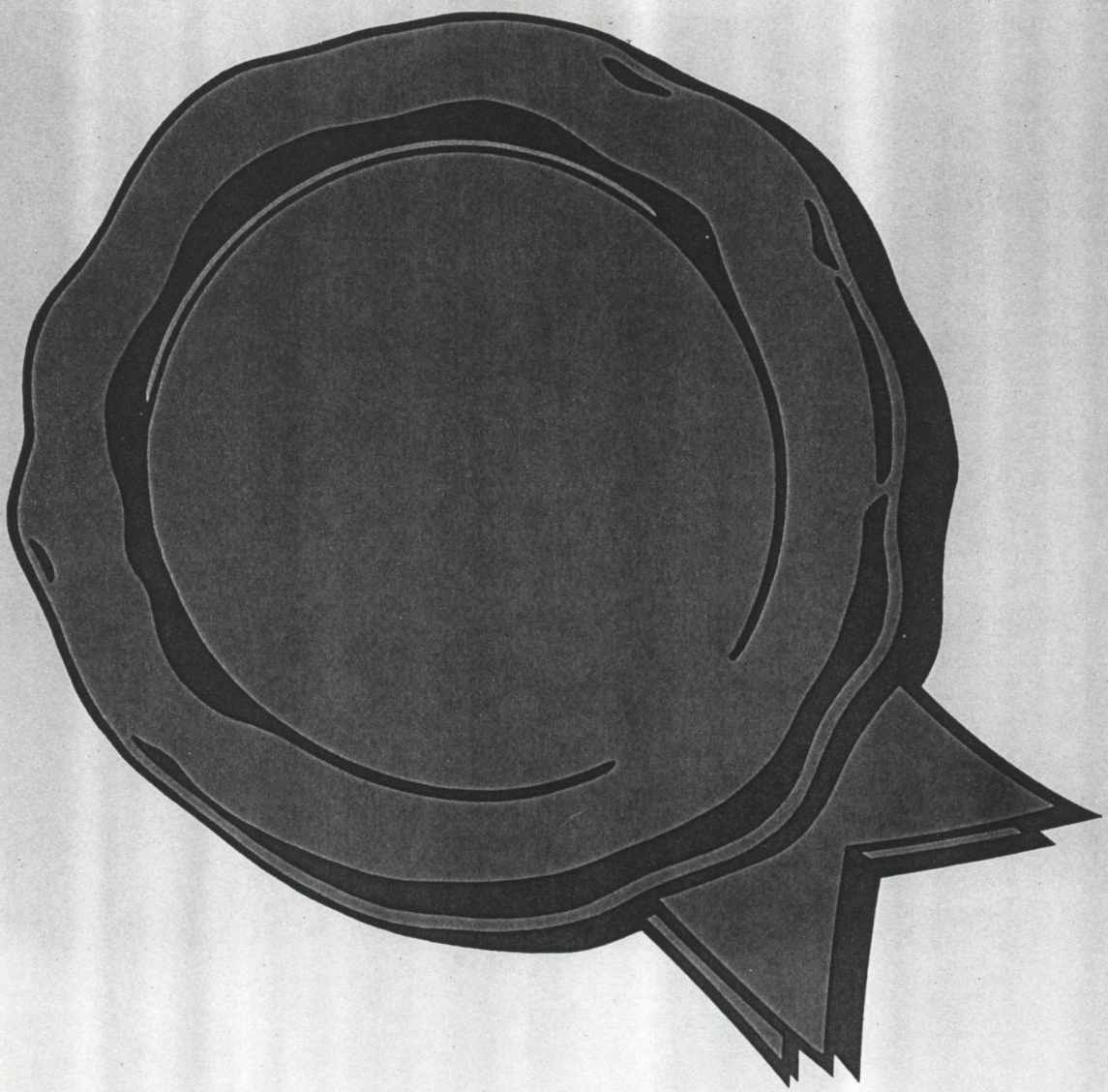
N.C. Lind, J.S. Nathwani, E. Siddall

irr
INSTITUTE FOR RISK RESEARCH

CAN/CSA-Q634-91
Risk Analysis Requirements and Guidelines

Quality Management

A National Standard of Canada



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FROM: MASSEY, Walter E.: NATIONAL SCIENCE FOUNDATION

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 03/09/92

SUBJECT: RE: A NEW PROGRAM ANNOUNCEMENT FROM NSF REGARDING A PARTNERSHIP BETWEEN CHEMISTRY, CHEMICAL ENGINEERING, AND INDUSTRY.

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NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

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March 9, 1992

The Honorable D. Allan Bromley
Assistant to the President
for Science and Technology
Room 358
Old Executive Office Building
Washington, D.C. 20506

Dear Allan:

I am enclosing 5 copies of a new NSF program announcement that will be of interest to you since it represents a partnership between chemistry, chemical engineering and industry. As a consequence of this partnership, the cover page not only reflects the NSF role, but also the Council for Chemical Research.

The environmental focus of this new activity is unique as the goal is to prevent pollution at its source. This work has enormous implications for the quality of our environment and it has the potential of very favorable economic payoff. In addition, the technology that will evolve from this research has the potential to develop new businesses that will be attractive world-wide.

Sincerely,

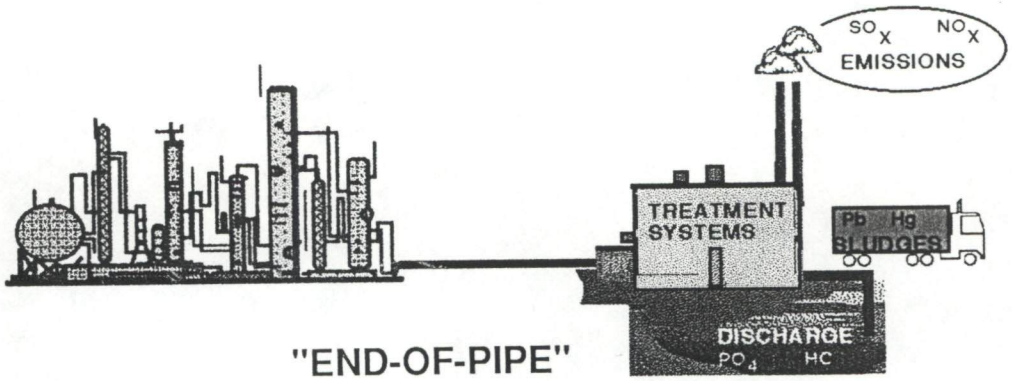
Walter E. Massey
Director

Enclosure

Environmentally Benign Chemical Synthesis and Processing

Research on Pollution Prevention at its Source

A University-Industry Cooperative Program



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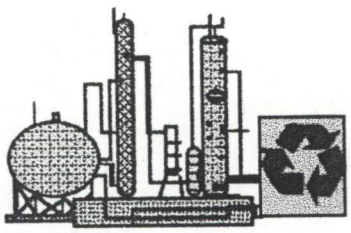

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ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

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FROM: TANNER, John E.

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 03/05/92

SUBJECT: RE: CARBON DIOXIDE EMISSIONS

****

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ACTION REQUIRED: STAFF ACTION:

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2175 Tasman Av.
Idaho Falls, ID 83404
March 5, 1992

Dr. D. Allan Bromley,
Presidential Science Advisor
% The White House
Washington, D.C. 20013

Dear Dr. Bromley:

I suggest you tell the US environmental leadership that holding the line on carbon dioxide emissions will be difficult, that flexibility and a multi-faceted approach will be needed, and that public cooperation will be required. For their part they can drop their opposition to nuclear energy.

Sincerely yours,

John E. Tanner, Jr.

Dr. John E. Tanner, Jr.

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TYPE: INFORMATION DOCUMENT NUMBER: 9200850
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

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FROM: LAWSON, RICHARD L.: NATIONAL COAL ASSOCIATION

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 03/05/92

SUBJECT: RESULTS OF A SURVEY OF U.S. ATMOSPHERIC SCIENTISTS CONCERNED THAT POLICY INITIATIVES DRIVEN BY "HIGHLY UNCERTAIN SCIENTIFIC THEORIES".

****

DIRECTORATE ASSIGNED: STAFF ASSIGNED:

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RICHARD L. LAWSON
President
(202) 463-2647

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March 5, 1992

Dr. D. Allan Bromley
Assistant to the President for
Science and Technology
Old Executive Office Building
Washington, D.C. 20506

Dear Dr. Bromley:

I thought you would be interested in seeing the results of this recent survey of U.S. atmospheric scientists who are concerned that policy initiatives being developed for the June UNCED meeting in Brazil are being driven by "highly uncertain scientific theories."

Conducted by the Science and Environmental Policy Project, the survey dispels the myth of scientific consensus on global warming. Nearly 50 U.S. atmospheric scientists responded, stating that catastrophic global warming predictions are unsupported by the scientific evidence, and are based on climate models that cannot be relied upon and are not validated by the existing climate record.

I think you'll agree this represents a most impressive list of credible scientists who believe a more cautious approach on global climate change is warranted. Their views would seem to validate the wisdom of the administration's current "no regrets" approach.

Sincerely,

Dick

Richard L. Lawson

Attachments

1130 Seventeenth Street, N.W.
Washington, D.C. 20036-4677

(202) 463-2625
FAX: (202) 463-6152

SCIENCE AND ENVIRONMENTAL POLICY PROJECT

NEWS RELEASE

FOR IMMEDIATE RELEASE

For More Information:
Candace C. Crandall
(703) 503-5064

SCIENTISTS SPEAK OUT AGAINST PROPOSED UNCED REGULATIONS

Climate Models Called Unreliable as Basis for Drastic Action, More Research Needed

WASHINGTON, D.C., FEBRUARY 27, 1992---In a strongly worded statement released today, more than 40 U.S. atmospheric scientists expressed concern that policy initiatives being developed for the June United Nations Conference on the Environment and Development (UNCED) in Brazil were being driven by "highly uncertain scientific theories."

"We are disturbed that activists, anxious to stop energy and economic growth, are pushing ahead with drastic policies without taking notice of recent changes in the underlying science," they said, adding that the rush to impose global regulations will have a negative impact on the world economy, on jobs, standards of living, and health care, with the most severe consequences falling upon developing countries and the poor.

Seeking to dispel the myth of scientific consensus on global warming, the scientists stated that catastrophic global warming predictions are unsupported by the scientific evidence, and are based on climate models that cannot be relied upon and are not validated by the existing climate record.

MORE...

Said Candace Crandall, editorial director for The Science & Environmental Policy Project, "It is important to note that unlike other surveys and declarations on global warming, which drew upon scientists from unrelated fields, such as biology or chemistry, all of these are trained atmospheric physicists and meteorologists."

Some 300 scientists, primarily members of the American Meteorological Society (AMS), were asked in January to endorse the statement, with the knowledge that the statement and their names would be made public, she said. There were 50 responses: 43 endorsed it, 3 disagreed with part of the statement and/or disagreed with the phrasing, and 3 endorsed it but were not included because their current research is in an unrelated field. Only one disagreed with the statement completely.

"It is remarkable--given the small sampling--that so many scientists were willing to take such an open and visible stand on this issue," said Crandall. What it indicates, she said, is that among U.S. atmospheric scientists, a group that includes roughly 11,000 members of the AMS, there are thousands who feel strongly that world governments, and particularly the U.S. government, are contemplating drastic actions on the global warming issue that are unwarranted at this stage of research.

The Science and Environmental Policy Project is an independent, foundation-funded research effort looking at how scientific data is used in developing U.S. environmental policy. Its director, atmospheric physicist S. Fred Singer, invented the currently used satellite instrument for measuring atmospheric ozone and was the first scientist to predict that population growth would lead to an increase in methane--an important greenhouse gas--in the stratosphere.

# # #

STATEMENT BY ATMOSPHERIC SCIENTISTS ON GREENHOUSE WARMING

WASHINGTON, D.C., FEBRUARY 27, 1992---As independent scientists, researching atmospheric and climate problems, we are concerned by the agenda for UNCED, the United Nations Conference on Environment and Development, being developed by environmental activist groups and certain political leaders. This so-called Earth Summit is scheduled to convene in Brazil in June 1992 and aims to impose a system of global environmental regulations, including onerous taxes on energy fuels, on the population of the United States and other industrialized nations.

Such policy initiatives derive from highly uncertain scientific theories. They are based on the unsupported assumption that catastrophic global warming follows from the burning of fossil fuels and requires immediate action. We do not agree.

A survey of U.S. atmospheric scientists, conducted in the summer of 1991, confirms that there is no consensus about the cause of the slight warming observed during the past century. A recently published research paper even suggests that sunspot variability, rather than a rise in greenhouse gases, is responsible for the global temperature increases and decreases recorded since about 1880.

Furthermore, the majority of scientific participants in the survey agreed that the theoretical climate models used to predict a future warming cannot be relied upon and are not validated by the existing climate record. Yet all predictions are based on such theoretical models.

Finally, agriculturalists generally agree that any increase in carbon dioxide levels from fossil fuel burning has beneficial effects on most crops and on world food supply.

We are disturbed that activists, anxious to stop energy and economic growth, are pushing ahead with drastic policies without taking notice of recent changes in the underlying science. We fear that the rush to impose global regulations will have catastrophic impacts on the world economy, on jobs, standards of living, and health care, with the most severe consequences falling upon developing countries and the poor.

David G. Aubrey, Ph.D., Senior Scientist, Woods Hole Oceanographic Institute

Nathaniel B. Guttman, Ph.D., Research Physical Scientist, National Climatic Data Center

Hugh W. Ellsaesser, Ph.D., Meteorologist, Lawrence Livermore National Laboratory

Richard Lindzen, Ph.D., Center for Meteorology and Physical Meteorology, M.I.T.

Robert C. Balling, Ph.D., Director, Laboratory of Climatology, Arizona State University

Patrick Michaels, Ph.D., Assoc. Professor of Environmental Sciences, University of Virginia

Roger Pielke, Ph.D., Professor of Atmospheric Science, Colorado State University

Michael Garstang, Ph.D., Professor of Meteorology, University of Virginia

Sherwood B. Idso, Ph.D., Research Physicist, U.S. Water Conservation Laboratory

Lev S. Gandin, Ph.D., Visiting Scientist, National Center for Atmospheric Research

John A. McGinley, Chief, Forecast Research Group, Forecast Systems Laboratory, NOAA

H. Jean Thiébaux, Ph.D., Research Scientist, National Meteorological Center, National Weather Service, NOAA

Kenneth V. Beard, Ph.D., Professor of Atmospheric Physics, University of Illinois

Paul W. Mielke, Jr., Ph.D., Professor, Dept. of Statistics, Colorado State University

Thomas Lockhart, Meteorologist, Meteorological Standards Institute

Peter F. Giddings, Meteorologist, Weather Service Director

Hazen A. Bedke, Meteorologist, Former Regional Director, National Weather Service

Gabriel T. Csanady, Ph.D., Eminent Professor, Old Dominion University

Roy Leep, Executive Weather Director, Gillett Weather Data Services

Terrance J. Clark, Meteorologist, U.S. Air Force

Neil L. Frank, Ph.D., Meteorologist

Bruce A. Boe, Ph.D., Director, North Dakota Atmospheric Resource Board

Andrew Detwiler, Ph.D., Assoc. Professor, Institute of Atmospheric Sciences, South Dakota School of Mines and Technology

Robert M. Cunningham, Consulting Meteorologist, Fellow, American Meteorological Society

Steven R. Hanna, Ph.D., Sigma Research Corporation

Elliot Abrams, Meteorologist, Senior Vice President, AccuWeather, Inc.

William E. Reifsnyder, Ph.D., Consulting Meteorologist, Professor Emeritus, Forest Meteorology, Yale University

David W. Reynolds, Research Meteorologist

Jerry A. Williams, Meteorologist, President, Oceanroutes, Inc.

Lee W. Eddington, Meteorologist, Geophysics Division, Pacific Missile Test Center

Werner A. Baum, Ph.D., former Dean, College of Arts & Sciences, Florida State University

David P. Rogers, Ph.D., Assoc. Professor of Research Oceanography, Scripps Institution of Oceanography

Brian Fredler, Ph.D., Asst. Professor of Meteorology, School of Meteorology, University of Oklahoma

Melvin Shapiro, Wave Propagation Laboratory, NOAA

Joseph Zabransky, Jr., Associate Professor of Meteorology, Plymouth State College

James A. Moore, Project Manager, Research Applications Program, National Center for Atmospheric Research

Daniel J. McNaughton, ENSR Consulting and Engineering

Robert E. Zabrecky, Chief Meteorologist

William M. Porch, Ph.D., Atmospheric Physicist, Los Alamos National Laboratory

Earle R. Williams, Ph.D, Associate Professor of Meteorology, Dept. of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology

S. Fred Singer, Ph.D., Atmospheric Physicist, University of Virginia, Director, Science & Environmental Policy Project

Robert D. Elliott, Meteorologist, Fellow, American Meteorological Society

Brian Sussman, Meteorologist

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ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

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FROM: MOFFAT, Lorna: CONCERNED CITIZENS FOR ENVIRONMENTAL HEALTH

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 02/08/92

SUBJECT: SHE IS WRITING TO OFFER SOLUTIONS TO THE PROBLEM OF OZONE DEPLETION DUE TO THE VENTING OF FREON BY AOUT CENTERS. SHE ALSO ASKS DR. BROMLEY TO URGE THE PRESIDENT TO ADDRESS THE ISSUE OF OZONE DEPLETION IN A SPECIAL ADDRESS TO THE NATION.

****

DIRECTORATE ASSIGNED: ENVIRONMENT

STAFF ASSIGNED:

ACTION REQUIRED: DIRECT REPLY

STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: 03/05/92

STAFF DUE DATE

DATE COMPLETED:

DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley

****

WHITE HOUSE TRACKING #:

CONTACT PERSON:

PHONE: EXT:

REMARKS:

OSTP RECEIVED: 02/20/92 DEPT RECEIVED:

FILE: P-ENVIRONMENT-OZONE LAYER

CENTRAL FILES:

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A

CONCERNED CITIZENS FOR ENVIRONMENTAL HEALTH

Lorna Moffat, Director
California 16th District
The Mailbox S-3064 Carmel, CA 93921
408/625-0905

RECEIVED
92 FEB 20 A9:27
OSTP
MAIL ROOM

Dr D. Bromley
Assistant to the President
for Science and Technology
Old Executive office building, Washinton D.C.

Dear DR. Bromley,

Febuary 8th,91

There is an easy solution to get auto repair shops that are allowed to vent their freon because they serviced less than one hundred automobiles in 1990 to comply without breaking them financially. Require them to use plastic bags such as Whirlpool has developed for recapturing freon from domestic refrigerators. The bags cost around a dollar each, can be used three or four times and are very strong.

The South Coast Air Quality Management District in Los Angeles estimates that twenty percent of recapturable freon is lost through existing regulations that exempt auto repair shops from recapturing their freon because they didn't service more than one hundred automobiles in 1990. When you consider what is being released nation wide it adds up. We are now facing a world wide emergency situation and I hope you will try and convince the President that everything must be done to stop all freon from escape. Requiring auto repair shops to recover their freon that are now exempt through this plastic bag technology is an inexpensive way out for them. Frankly , I would hope these shops not be allowed to service any auto air conditioners unless they had full recovery equipment but you may feel

CONCERNED CITIZENS FOR ENVIRONMENTAL HEALTH

Lorna Moffat, Director
California 16th District
The Mailbox S-3064 Carmel, CA 93921
408/625-0905

differently. This could also apply to domestic refrigerators repair shops.

We have also found a way to aid the five part time inspectors at EPA who are suppose to watchdog the entire nation once the rules are out. Since it is impossible for those five inspectors to inspect all the repair shops the president could suggest that county health inspectors get involved with this issue on a local level. For instance, we are now working with our local inspectors that are required by law to go to these automotive repair shops and make sure they are recycling their waste oil. We are asking them to add three words to their vocabulary at no or little extra cost; 'And your freon.' This greatly helps EPA to keep tabs on who is complying because the local inspectors tip them off. The counties get a bounty fee for the tip off and these places realize that they are being watched. With the plastic bag technology, we are asking that a local drop-off place be designated for the freon to be picked up by our local Waste Management District who then takes it to their site and recycle it in their recovery machine. These auto repair shops can also devise an inexpensive pump that puts the freom into storage cylinders leased from chemical

CONCERNED CITIZENS FOR ENVIRONMENTAL HEALTH

Lorna Moffat, Director
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408/625-0905

companies. Our own regulation, soon to come into being, may require a fifty dollar fine to those shops not complying and the money then going to them having to buy these plastic bags.

I hope you will urge the President to address ozone depletion in a special address to the nation. It is then he could help people understand the urgency of the situation we all face. The enclosed letters are from people in our area writting their congressman on this issue. Many people think ozone depletion is not a serious life threatening problem because the government doesn't treat it as one. This premise must be turned around. All life is threatened if we don't do something fast and soon and you, Dr Bromley are the key that can help save us all through your direct influence and action.

I enclose some information for you although I am sure your are already aware of it all. I hope these suggestions can be of some use to you and I look forward to any imput you may have.

CONCERNED CITIZENS FOR ENVIRONMENTAL HEALTH

Lorna Moffat, Director
California 16th District
The Mailbox S-3064 Carmel, CA 93921
408/625-0905

I wish to mention, as an aftertnought, that our local Air Resourses Board does not feel EPA will be able to sucessfully regulate their rules even if local inspectors were to aid with tip offs . The reason being that they cannot envisen EPA inspectors reacting immediatly to every call across the nation with only five or ten EPA inspectors. What needs to happen and cannot nappen, according to Lena Nirk of the Ozone Protection branch of EPA is that somehow local ARBs can be givem the power to enforce Federal regulations.

One thing is clear,money needs to be given to EPA for ozone protection above all else for I ask you what will we do when we cannot grow crops for food? What will we do when our immune systems can no longer fight off diseases? Our very existence hinges on what we do now to save our ozone shield.

Thankyou,

Sincerely,

Lorna Moffat

Recycled paper

AS THE OZONE THINS, THE PLOT THICKENS

Francesca Lyman

For all but the people of Australia, New Zealand, southern Chile, and other places at the bottom of the globe, the "hole" in the earth's ozone layer over Antarctica has seemed reassuringly far away. Since the alarming phenomenon came to light in 1985, the world has watched the scientific missions come and go, exploring uncharted territory at the coldest, furthest edge of the earth. High-flying spy planes have rocketed to maximum heights to take readings of ozone and other chemicals in the stratosphere; cargo planes have touched down on runways of ice for ground-level research; and robotic eyes aboard National Aeronautics and Space Administration (NASA) satellites have kept vigil on "the hole in the sky." Yet these probes of our own planet's vital signs have seemed more abstract than the moon landings.

Every year brings fresh evidence that the ozone layer, the earth's protective shield against ultraviolet rays, is eroding. In 1986, Canadian scientists detected another bald spot, a thinning of ozone over the Arctic region. In 1988, NASA reported that the ozone layer over the entire globe was eroding much faster than predicted. And this year, with little media fanfare, NASA scientists released new findings that ozone depletion over the northern hemisphere's mid-latitudes was twice and even possibly three times as great during late winter and springtime as scientists had believed a few years ago. In July, British scientists reported that the ozone layer over Europe—a swath stretching from northern Britain to south Spain—had been depleted 8 percent during the last decade, a rate twice that of the previous decade.

Environmental Protection Agency Administrator William Reilly called NASA's latest findings "shocking and disturbing." He predicted they would result in dramatically higher skin cancer rates for humans and other as-yet-unkown damage to plants, animals, and ecological systems. Senator Albert Gore (D-Tennessee) said, "The problem is not just over Antarctica, and not just in the winter. It's over our heads, here, now."

This year's surprises, scientists worry, may signal that the chemistry responsible for severe depletion at the poles (as much as 100 percent at

Kirk Kinne/National Science Foundation

Dorin Toohey

At the South Pole, chemist Susan Solomon, who led the first mission to probe the ozone hole in 1986, alights from a helicopter. Harvard University's James Anderson (left) will head a mission this fall to study the northern hemisphere's ozone losses.

certain times and altitudes) is spreading or that some unknown factor has come into play. One new development has been compared in magnitude to the discovery of the ozone hole: scientists found that tiny sulfate particles at the densely populated mid-latitudes may be creating a stratospheric chemistry similar to that formed by ice crystals in stratospheric clouds of the Antarctic and, to a lesser extent, in the Arctic.

"It's now quite clear that these dust particles [in the temperate and tropic regions] do affect the stratospheric chemistry and contribute to ozone depletion. The real question is how much," says Susan Solomon, an atmospheric chemist with the National Center for Atmospheric Research in Boulder, Colorado. Solomon led the first expedition to investigate the Antarctic ozone hole in 1986, and it was she who originated the hypothesis that the ozone-hole mystery was a case partly of cold temperatures and partly cloud chemistry: Antarctica was cold enough for clouds to form in its stratosphere, and these cloud surfaces catalyze the chemical reactions.

Why ozone depletion is occurring faster than scientists believed possible is still a puzzle. But if the crime is still unfolding, the culprits have long been known. They are a group of compounds called chlorofluorocarbons used in a host of common products from refrigerators to foam mattresses. Once hailed as "miracle chemicals," they are now the target of a worldwide ban. A landmark international agreement, the Montreal Protocol on Substances that Deplete the Ozone Layer, which originally required only a 50 percent cut in CFCs by the year 1998, was strengthened at a meeting in London in June 1990. At present, the protocol calls for a total ban on CFCs and halons (another, more potent ozone-depleting compound used primarily in fire extinguishing), and a ban on two chemicals used as cleaning solvents: carbon tetrachloride by the year 2000 and methyl chloroform by 2005. The agreement also calls for a program to help Third World countries phase out their use of CFCs.

"The problem is not just over Antarctica . . . It's over our heads, here, now."

Even these stronger measures now appear to many as too little, too late. The new NASA data has upped the ante for a speeded up phase-out of CFCS, while sending a strong message to the industry to speed its search for substitutes. At an international meeting held in Nairobi, Kenya, in mid-June, delegates set the stage for another round of strengthened amendments. Observers say that negotiators are likely to move up the ban of CFCs from 2000 to 1997. EPA is considering speeding up its regulations, too.

As fast as industry now moves away from these chemicals, environmentalists insist it has to be faster. "Every time the ratchet has been tightened, industry has found new places they can cut their use of CFCs," said David Doniger, a senior attorney at NRDC, who has worked on the issue for the last seven years.

To spur a faster CFC phaseout, some countries have introduced their own more stringent domestic laws. Germany, for example, has passed a law that will ban CFC production by the year 1995. Australia, Sweden, and Norway are banning halons as of 1995. Canada will cease CFC production in 1997 and phase out use of methyl chloroform by 2000. And in the United States, nearly two dozen states have laws limiting or banning CFC-bearing products.

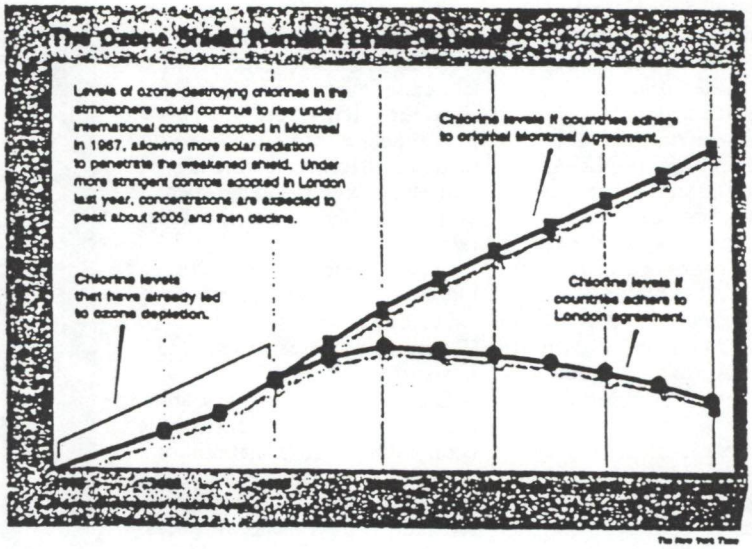
Meanwhile, with several provisions regulating CFCs coming into effect under the Clean Air Act in 1992, consumers can use their purchasing power to spur the recycling of CFCs (see "CFCs: Just Say No," page 29) and put pressure on manufacturers to develop truly ozone-safe products.

A deep blue, acrid-smelling poisonous gas, ozone is toxic when found in the smog around us. But in its rightful place—a distance of eighteen to thirty miles above the earth—ozone is vital to the planet's health, protecting the DNA of all living things from dangerous ultraviolet rays. Considering that scientists link the origin of ozone in the stratosphere with the birth of life on earth, it is hard to imagine a more catastrophic risk than ozone depletion. Little wonder that EPA today regards it as one of the highest-risk environmental problems.

As far back as 1974, scientists Sherwood Rowland and Mario Molina, of the University of California at Irvine, theorized that CFCs, whose uses were soaring at the time, could—because of their stable chemistry—waft up undisturbed to the stratosphere, where ultraviolet light could release their constituent element, chlorine, which could then destroy ozone. They soon realized that not just one ozone molecule was destroyed by each chlorine atom released, but a chain rea left chlorine to wander off to destroy 100, or more ozone molecules.

Environmentalists considered the threat o ozone depletion so great that they made banning CFC use in aerosol spray cans one of their biggest causes during the 1970s, as Lydia Dotto and Harold Schiff wrote in their memoir of the controversy, *The Ozone Wars*. EPA began regulating CFCs before they were firmly pinpointed as a major cause of ozone depletion and officially outlawed "non-essential" uses of CFCs in spray cans in 1978. By then the markets for these products had all but disappeared anyway, thanks largely to consumer boycotts. Like companies now trying to catch the green consumer wave, "Arrid Extra Dry came out with a new product that said 'safe for the ozone' right on the can" in the late seventies, according to Dotto and Schiff.

EPA's ban of "non-essential" CFCs (90 percent of aerosol sprays) left for future regulation other sources of CFCs in refrigerants, air conditioners, coolants. Not until ten years later did EPA get around to regulating the chemicals, dragging its feet because of a combination of politics, bureaucratic oversights, and intense lobbying by industry, say people working on the issue. With hindsight, it is easy to say that a lot of time was lost debating the scientific facts. The government followup plans on CFCs gradually disappeared, laments scientist Sherwood Rowland, "and so did further research on substitutes. We lost eight years!"



During the early 1980s, the incoming Reagan administration took the stance that ozone depletion was yet another case of environmental alarmism; then-EPA administrator Anne Gorsuch Burford, in her book *Are You Tough Enough?*, wrote, "Remember a few years back when the big news was fluorocarbons that supposedly threatened the ozone layer?" Concern died down, too, because worldwide demand for CFCs dropped, because of the U.S. spray can ban, followed by bans in Canada and Sweden, and because of a global economic recession. A 1983 National Academy of Science study tended to downplay the threat of CFC emissions, and EPA nearly halted work on the issue.

Industry, in the meantime, stopped research on CFC substitutes. A newly formed industry group, Alliance for a Responsible CFC Policy, campaigned in the early 1980s against a draft proposal to place a cap on CFC emissions. Quietly, world CFC production started to rise again, and was diverted to new markets—coolants, foamers, and cleaning solvents for electronic components. Between 1978 and 1986 CFC emissions grew at a rate of about 5 to 7 percent a year worldwide.

Fortunately, when Burford left EPA in 1983, high EPA officials began listening to a few staffers who questioned the low-depletion forecasts, according to NRDC's Doniger. They also recognized that CFCs were not simply ozone-depleters but also potent contributors to global warming, as every CFC molecule is

The Ultraviolet Zone

A biological experiment on a grand scale, started when the first ozone-depleting chlorofluorocarbons (CFCs) were produced in the 1930s, is now unfolding. These chemicals are being phased out, but for the next thirty to fifty years, the earth's surface will be exposed to mounting levels of ultraviolet radiation.

The ozone layer filters out solar rays on the high-energy end of the ultraviolet spectrum, called ultraviolet-B (UVB). Since UVB damages DNA, the protein code every living cell holds, the biological effects of UVB are wide-reaching. Crops, trees, human and animal immune systems, as well as the microscopic phytoplankton at the base of the food chain, are all vulnerable. Without the protective ozone veil, UVB would scrub the earth clean of life.

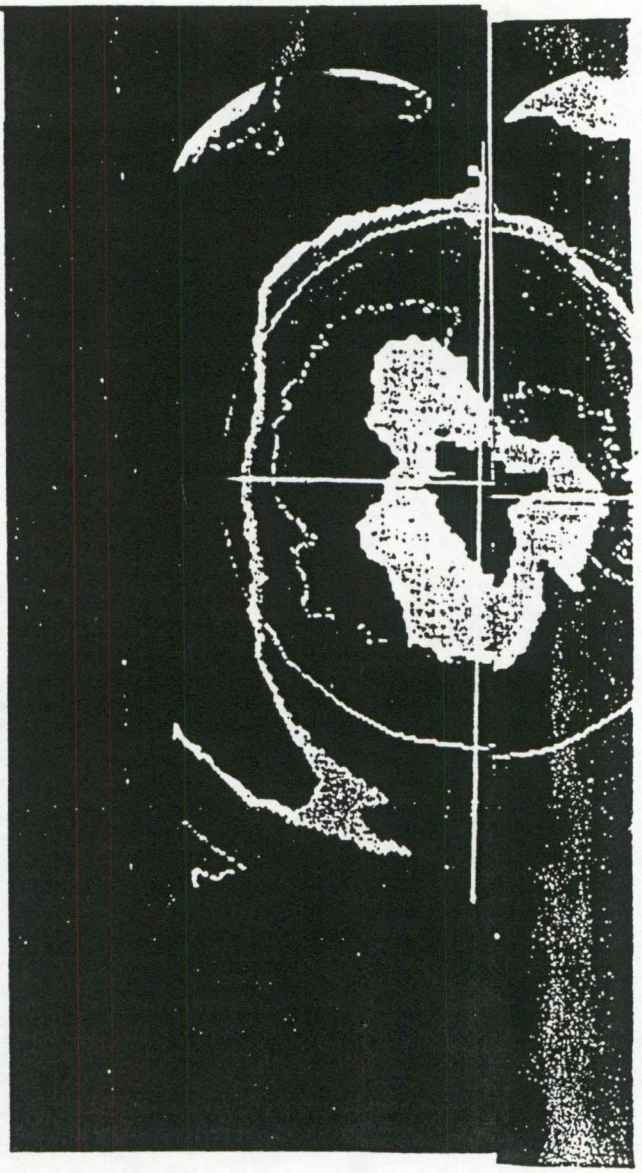
The recent findings by NASA that ozone depletion is more than twice what had been expected a year ago has scientists worried. A 5 percent loss of ozone, detected over the southern United States this spring could increase UVB by 10 percent. Depletion is no longer focused at the polar extremes but has moved over heavily populated regions.

The numbers of human skin cancers—the biological injury scientists understand best—will leap as a result, to 12 million in the United States alone according to William Reilly, administrator of the Environmental Protection Agency. U.S. skin cancer deaths over the next fifty years will increase twenty-fold, to 200,000, from the 9,300 EPA predicted in 1988.

Worldwide, higher doses of UVB are likely to have much more widespread effects on plants, animals, and ecosystems, but these impacts are the least understood. Biological researchers are now trying to answer a host of questions about ultraviolet radiation: What regions of the world will be most affected? Might sea mammals be deprived of their diet and die out? How is radiation linked to tropical diseases such as malaria? How much more susceptible are children?

While some scientists predict catastrophe, others take a less alarmist stance. Henry Lee, who heads EPA's team researching ozone depletion's effects on marine life, puts himself somewhere in between. "I don't think [those effects] will be catastrophic, but a change in UV may have a minor effect on oceans, but those effects will be extremely widespread, because water covers 70 percent of the earth's surface," Lee says.

Except for the plants and animals inhabiting the dark reaches of the oceans where ultraviolet cannot penetrate, all life has had to adapt to natural levels of UVB. Ultraviolet radiation has even become necessary to sustain life, in some instances. Humans, for example, require UV to synthesize vitamin D.

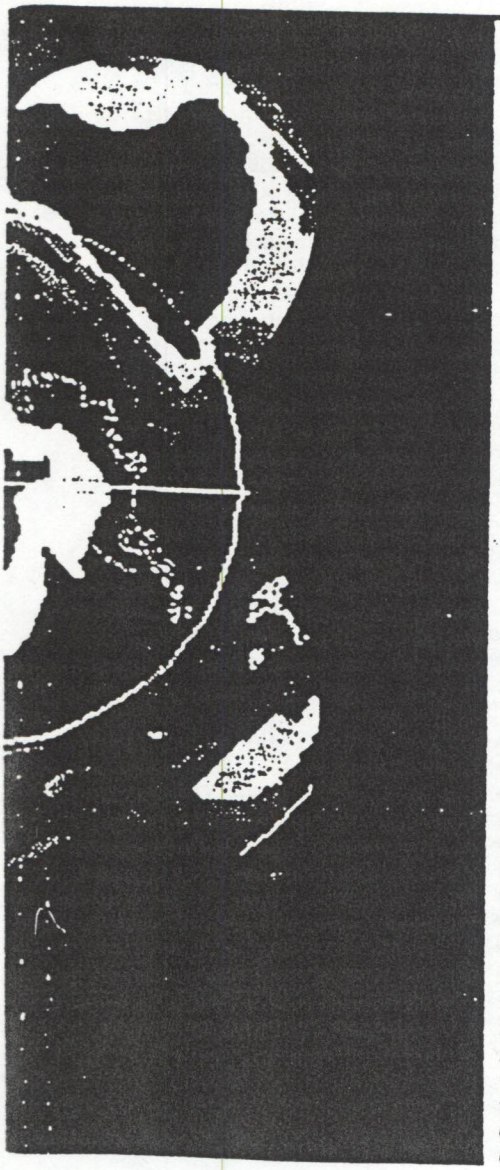


equivalent to at least 20,000 molecules of carbon dioxide. Pressed by a 1984 lawsuit by NRDC against EPA, the agency agreed in 1985 to start formulating CFC regulations under the Clean Air Act.

While policy was shifting, the real turning point in the story, of course, was the emergence of the ozone hole over Antarctica. This event jolted scientists from their typically cautious stance and eventually led to the 1987 Montreal Protocol. Yet, the largest producer of the chemicals, DuPont, waited until 1988 to announce that it would get out of the CFC business (and stop producing its big seller Freon), switch to safer substitutes, and support worldwide controls. Brad Allenby, a lawyer with AT&T, said, "DuPont's move earned credibility in the industry and a lot of companies realized the writing was on the wall."

Some observers attribute DuPont's move to fear of vast potential liability, because of the cancers caused by ozone depletion. Others point to genuine corporate concern. Whatever the reason, industry stopped fighting, fourteen years too late.

Within a few years, the tables had completely turned. As the Antarctic ozone hole expanded and NASA in 1988 reported "surprising" new erosion of the ozone layer, nations went back to the negotiating table. The Montreal Protocol, which called for a 50 percent reduction in the chemicals, also contained a



But for the most part, UVB is injurious to life. Human skin fends off UVB by thickening and producing melanin, the pigment that blocks UV. By absorbing or blocking UV, sunscreens perform the same role.

Certain animals and plants produce substances that act like sunscreens, according to Deneb Karentz, a researcher at the University of California studying the effects of UVB on Antarctic species. Eighty-six percent of fifty-seven marine species Karentz studied in Antarctica—including algae, sponges, sea anenomes, leeches, sea spiders, and krill—all produce such substances. Land animals cloaked in fur or feathers are also shielded. However, these adaptations may prove less effective as exposure to UV is intensified.

Among the members of a species, ability to handle UV varies widely; there is a 100-fold range among Antarctic plankton in susceptibility to UV, Karentz has found. As UV levels grow, populations will shift toward those best able to survive, she predicts. Whether or not these resistant species can satisfy appetites up the food chain is one of the big questions. Herbivores that are very selective about what they eat may find less appealing or less nutritious food. Such changes will trickle up to the upper levels of the food chain, says Karentz, but so far scientists do not have enough data to predict what those changes might be.

Human skin cancer has been the most studied impact of UV exposure. Skin cancer has three manifestations: basal and squamous cell carcinomas are for the most part disfiguring rather than fatal, and are linked to the amount of UV absorbed over a lifetime; melanoma is rarer and often fatal, and is believed to result from a bad sunburn early in life, according to Margaret Kripke, chairman of the department of immunology at M.D. Anderson Hospital and Tumor Institute in Texas.

In recent decades, skin cancer has become dramatically more prevalent in the United States and Europe because of the popularity of outdoor recreation and tanned skin. Under EPA's newly revised ozone data, both melanoma and non-melanoma skin cancers will rise even more dramatically.

Children are especially susceptible. By age eighteen, most people incur half of the damaging effects of sunlight that they will incur over the course of their lifetime. "Children born in the last ten years are most vulnerable," says Janice Longstreth, a risk assessment expert at Battelle Laboratories who is updating a report on the health effects of ozone depletion for the United Nations Environment Program (UNEP).

Ultraviolet radiation may induce

clause saying that the treaty could be strengthened if warranted. A total global phaseout, unthinkable only a few short years before, was agreed to in June 1990.

Before 1986, "few people could have conceived of a CFC-free world," Doniger told a group of industrialists gathered for the November 1990 International Conference on CFC and Halon Alternatives. "It was conventional wisdom that even a freeze on production would leave whole industrial sectors high and dry and impose ruinous costs on the American economy. . .Now virtually every firm that uses these chemicals knows how it will eliminate them. Many of you already have."

"Children born in the next ten years are most vulnerable to the increased ultraviolet radiation."

As fast as industry developed new CFC markets in the 1980s, it is disinvesting in them in the 1990s. That is no small task, considering the indispensability with which these chemicals had been regarded and industry's resistance to change. EPA estimates that the CFC phase-out will cost the American economy $3 billion over the next decade.

AT&T's Allenby, who now heads an indus-

skin cancer by lessening the skin's ability to fight off invasive organisms—including the body's own cells made malignant by exposure to UVB, says Kripke. UV exposure has also been linked to herpes simplex, leprosy, tuberculosis, lupus, and other genetic and metabolic diseases; exposure to UVB may also make the skin more permeable to parasites carried by insects or that live in water, such as Lyme disease and malaria, Kripke says. UV may even shift the AIDS virus infecting skin cells from an inactive to active state, according to a 1988 report in the journal *Nature*. UV can also cause conjunctivitis, and later in life, cataracts and blindness.

Because the ozone shield will thin unevenly around the globe, some regions will be bathed in more radiation than others. Australia, the most populated land mass near Antarctica, had skin cancer levels that topped those worldwide before ozone depletion began. In the skies above the continent, ozone loss is 17 to 22 percent greater during the summer than at corresponding latitudes in the northern hemisphere. San Francisco and Melbourne, Australia are at about the same latitude north and south, yet the rates of melanoma are 33.8 percent higher for men, and 82.8 percent higher for women in Melbourne.

Because the nation's exposure is so severe, Australia has taken an aggressive stance in public education and public policy. Campaigns now encourage Australians to protect themselves from the sun's rays with sunscreens, hats, and clothing. Aussies have begun planting trees in schoolyards and have regimented outdoor programs for children around the time of day when they will get the least exposure, and the government has even mandated hats as part of the school uniform.

Countries that are not close to the poles may be jeopardized in other ways; increased radiation could endanger global food supplies. Fisheries may be damaged by even small increases in UVB, and fish provides more than half of the diet for many peoples.

Two-thirds of about 300 crops and other plants tested for their tolerance to UVB are also sensitive to it, according to a 1989 report by the UNEP. Among the most vulnerable were peas and beans, melons, mustard, and cabbage; also hurt were tomatoes, potatoes, sugar beets, and soy beans.

Forests appear to be vulnerable too, according to studies carried out by Alan Teramura, a researcher at the University of Maryland. About half of the conifers Teramura has studied were adversely affected by UVB. "Small changes [in UV] can accumulate and ultimately have catastrophic effects," Teramura told *New Scientist* magazine last fall.

UVB damages not only living things but polymers used in buildings, paints, packaging, and countless other substances, which it degrades and turns brittle. Increased radiation could cause damage running into the billions of dollars each year, according to UNEP.

Scientists are working toward a better understanding of the impacts of UV, yet they have scant data about the amount of radiation now hitting the earth. One reason, ironically, is that ground-level ozone pollution due to smog is obscuring information about ground-level UV. Ultraviolet is measured at meterologic stations at airports, which are mostly found in smog-blanketed cities, says Longstreth.

Studies of UVB could light the way as we try to adapt to its growing intensity, yet basic science research is losing funding. "EPA has decided that because we have a [CFC] protocol, we don't need to look at the health effects anymore—we've got a regulatory fix," said Longstreth. EPA's own program, too, is in jeopardy, said Bob Worrest, its director, as its already small budget hangs in the balance for 1992.

Former Secretary of the Interior Donald Hodel was ridiculed in 1987 for his suggestions that U.S. policy be based on "personal protection"—that we rely on hats, sunscreens, and sunglasses rather than a meaningful global accord to protect the ozone layer. Yet in Australia, hats have become public policy, as the reality of life under the ozone hole has hit home. How far away is that scenario for the rest of the world?

—*Beth Hanson*

try consortium called the Industry Cooperative for Ozone Layer Protection, says he initially faced an uphill battle. "We would go around and tell companies, 'You guys are going to have to get out of CFCs,' and they'd say to us, 'We don't have to worry. . ..All we use is Freon.' Well, we realized very quickly that we had an information gap here!"

During the last few years, the industry has stepped up its drive to avoid unnecessary releases of CFCs, cut easily replaced uses, and speed research into harder-to-find substitutes. "Business is doing a great job on this stuff," says John Hoffman, an official in EPA's climate change division. "Companies are cutting use of CFCs far in advance of compliance deadlines." Some signs of progress:

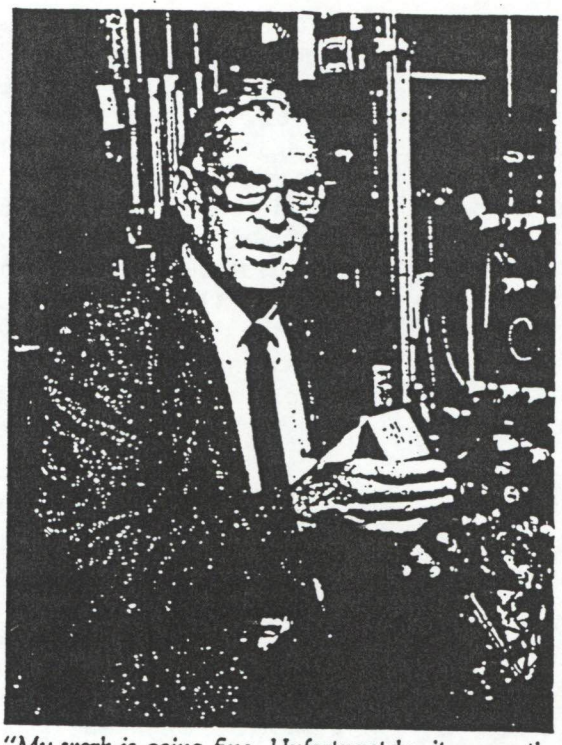
* By 1989, the food packaging industry had largely stopped using the worst ozone-depleters, CFC-11 and CFC-12, for blowing foam used in fast-food containers and moved to lesser depleters like HCFC-22 (which it must also abandon by 1994).

* Companies have reduced their use of halon in fire extinguishers by as much as 30 percent during the last few years.

* The electronics industry, which a few years ago complained it could not get away from CFC-based solvents for cleaning sensitive components, is rapidly switching to alternatives, and, in many cases, even using soapy water instead. Some have modified their circuit boards to avoid having to clean them to begin with—saving time and money to boot.

What has been harder than expected is finding good CFC substitutes in refrigeration and air-conditioning that can be used on existing equipment. In general, while the larger companies like Northern Telecom and AT&T have been moving quickly to phase out their use of CFCs, a vast number of smaller companies are less able to keep up, says Doniger.

By 2000, DuPont and other producers hope to supply nearly 40 percent of their markets with hydrofluorocarbons (HFCs) and hydrochlorofluorocarbons (HCFCs), according to a chemical industry trade journal *R&D*. But HFCs, which do not deplete the ozone layer (they are made with hydrogen instead of chlorine) still contribute to global warming. And HCFCs (made with hydrogen so they will degrade in the troposphere and slow their rendezvous with the stratosphere) still deplete ozone, although at a rate only 2 to 10 percent of the most powerful CFCs. While industry wants to get a go-ahead from government to commercialize these new technologies, EPA is reluctant to approve them except for a transitional period, and then, with strict limits on production and consumption.



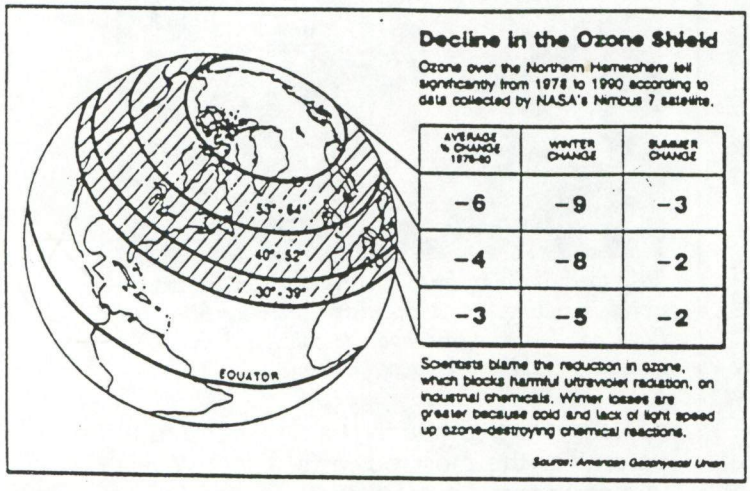
"My work is going fine. Unfortunately, it means the world is ending," said chemistry professor Sherwood Rowland. Fifteen years ago, he calculated that CFC molecules could wreak havoc on ozone.

Some of the non-CFC replacements have their downsides as well, such as toxicity or flammability. Ironically, says EPA's Stephen Anderson, a number of industries are going back to the future with compounds that date back to the 1920s or 1930s. It is quite possible, for example, that we might see refrigerators running on ammonia, the flammable substance that CFC-12 replaced. "People still think of ammonia as unsafe," says Anderson. "But if we'd known what we know now, we'd regard the chlorofluorocarbon as the most dangerous chemical ever invented!"

Industry has shown that it can move quickly when it wants to; the nations of the world have also shown that they can come together to bring the world back from the brink of global environmental catastrophe. But despite these signs of progress, it

is important to recognize how much damage we continue to inflict on the stratosphere. Yes, CFC producers are holding these compounds at or below 1986 levels. But more than 20 billion pounds of CFCs, about half as much as the total that has been manufactured since the 1930s, could be made before the phase-out is accomplished.

The challenge of ridding industry of CFCs illustrates poignantly that we cannot turn off the faucet so easily. Because of the slow pace at which manufacturers replace machinery, there is a tremendous lag time between regulation and results.



Then there is the pace of atmospheric chemistry. CFCs have lifetimes of up to thirty years per molecule. Because the chlorine (in CFCs) and bromine (in halons) that unravel the ozone layer participate in chemical chain reactions in which they can escape undamaged, they can continue breaking down hundreds of thousands of molecules of ozone before they themselves disintegrate. And each molecule of these compounds takes six to eight years to get to the stratosphere. Not counting the CFCs now escaping from car air conditioners and other products, there is an enormous bank of CFCs that have yet to leak out to the air—gas bubbles in old refrigerators, air conditioners, and even Styrofoam containers lying in landfills.

It would be nice to be able to "zap" these chemicals before they make their way up to the stratosphere, but there is no technology, as yet, for safely getting rid of CFCs on earth. For now, the focus is on recycling CFCs.

The world is not going to feel the full impact of ozone depletion until literally decades from now. Peak levels of ultraviolet radiation hitting earth will not occur until 2010 or 2020; scientists know very little at this point how severe those impacts will be. Atmospheric chemists say the ozone hole will not be closed until about a century from now, 2075. Not surprisingly, pioneers like Sherwood Rowland get little satisfaction from being vindicated in sounding the alarm on the perils of CFCs. When asked by his wife how his work on CFCs was going, Rowland answered, "My research is going fine. Unfortunately, it means the world is ending!"

Perhaps the most sobering aspect of the ozone issue is scientists' realizations that, with the discovery of ozone holes and the anomalous chemistry causing them, our models of how ozone depletion occurs in the atmosphere have been faulty at best. Beginning this fall, a team of scientists led by James Anderson, a Harvard University atmospheric chemist, will be launching a new expedition to determine more precisely why ozone is being lost over the mid-latitudes and to what extent this loss is connected to ozone thinning over the Arctic. "For eight months we will be looking at the continental United States and Canada," says Darin Toohey, an atmospheric chemist on the mission. "We don't have good models for projecting the rate of future ozone depletion. We need more data." Besides looking at ice crystals, they will be looking at the role of fine sulfate particles from natural and manmade sources found over our latitudes. Instead of Antarctica, the venue this time is Bangor, Maine, and Fairbanks, Alaska.

If policymakers had known fifteen years ago what we know now, they would have realized how foolish it was not to phase out all CFCs and to begin a speedy search for substitutes. Many, like Richard Benedick, U.S. state department negotiator on the Montreal Protocol, would argue that a strong hypothesis is a good enough argument for action: absolute proof is not needed when we are conducting an experiment on our own planet.

(continued on page 30)

CFCs: Just Say No

Most Americans are unwitting players in the sad saga of ozone depletion. From the carpet foam under our feet to the roof insulation over our heads, ozone depleters are all around us.

Air conditioners filled with CFCs and HCFCs cool 150 million homes; 75 percent of our food is kept in Freon-loaded refrigerators; more than 100 million leaking car air conditioners hurtle down U.S. roads, according to industry figures.

Thanks to the Montreal Protocol and the Clean Air Act, the worst of the ozone-depleting chemicals will be banned by the year 2000. In the meantime, there are numerous ways to cut or even eliminate your use of products that use or contain these compounds. Identifying them can be tricky, though; products containing the most damaging ozone depleters (CFCs, halons, carbon tetrachloride, or methyl chloroform) will not be labeled until May of 1993. Hydrochlorofluorocarbons (HCFCs), with 2 to 10 percent of the ozone-depleting power of these other chemicals, will not a require warning label until 2015. Still, there are general categories of products to beware of:

Car Air Conditioners are the single largest source of CFC pollution over which you have some control.

- When your car air conditioner breaks, find a shop that recycles CFCs. Under the 1990 Clean Air Act, all repair shops must recycle starting in January, 1992. Until then, have the work done *only* at a shop with "vampire" machines that suck the coolant out and recycle it.
- Better still, if you live in a cool part of the country, when your air conditioner breaks down, do not refill it—give it up; turned on or off, all car air conditioners leak, no matter how well-maintained. Again, if you live in a cool enough place, buy a car without air-conditioning (as many Vermonters are doing).

Home Air Conditioners. When yours needs repair, shop around for a service center that recycles the coolant. If none are available, try to hold out until July 1992. After that, it will be illegal to vent home air conditioner coolant into the air.

Refrigerators. If your refrigerator needs repair, shop around for a service center that recycles CFCs. They all must after July 1992. Many already do.

Ten things you can do to preserve the ozone layer

By January, 1995, refrigerators will have to be drained of coolant before being discarded. If you must replace your refrigerator before 1995, call the manufacturer and press the company to collect the coolant. If it will not, try local service shops. That service will become increasingly available. Whirlpool, as well as a growing number of companies, will collect and recycle coolant now, whether its unit is being repaired or replaced. Call 1-800-253-1301 for information.

Home Insulation. Foam building insulation is made with CFCs, which eventually leak. Consider using fiberglass, cellulose, or other materials. These often must be thicker to get the same insulation value. But if you have the space, you can use them without losing efficiency.

Fire Extinguishers. Do not buy halon fire extinguishers for ordinary home or auto use. Traditional fire extinguishers will do. If you have a halon extinguisher, wrap it and store it until a halon reclaiming program is developed.

Methyl Chloroform, or "Public Enemy 1,1,1" (1,1,1-trichloroethane), is used mainly in industrial processes but is also found in hundreds of consumer products, including bug sprays, fabric protectors, cleaners and spot removers. Avoid these.

Aerosols. Check the contents of aerosols such as photographers' dust removers, boat horns, and cleaning sprays for electronic equipment.

Foams. Flexible foams—used in such things as cushions, mattresses, seat pads, and stuffed animals—are made with CFCs. For new purchases switch to down or fiber.

Put the Pressure On. Government and industry officials read and respond to every letter they get. They know that each letter translates into hundreds of votes and consumers.

Urge President Bush to support the amendments to the ozone-protection treaty that will phase out production of CFCs and other first-generation ozone depleters by 1995. Tell him to support rapid elimination of all HCFCs and other second-generation depleters.

Write Your State and Local Leaders. Call their attention to local industries that are offenders. For more information, send for "Who's Who's of American Ozone Depleters," NRDC's state-by-state list of the nation's 3,014 factories that were the largest emitters of ozone-depleting chemicals in 1987 and 1988. The report remains useful today as a means of measuring how things have changed. Finally, send for NRDC's guide, "Saving the Ozone Layer," which lists more than 100 art supplies, automotive cleaners, and miscellaneous household products that contain CFCs, and gives detailed suggestions for consumer action.

—Penny Mintz

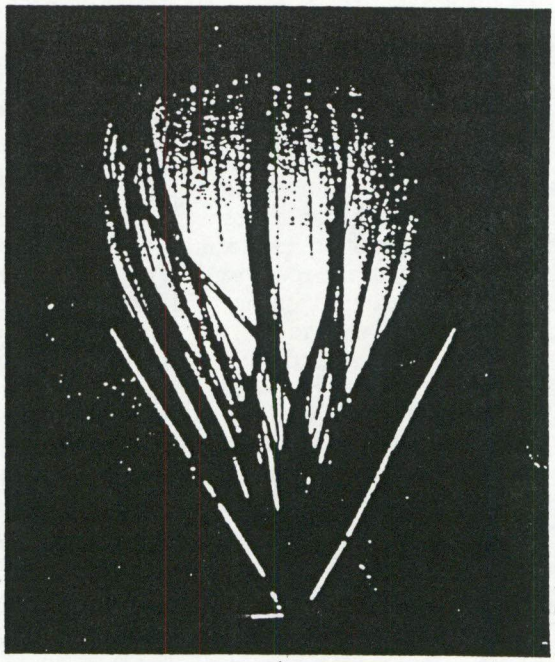
The lessons learned from the ozone story should not be lost: they should be applied to the global warming debate, as Michael Oppenheimer of the Environmental Defense Fund wrote recently in a *New York Times* op-ed piece. The perils of global warming, like those of ozone depletion, allow for little margin of error, since their impacts are far-reaching, multifaceted, and will last for many years to come. There is a virtual scientific consensus that global warming will occur; the questions that remain ask how much warming there will be and where. Just as DuPont and the CFC industry poured millions of dollars into debunking studies that sounded the alarm on ozone depleting chemicals, major manufacturers and energy users have mounted a similar campaign to debunk greenhouse effect theories and projections of global warming.

The ozone story has some happy twists, however. Karim Ahmed, a chemist who worked on the issue for NRDC in the 1970s, says, "We were lucky to have banned CFC-propelled aerosol spray cans back in the seventies." This act of prudence, he points out, took care of about 60 percent of the problem at the time. "With this we were able to buy a tremendous chunk of time," he adds. "So even though we lost time in the 1980s, can you imagine how much more draconian our measures would have had to be now?"

Energy conservation to reduce fossil fuels' carbon dioxide emissions could be the aerosol spray cans of the 1990s. Mandating energy efficiency, in everything from cars and appliances to huge industrial applications and building construction, has long been advocated by environmentalists as a way to contain pollution and gain time in the fight against global warming.

But that time is running out. By the time global warming can be measured, it will be too late to do much about it. We are already seeing 4 to 5 percent ozone depletion all over the globe, which models did not predict would happen until around 2025, when only a fraction of CFC production has been scaled back. Given errors in computer models, most scientists predict that percentage will rise.

The Bush administration has failed to act on global warming, arguing that more scientific study is needed, and has even suggested that by regulating CFCs (because of their role as greenhouse gases) we have already done enough without having to consider regulating carbon dioxide. Most other countries of the world disagree. Environmentalists argue that both problems have to be tackled simultaneously.


Darin Toohey

Sunrise on Easter Sunday, 1991, as a new balloon instrument takes its first readings in the stratosphere over New Mexico.

The more scientists probe, the more they find ozone depletion and global warming interconnected. Paradoxically, for example, global warming encourages ozone depletion, as greater concentrations of greenhouse gases tend to raise the earth's surface temperatures while decreasing the temperature of the stratosphere. At the same time, greater ozone depletion creates greater ultraviolet radiation, which spurs the formation of ground-level ozone, another greenhouse gas.

Some fear it will take a freak event in climate—a thermal version of the ozone hole—before policymakers act to prevent global warming. "The proof hasn't come to climate change scientists," says Harvard's Darin Toohey. "I wish we could do the same thing in terms of detective work on global warming, because by the time they determine the mechanism of warming, it may be too late."

It is a tragedy to simply watch the ozone layer slip away—and the earth heat up—while waiting for scientists who work so hard to unravel the atmosphere's mysteries. □

Francesca Lyman *is the editor of this journal.*

TEXAS A&M UNIVERSITY
COLLEGE OF GEOSCIENCES AND MARITIME STUDIES
DEPARTMENT OF OCEANOGRAPHY
College Station, Texas 77843-3146
Phone: (409) 845-2134
FAX: (409) 845-6331

November 25, 1991

Ms. Lorna Moffet
Director, Concerned Citizens
For Environmental Health
The Mailbox S-3064
Carmel, CA 93921

Dear Ms. Moffet:

Thank you for your letter of November 12 and enclosures.

I am greatly surprised, even dismayed, to learn that there are some scientists who still doubt, or even question, the fact that the ozone shield is protecting our health! The preponderance of evidences is too overwhelming for anyone to refute. The short article entitled "What if the Shield Erodes?" succinctly summarizes the frightening scenarios that would result as a consequence of the depletion of the ozone layer (see enclosed).

I also enclose two articles* on the subject; one was published in NATURAL HISTORY Magazine (October 1988), and the other was published in a Proceedings of a scientific meeting held in Hobart, Tasmania, Australia.

I enjoyed discussing the subject of the ozone depletion with you the other day. I warmly applaud you and the other Concerned Citizens for all your efforts in protecting the environment.

Keep up the good work!

Sincerely,

Sayed Z. El-Sayed
Professor

tlp

*My dutiful secretary beat me to it; he mailed them to you last week!

What if the shield erodes?

The sun bombards the earth with photons, light rays of varying wavelengths. The shorter the wavelength, the more damage the rays can inflict. Among the most dangerous are wavelengths of ultraviolet light (UV) measuring from 200 to about 315 nanometers (a nanometer is a billionth of a meter).

The ozone layer blocks all of the most damaging UV light, the band from 200 to 290 nanometers known as UV-C. Without that protection, life on earth could not survive. Fortunately, only a drastic reduction of the ozone shield would allow any UV-C to filter through. The ozone also screens out much of the UV between 290 and 315 nanometers, the band called UV-B. But enough gets through to cause, even now, millions of cases of skin cancer every year.

It's the UV-B that has scientists worried. For every 1 percent drop in ozone, there's a 2 percent increase in UV-B intensity at the earth's surface. Most plants and animals have evolved under relatively constant UV-B. Any prolonged increase could set in motion far-reaching—and unpredictable—ecological changes.

When UV-B radiation strikes a living thing, it is absorbed by the outer layers of cells. Microscopic plants and animals lack such protection. Single-celled plants at the bottom of the marine food chain are the base on which much of the world's population ultimately depends for protein. Those plants suffer a drastic drop in photosynthesis when exposed to UV-B at levels found under the Antarctic ozone hole.

Nor is the effect limited to single-celled plants. When exposed to increased UV-B in experiments, many crop plants react negatively. Peas, beans, squash, cabbage, and soybeans show reduced nutrient content, slower growth, and lower yields, as well as impaired photosynthesis. Plants vary in their response to UV-B, though. Some weeds, especially, seem to love it.

In humans, exposed body parts usually have some protection from UV-B. Pigmentation in the skin's surface layer stops UV rays before they reach lower layers. In the eye, the cornea and lens block UV from reaching the retina, the light-sensitive tissue that UV would damage.

But inborn defenses against UV go only so far. Some sun-induced damage still occurs:

Skin cancer. Exposure to UV-B is linked to all forms of skin cancer—basal-cell carcinoma, squamous-cell carcinoma, and malignant melanoma. The first two are quite common, and usually curable. But melanoma, which represents only 3 percent of all skin cancers, accounts for two-thirds of skin-cancer deaths. The EPA projects more than 60 million additional cases of skin cancer and about one million additional deaths among Americans alive today or born by the year 2075 if CFC usage continues to grow at its present rate.

Eye damage. Under extremely bright conditions, such as sunlight on snow, prolonged UV exposure can cause painful snowblindness, a temporary inflammation of the cornea. A rise in UV radiation may increase the frequency of such effects. Even more worrisome is the potential effect on the lens. Growing evidence suggests that chronic, lifetime exposure to UV contributes to certain types of cataracts—opaque regions in the lens that interfere with vision. The EPA projects some 17 million additional cases in the future caused by CFC damage to the ozone layer.

Some scientists believe that increased UV-B exposure might affect certain immune-system processes, but any danger is still speculative. No doubt exists, however, that UV causes sunburn and premature aging of the skin. A rise in UV will probably increase the incidence and seriousness of those conditions.

SANYO

News Release

SANYO North America Corporation
Corporate Communications Department
666 Fifth Avenue
New York, New York 10103
Telephone: 212-315-3232
FAX: 212-315-3263

For Immediate Release:

For Further Information Contact:
Perry Tamura/Nancy Brown
Corporate Communications
(212) 315-3232

New Fluorocarbon-Free Refrigeration System Developed

NEW YORK, March 22, 1990 -- Sanyo North America Corporation announced that Sanyo Electric has employed hydrogen absorbing alloy technology to achieve the industry's first 14° F conditions with a refrigerator driven by thermal energy, enabling the development of a new compressor-less refrigeration system free of fluorocarbon refrigerants.

This significant breakthrough was made technologically possible by 1) a hydrogen absorbing alloy series that is effective throughout a temperature range of 14° F to 482° F, 2) the development of a heat exchanger that quickly and efficiently converts the alloy's heat of reaction, 3) the industry's first vacuum insulation system that radically reduces heat loss, and 4) an exclusively developed high efficiency operation control method.

The most important development area to be considered is the home appliance market, where the wide diffusion of fluorocarbon-free heating and cooling devices can make a significant contribution to protecting the earth's ozone layer. This technological advance has opened the door to quieter operating conditions, by eliminating compressor noise, and pollution free refrigerating devices that do not depend on environmentally harmful fluoro-chemicals. The new system has also provided a new way of using 302° F to 320° F waste heat sources for more efficient and economical energy use.

The system can easily be adapted to: 1) cold storage facilities in food processing factories with abundant sources of exhaust heat, 2) refrigerators in places demanding minimum noise levels, such as hospital and hotel rooms, and 3) areas such as remote islands and mountain regions without electricity but having plentiful sunlight, geothermal energy and other natural energy sources.

Sanyo engineers have already been commissioned by NEDO (New Energy and Industrial Technology Development Organization) to develop a system capable of lowering refrigeration temperature to -4° F, a Class F category. 51 domestic and 3 international patents are now pending.

###

SANYO

SANYO North America Corporation
666 Fifth Avenue
New York, New York 10103
Telephone: 212-315-3232
FAX: 212-315-3263

Thank you for your interest in Sanyo's new refrigeration system. Enclosed are the news release and diagrams explaining the system.

For your reference:

There is no compressor unit in the refrigeration system. Heat is applied to the alloy to extract heat from the air.

Currently, the new system is still in the development stages. Sanyo has no plans to release the system into the market at this time, thus we cannot provide you with sales and marketing information.

However, we can tell you that this technology is potentially applicable to home usage. Such application would probably begin in areas short of power supply and areas requiring extreme quietness. Perhaps in three to four years commercialization will begin, when Sanyo achieves a refrigeration temperature below -20° C.

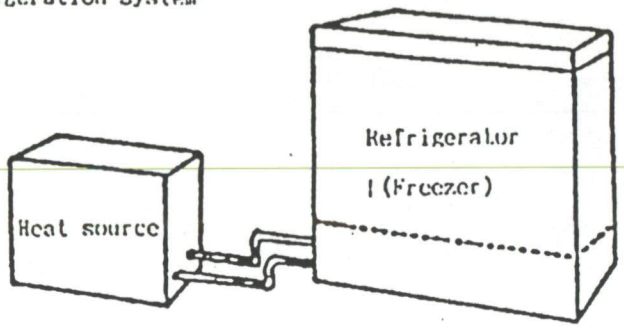
Sincerely,

Nancy Ann Brown

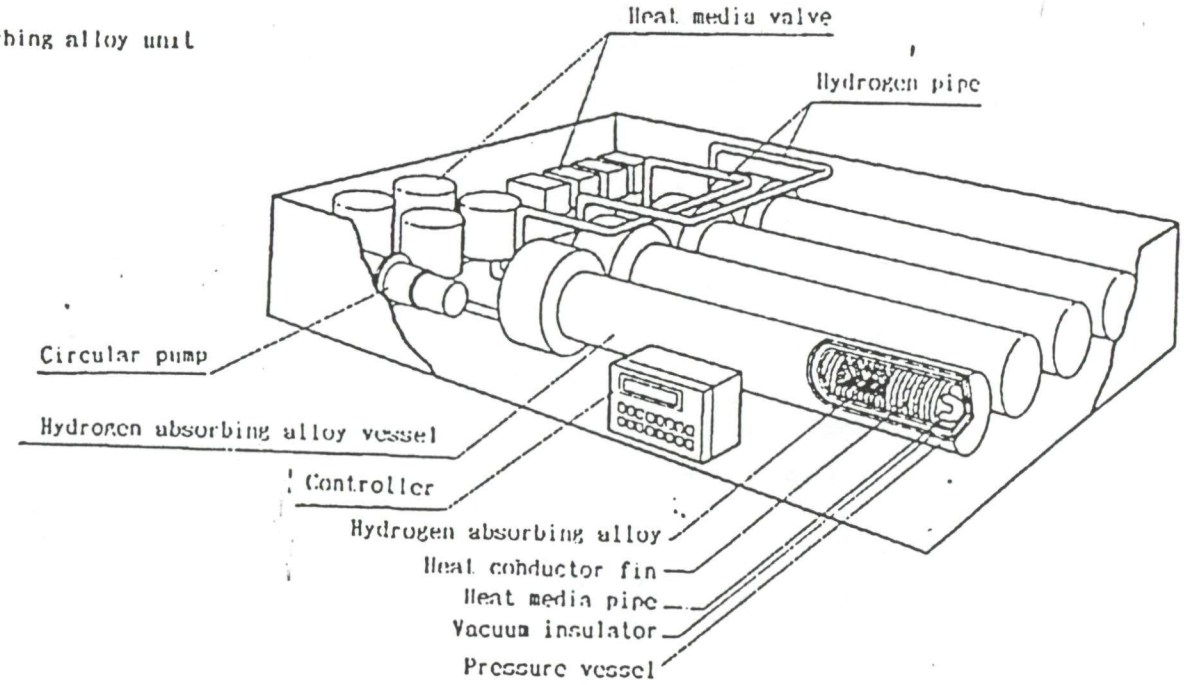
Nancy Ann Brown
Coordinator
Corporate Communications

Enclosures

Outline of the refrigeration system

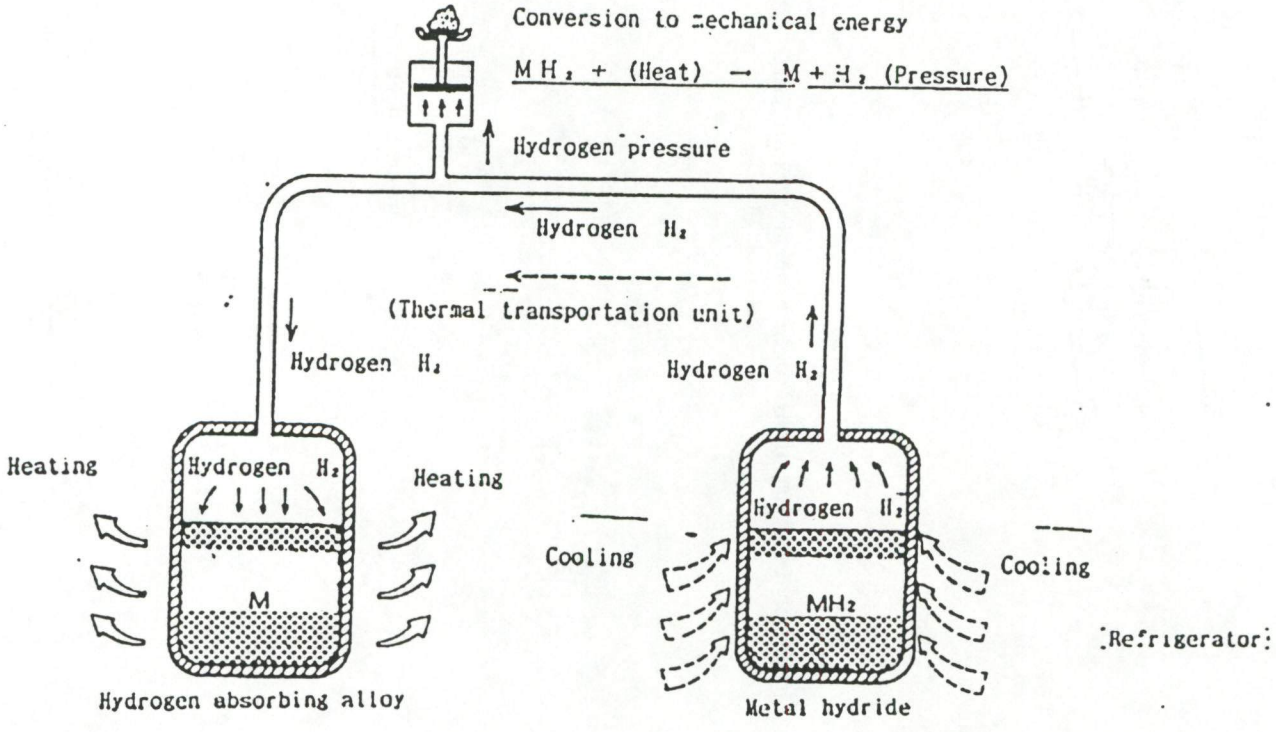


Inner construction of hydrogen absorbing alloy unit



Principle of energy conversion using hydrogen absorbing alloy

How the alloy actually functions go something like this. In the presence of hydrogen under pressure, the alloy begins to absorb hydrogen exothermically. When the pressure is lowered or heat added to the alloy, it will begin releasing hydrogen endothermically. It is this latter endothermic reaction that has been applied to the new refrigeration system.



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The Latest on the CFC "Freeze"

by Mike Soniat

Many service companies and technicians are concerned about the impact of the new CFC restrictions. *Appliance Tech Talk!* has received many letters and calls from readers asking some very good questions. Why are these restrictions necessary? When will they take effect? Should I recover or recycle? What substitute refrigerants are available? Who will enforce these new restrictions? I hope to answer all of your questions. First, here is a little background information.

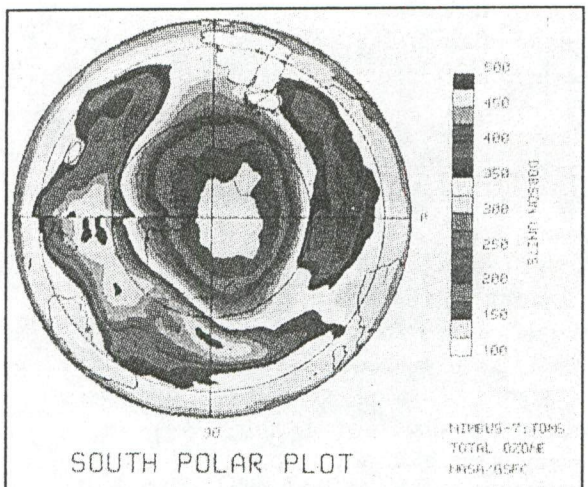
In 1987, NASA revealed evidence connecting chloroflourocarbons (CFCs) to the ozone layer depletion over Antarctica. This prompted twenty-four countries to meet in Montreal to discuss the future of these substances. In what became known as the Montreal Protocol, they agreed to cut CFC production in half by the year 2000. This cut included the refrigerant that we call "R12" or "freon." Since freon is actually Dupont's product name, I will use the term refrigerant.

In June of 1990, NASA announced new evidence that the ozone problem was much worse than previously believed. Because of this new information, more than 90 countries agreed to ban CFCs by the year 2000.

On October 6, 1991, the tests conducted by NASA's Goddard Space Flight Center using TOMS (Total Ozone Mapping Spectrometer) showed the lowest minimum ozone ever seen in its 13-year record of data. (See photo below)

On October 22, 1991, Dupont announced even more aggressive plans to phase out CFCs by the end of 1996. This was in response to a study by the United Nations Environment Program and the World Meteorological Organization.

The Clean Air Act, which will make it illegal to vent CFCs into the atmosphere, will go into effect in 1992. January 1, is the deadline for automotive air conditioning. July 1, is the deadline for stationary equipment including refrigerators. This will have a major impact on anyone who services refrigeration equipment.



The photo displays a Nimbus-7/Total Ozone Mapping Spectrometer (TOMS) false color image for October 1, 1991. The color scale on the right shows the total ozone values (missing data are white.) The ozone hole is seen as pink, with the purple colors indicating extremely low ozone values. On this date a low ozone value of 127 dobson units was recorded.

The days of opening a service valve and releasing the refrigerant charge into the open air will be over. Now, you will have two choices: recover or recycle.

RECOVERY

Recovery is the least expensive option. A recovery system consists of a compressor, a regulator, and a removable storage tank. With it, you simply pump the refrigerant from a failed appliance into the storage tank. Then, you return the tank to your local distributor. He, in turn, transports it back to the manufacturer to be recycled. The distributor will normally grant you either a deposit or a credit towards future refrigerant purchases. Or you can use a recovery bag, for use with your high and low side piercing valves. Complete instructions for the use of a recycling bag are on the package. (You can also see the recovery process in video #1010, The Truth About Sealed System Repair.)

Most appliance manufacturers have some type of recovery system that they offer to their dealers. If you are not an authorized dealer, ask your parts distributor for recommendations. There are many good systems available; shop around for price.

RECYCLING

A recycling system goes one step farther than recovery. It consists of a compressor, a series of filters that clean the refrigerant, and a temporary storage container. With a recycling system, you pump the refrigerant out of the failed

continued on page 10

BUILD YOUR OWN CFC RECOVERY SYSTEM

by Jim Snow

CFC recovery!!! The mere sound of these words can rattle even the most seasoned of appliance repair veterans. A barrage of questions immediately pops into your mind, including the biggie, what will it cost?

Though freon recovery won't be required by law until July 1, 1992, the time to act is now! Some manufacturers, such as Whirlpool, have already required their authorized sealed system service centers to begin a CFC recovery program. That became effective January 1, 1991.

Recovery of freon doesn't have to be the major undertaking that it appears. Nor is it necessary to mortgage one of your kids to pay for the needed equipment. At this time, the only types of freon that we're concerned with recovering are R-12 and R-500.

The process is comparatively simple and can be inexpensive. The first step is to capture the freon from the defective system into an approved freon recovery bag, such as the Whirlpool "Ozone Saver" Part No. 4211246. The cost of a box of two bags is about $40.00 and will last through many sealed system jobs before requiring replacement. These bags are designed to hold 24 oz. of freon, but can hold an equivalent of 5 pints without bursting. **One word of caution:** when carrying a recovery bag in an enclosed truck, 24 oz. of freon will swell the bag to the size of your truck!

Possibly the most expensive item in freon recovery is the condensing unit used to transfer the freon from the holding bag to an approved freon shipping tank. However, you can save big bucks by constructing this equipment out of used and scrap parts that can be found laying around most appliance shops.

Start with a compressor that has been changed due to excessive noise but still pumps properly. A good example to use is the Whirlpool Part No. 482982, because of its 1200+ BTU rating. Inline shut off handles are needed to control the flow of gas to insure the complete extraction of freon from the system (see diagram next page.) The purpose of the oil loop is to prevent oil from escaping the compressor and entering the freon tank. These lines can be made from 1/4 copper gas line. The rest of the components can be connected using schrader valves and old hoses off your gauges. Remember that the gas has only to pass through these hoses, not be held in them. They don't have to be spit-shine perfect.

CFC recovery is now a reality in the appliance business, but it doesn't need to be a two headed monster if you'll use a little ingenuity and imagination.

The pressure relief gauge is important. Don't try to cut corners here or you could test the "Big Bang Theory" in your shop. For about $25.00 the Robinaire Part No. 17038 is a reliable and inexpensive gauge to use.

An old condensor from a discarded refrigerator works great to condense the hot recovered freon. Admiral "Jellyroll" condensors are the best to use since they are the most efficient for this application. Any type of strong fan can be used to cool the condensor. Squirrel cage blowers work best because of the great volume of air they can move.

The final component needed is the storage tank itself. These can be ordered from a variety of sources such as:

Dayton Factory Service
Attn: Parts Coordinator
3800 Space Drive
Dayton, OH 45414
or any Whirlpool Factory Distribution Center

One tank, including all appropriate identification and shipping labels, will cost you around $65.00. Since ICC and DOT regulations are strict regarding shipping the containers, make sure you use an approved container only.

My entire system, including supplies, cost about $125.00. In many ways it is superior to anything you

continued on next page

CFC "Freeze"

continued from page 8

appliance, complete your repairs, and then recharge the system with the same refrigerant.

This sounds great but there are some disadvantages. First, these systems are much more expensive. You should expect to pay 2 to 5 times as much for a recycling system as you would for a recovery system. They also take up more physical space and do not normally clean the refrigerant to new product standards. This could increase the possibility for call backs.

REPLACEMENT REFRIGERANTS

Although refrigerant manufacturers may continue to make CFCs for a few more years, the race is on to create a replacement. The ideal substance would be a direct replacement refrigerant with the same cooling capabilities of CFCs. Because modern refrigeration equipment was designed around the physical properties of CFCs, manufacturers do not expect to come up with a direct replacement substance. The plan is to use a blend of substances. This blend, if developed, will almost certainly require some modification to the mechanical refrigeration system.

There are new, non-CFC, refrigerants available already such as Dupont's SUVA. While they promise to make future refrigeration systems more environmentally friendly, they are not interchangeable with CFC based refrigerants.

ENFORCEMENT

As far as enforcement, it appears that the EPA will be responsible for making sure that we follow these restrictions. They have not yet announced how they will enforce these rules. Of course it would be impossible for a government agent to follow you around all day. They may, however, limit new refrigerant purchases. They also could monitor recovered refrigerant returns. They may decide to require some type of license or certification. With the widespread publicity and public awareness of the CFC problem, they may just rely on the consumer to report violations. These are only speculation as the EPA has not officially answered this question.

I have tried to answer some of the most commonly asked questions regarding the CFC restrictions. I have included the most current information that is available to me now. Because this issue is still pending, however, there may be changes before the restrictions take effect. I suggest keeping informed by reading any information offered by your refrigerant distributor and of course, continue to read *Appliance Tech Talk!* They will print updated information on this issue as it becomes available.

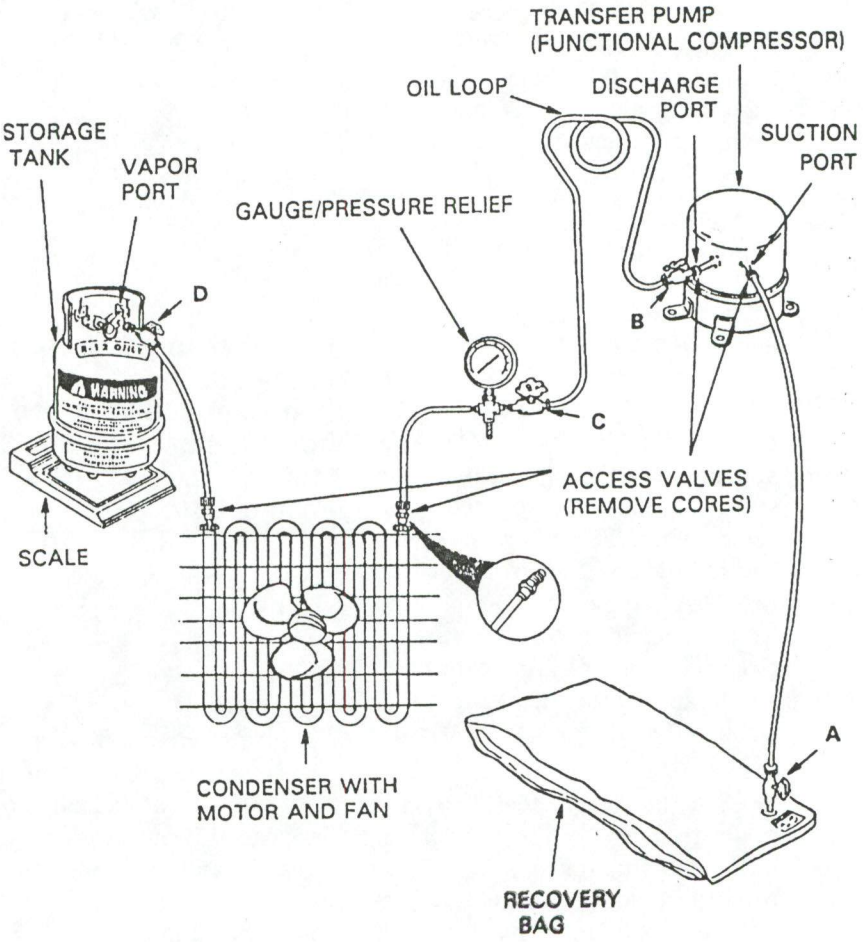
Build Your Own CFC Recovery System

continued from page 9

could buy. If mine breaks down I have an almost unending supply of replacement parts at little or no cost. This type of system can be constructed as large as you want to make it. It stays in the shop and is only used when you return from the field with your freon recovery bag.

The schematics for construction of this system are printed below.

CFC recovery is now a reality in the appliance business, but it doesn't need to be a two headed monster if you'll use a little ingenuity and imagination. Good luck!



Biomedicine

War against the heart

War, that notorious thief of a country's wealth, takes a subtle toll on civilian health as well. In a study of war as a risk factor for heart disease, researchers have documented a correlation between exposure to wartime events and the risk of coronary artery disease among people living in Beirut.

Abla M. Sibai and her colleagues at the American University of Beirut studied 127 patients referred to a hospital for possible coronary artery disease. The researchers interviewed and gave specially designed questionnaires to the patients and to matched controls randomly chosen from hospital visitors. They collected data on classic coronary risk factors such as smoking history, diabetes and family history of coronary disease and on war-exposure variables, which they characterized as either "acute" or "chronic." Acute war-related variables included major events directly affecting a patient's nuclear family or property, such as kidnappings or property damage; chronic variables included more general stress factors, such as living in a dangerous neighborhood or crossing the "green lines," which separate belligerent factions within the city. When crossing green lines, citizens enter the line of sniper fire, and they must stop at multiple checkpoints manned by opposing military and political groups.

Even after adjusting for the expected effects of the classic risk factors, the researchers conclude that exposure to both chronic and acute war-related events increases an individual's risk of coronary artery disease. Moreover, they found that the risk increases with the frequency of exposure to war-related stressors; patients exposed to four or more events have a coronary disease risk up to 11 times greater than that of patients exposed to just one event.

Coauthor Haroutune K. Armenian, now at the Johns Hopkins University School of Hygiene and Public Health, cautions that the small sample size makes it difficult to draw definitive conclusions. Sibai is currently conducting a larger study to investigate the trends. Previous studies have noted a correlation between the stress of natural disasters and the occurrence of coronary artery disease, but this is the first study to focus on wartime risk factors, the researchers report in the October AMERICAN JOURNAL OF EPIDEMIOLOGY.

Supersensitive supersecrecy

At UNISYS Corp.'s defense group computer facility in Camarillo, Calif., workers are putting final touches on a new data bank set to go on line within the next six months. The computer system will house information so secret that even high-ranking government officials will have no direct access by telephone links. Instead, information will be entered by hand from sealed, written reports and, upon request, distributed to qualified personnel via the mail – perhaps in double-wrapped envelopes that will not give away the nature of their contents.

What information could be so sensitive? Nothing less than a national compilation of all professional reprimands against individual physicians, dentists and other health care practitioners along with detailed accounts of any malpractice payments made by these practitioners.

Last week the federal government published its description of the new system, stirring controversy for its decision to deny individuals and health care advocacy groups access to the computer's contents. Physician organizations want the data kept out of non-physician hands for fear they will be misinterpreted by consumers. Patient advocates counter that such information could help people choose health care providers.

The new plan allows licensing boards, health care facilities and individuals who are the subjects of reports access to reports. Hospitals must check the records of medical staff applicants and must periodically review their staffers' records.

Environment

Ozone hole threatens polar plankton

Elevated levels of ultraviolet light filtering through a seasonal "hole" in the stratospheric ozone layer above Antarctica threaten tiny plants that feed, directly or indirectly, virtually all other polar life, according to oceanographer Sayed El-Sayed at Texas A&M University in College Station. His studies at Antarctica's Palmer Station show the photosynthetic capacity of marine phytoplankton at the bottom of the polar food chain is extremely vulnerable to the increases in ultraviolet (UV) light that accompany the ozone hole detected annually over the Antarctic since the late 1970s (SN: 10/14/89, p.246).

In a series of experiments, El-Sayed measured the photosynthetic rate of polar phytoplankton housed in adjacent tanks and exposed to four different UV conditions. Ambient light irradiated the one-celled organisms in the first tank. Plexiglas filters eliminated all UV light from the second tank. Filters screened out about one third of the ambient UV from tank three. And fluorescent UV lamps augmented natural solar-UV irradiation by about 16 percent in the fourth tank, conditions meant to simulate what might occur under an ozone hole.

Compared to phytoplankton raised under ambient light, those exposed to the enhanced UV reduced their photosynthetic rate 35 to 75 percent – depending on the source of the tiny plants (open water, ice or a sea-ice hole). By contrast, those exposed to just two-thirds the normal UV increased their photosynthetic rate from 35 to 175 percent. Those in the UV-free tank boosted their photosynthetic rate a dramatic five- to seven-fold.

These data "are very consistent with our results," says Osmund Holm-Hansen at the Scripps Institution of Oceanography in La Jolla, Calif. He says they show that where the light intensity is high – as it is in the upper one or two meters of the ocean – "natural UV levels are having a very dramatic effect," substantially reducing the productive capacity of these plants. Less clear, he says, is whether UV effects are as potent in the ocean's darker, deeper reaches.

A light meal at sea

In a molecular bucket brigade of life, carbon atoms pass from soil to plant to animal to air. Scientists studying the cycle have long puzzled over the ocean – which seems to hog the buckets rather than pass them on. In the ocean, organic molecules from decaying plants and animals – known as humic material – combine into larger molecules that plankton or bacteria can't ingest. These inedible molecules can last thousands of years without decaying.

Now researchers at the University of Miami report sunlight can boost these molecules back into circulation. They exposed samples of seawater to sunlight and found that the light breaks these larger molecules into smaller fragments. Tiny zooplankton and bacteria rapidly gobble them up, returning them to the carbon cycle. The Miami team, led by marine chemist Kenneth Mopper, observed the reaction in coastal waters and open ocean, in the tropical Sargasso Sea and along the Maine coast.

The finding, reported in the Oct. 19 NATURE, both explains what happens to the enormous amount of carbon in the ocean, Mopper says, and accounts for regions where microorganisms thrive without an obvious source of edible carbon.

The marine chemists found a daily rhythm to the reaction, with sunlight breaking down the large molecules slightly faster than the microorganisms eat the results. At night, the creatures finish off the day's production. "Here is a mechanism that makes sense," says oceanographer John I. Hedges of the University of Washington in Seattle. "It's not [the result of] some little organism that lives only in Antarctica. It's global in scope – it occurs wherever sunlight hits the ocean."

CONCERNED CITIZENS FOR ENVIRONMENTAL HEALTH

Lorna Moffat, Director
California 16th District
The Mailbox S-3064 Carmel, CA 93921
408/625-0905

Paul Dinkel
Syngas Inc.
18484 Highway 18, Suit 215
Apple Valley, Ca.

Dear Mr. Dinkel

Feb. 4th,92

I enjoyed our conversation last week concerning the possibility of Syngas (Texaco) possibly looking into the feasibility of destroying ozone depleting chemicals. As I understand it from Lena Nirk at EPA (Tel;202 260 7411) there are no plans to try and destroy these chemicals once they are banned from,the market. This means they will probably be released thus finishing off what little ozone we have left. Texaco could save the day if indeed you can find a way of disintergrating them instead. Therefore I urge you to look into this as soon as possible.

Thankyou for your time and consideration in this most urgent problem.

Sincerely,

Lorna Mofiat

Recycled paper

The Sacramento Bee

Researchers use sound to create refrigerator

By Deborah Blum
Bee Science Writer

MONTEREY — The "bozos in the basement," as they sometimes call themselves, have built a refrigerator that runs on sound waves. It works so well that NASA is flying it on next week's shuttle mission and refrigerator companies from around the country have come calling.

This group of proudly maverick researchers at the Naval Postgraduate School in Monterey – "we're something of a cowboy operation," says lead physicist Steven L. Garrett – has taken a hands-on, we'll-build-it-ourselves approach to science with startling results.

They have a compact cooling unit, which uses a rock-and-roll loudspeaker to produce sound waves with a chill on them. The sound vibrations can actually force molecules, in a gas-filled tube, to begin a cooling cycle and – with a little push from modern technology – do a near free fall into subzero temperatures.

The resulting Space Thermoacoustic Refrigerator, developed at a cost

See COOLING, back page, A20

Cooling: Technology could be ecological boon

Continued from page A1

of barely $1 million, is drawing international attention – and contracts with companies such as General Electric. The excitement comes not only because of the ingenious physics but because the device has the promise of helping with one of the world's major environmental crises.

Unlike today's refrigerators, the thermoacoustic refrigerator doesn't need chlorofluorocarbons (CFCs), the long-lived compounds blamed for chewing away the planet's protective ozone layer and raising the skin-cancer risk. CFC-dependent technology is doomed; under international treaty the destructive chemicals must be phased out in the next eight years. And the substitute compounds, so far, have proven to be corrosive at best, cancer-causing at worst.

"Without a disaster like CFCs, you couldn't even have thought of bringing in an entirely new technology like this," said Gregory Swift, a physicist at Los Alamos National Laboratory, who helped pioneer the technology. "There's still a lot of difficult work to do. But it's looking better. It's not impossible that this could be the refrigerator of the future."

Although the relationship between sound and temperature has been known for years, the research didn't really take off until the late John Wheatley, a brilliant Los Alamos physicist, first demonstrated in 1982 that sound waves could be used to drive a heat pump.

Garrett joined that project because of his expertise in acoustical physics. After Wheatley died in 1986, his colleagues agreed his work was too valuable to drop. But they split it up. Los Alamos continued working with heat engines; Garrett and his team in Monterey concentrated on refrigeration.

"We got custody," joked Jay Adeff, a physicist and graduate student in Garrett's laboratory. "And it's been great. I may not get rich working here, but I'm going to have fun. That's what science should be about."

Garrett and his colleagues draw maximum enjoyment out of every effort to push the technology, right down to the rush to prepare their refrigerator for shuttle flight.

"We stayed up all night to get it together and we really looked like five auto mechanics on a drunken binge," Garrett said of himself, Adeff, theoretical physicist Tom Hofler, machinist Glenn Harrell and payload manager David Rigmaiden.

"But the final product looked slick," he added, with real pride.

The Space Thermoacoustic Refrigerator (STAR), now scheduled to lift off in the shuttle Discovery on Wednesday morning, is essentially a chilling unit – unattached to any compartment where food or supplies would be stored. It is designed for space, packed into a compartment 2 feet by 3 feet, according to NASA's specifications.

The basic design is still the one that Adeff hopes can someday power household refrigerators and commercial air-conditioners around the world.

The setup is almost breathtakingly simple. The scientists begin with a JBL speaker, slightly modified to fit into their device. The speaker generates the needed sound waves, which are trapped into a tube so sturdy that no vibration or sound escapes. Everyone agrees that's a good thing; the noise level inside the tube is estimated at about 160 decibels, comparable to the deafening roar of a rocket launch.

The sound waves vibrate through helium in the tube, pushing the molecules around so that they pack and compress at one end and loosen back up at the opposite end. As the molecules squeeze down, they heat up. As they expand, they cool down. This creates a heat gradient.

The physicists take advantage of that with heat exchangers, tapping into the cold region, pushing the heat energy into the opposite direction. The tube rapidly becomes warm at one end and icy at the other; in one experiment, the researchers were able to create difference of 212 degrees Fahrenheit from one end of the tube to the other.

"That would mean if one end was at a room temperature of 70 degrees, we could drop the other end down to minus 142 degrees Fahrenheit," Adeff said. "And that's a lot more than you need for a household refrigerator, which only needs to get down to freezing, 32 degrees Fahrenheit."

There are still real obstacles, the most obvious being that the acoustic cooling unit has yet to be plugged into an actual storage system. But the potential is so strong that GE has contracted with Garrett to develop a small, full-scale refrigerator. This first commercial venture is geared for the space shuttle, where conventional coolers are plagued by the lack of gravity. The STAR system works as well, or better, without gravity.

Garrett won't comment on whether GE has further commercial interests in the system nor will he release the names of the other companies that have approached him, as negotiations are still under way. He said the interested companies include at least one national air-conditioning firm and a major builder of home refrigerators.

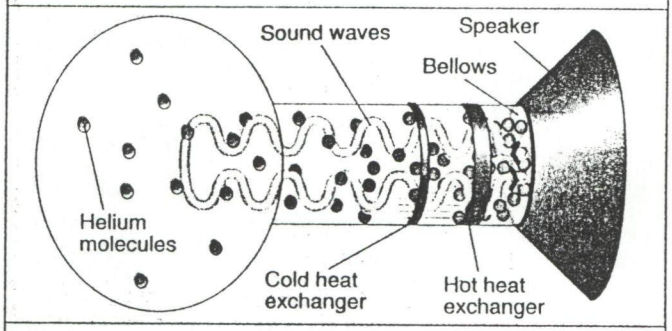
Garrett said he believes a good researcher, and definitely a project manager, should know how to build what he designs. So, as part of his program, he has insisted that scientists from private industry come to Monterey and learn how to build the device. He's created a well-equipped machining shop in the Navy school's basement – from which Adeff coined the "bozos in the basement" nickname.

But as well as more people, the technology needs more money, Swift said. He estimated that it could take somewhere between $10 million to $20 million to establish how well acoustic refrigerators will perform commercially. Among the issues to resolve are how much energy it will take to run them; how to handle the heat that builds up; and whether they will be competitive in cost.

"The economy is so screwed up and the government is bankrupt so that finding the money may be difficult," Swift said. "But if we get it, I think we'll be able to establish the answers in just a few years."

Space thermoacoustic refrigerator

A rock-and-roll loudspeaker provides soundwaves that are trapped in a tube-like device where they cause gas molecules to vibrate. As the molecules move around the tube, they are compressed, causing heating. Eventually they expand and cool at the tube's open end. Scientists use a system of heat exchangers and thin plates to direct heat energy away from the cooling molecules, producing icy conditions at one end of the tube.



Source: U.S. Naval Postgraduate School

Bee graphic / Barbara Stubbs

The Advocate, Baton Rouge, La., Tues. Jan. 21, 1992

Pump up space-age fridge's volume to chill

By MARCIA DUNN
AP Aerospace writer

CAPE CANAVERAL, Fla. — A cooling unit powered by sound for a space-age fridge is to fly aboard the space shuttle Discovery this week. It will rock 'n' roll 10,000 times louder than a Rolling Stones concert.

But the shuttle's seven astronauts won't hear any of it — the noise will be contained within the cooler, a thermoacoustic refrigerator, in a pollution-free chilling system being tested in space for the first time.

Discovery is scheduled to blast off with the sound-chiller and nine other Get Away Special experiments — sponsored by students and scientists from six countries — at 8:53 a.m. Wednesday. The scientific research mission is to last one week.

NASA was working on only one technical problem Monday. A malfunctioning flight data recorder in Discovery's cockpit will be replaced without interrupting the countdown, officials said.

Steven Garrett, a physicist at the Naval Postgraduate School in Monterey, Calif., and his research team designed the thermoacoustic refrigerator for use on satellites with electronic instruments that need to be kept cold.

It has only one lightweight moving part — a loudspeaker — and therefore vibrates less than conventional cooling systems, important for motion-sensitive telescopes.

Garrett's system relies merely on sound and inert gas, and therefore is environmentally safe. He says there's no reason why it could not replace home refrigerators and air conditioners, which can leak ozone-destroying refrigerant chemicals into the atmosphere.

"It has a good number of applications in space and also on Earth," said Tom Dixon, flight operations manager for NASA's Get Away Special program.

The shuttle ride, which cost $10,000, is "only to certify the flight worthiness of the refrigerator," Garrett said. "The physics, the performance (on Earth), has all been measured. That's all history."

The principle was discovered in the early 1980s at Los Alamos National Laboratory in New Mexico.

Garrett said the 199-pound cooler is embarrassingly low-tech. Instead of a motor-driven compressor, it consists of a modified loudspeaker — "designed for Bonnie Raitt's voice, not thermoacoustics" — fishing line glued to plastic film that is rolled into a tube, helium and xenon gas, batteries and a data recorder.

The loudspeaker generates 160 decibels of sound, enough to "burn your ear drums," Garrett said.

Gas molecules are compressed and heat up when sound waves blast from the loudspeaker. The molecules are shoved into the plastic and transfer their heat, which makes the gas progressively cooler.

Garrett expects the cooler, in the shuttle's cargo bay, to dip to 140 below zero Fahrenheit when Discovery is in darkness 187 miles above Earth. The temperatures inside the unit should hover around 40 below zero when the cargo bay is pointed toward the sun.

Unlike conventional vapor-compression systems, like your home refrigerator, the sound-chiller does not turn on and off to adjust to shifting temperatures. It's simply a matter of volume control.

"You could run it full blast to get chicken and beer cooled, then turn the volume down," Garrett said. "It never really turns off, so it's more efficient and uses less energy."

The researchers have received about $1 million in funding so far from the Navy. Garrett recently signed a contract with General Electric, through NASA, to design a thermoacoustic refrigerator for use aboard a shuttle next year.

Garrett said a commercial sound-chiller could be available for home use within a few years. But he's still waiting to hear from appliance makers.

"It could be I should be asking Panasonic or Mitsubishi, don't ask me," he said. "For all I know, they're watching this closely or ignoring it, too."

John Sanders
Naval Postgraduate School
Public Affairs Officer
Monterey, CA 93943-1500

assign their own rep[illegible]

4. NASA shuttles destroy the ozone shield *(SSU Star, Earth Island Journal, San Francisco Chronicle)*

A report by Gar Smith in the fall issue of *Earth Island Journal* restated the warnings of two Soviet rocket scientists that each time a U.S. space shuttle is launched, 187 tons of ozone-eating molecules are released into the atmosphere. According to Valery Burdakov, who helped design the USSR's Energiya rocket engine, and his colleague Vyacheslave Filin, a single shuttle flight can destroy up to ten million tons of ozone. It would take only 300 shuttle flights to completely destroy the ozone.

Gar Smith says the TASS-released findings of the scientists were picked up by the European press in the summer of 1989. Smith's article confirmed claims by Dr. Helen Caldicott that appeared in a May 8 story by Mindi Levine in the *SSU Star,* the Sonoma State University campus newspaper, which said that "with each launch, .25 percent of the ozone is destroyed. So far the space shuttle has destroyed 10 percent of the ozone."

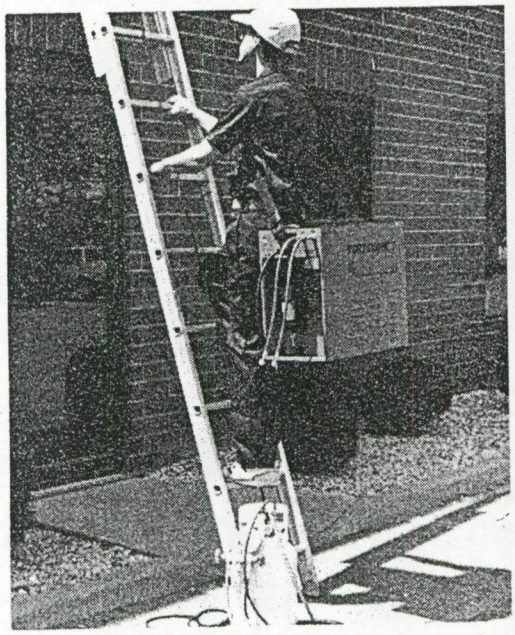
avoid potential EPA problems due to lubricant disposal. The recycled lubricant has no loss in quality or performance and lube/water ratio is unchanged; recaptured lubricant mixture can be re-applied almost an unlimited number of times, continually reducing costs.

Advance Products Corp., Benton Harbor, MI 49085.

FOR INFO - WRITE IN IPB 474

CFC RECLAMATION/ recharging system

Port-Ozone 1 System distills, filters and dries R-12, R-22, R-500, and R-502 refrigerants. Heavy-duty machine can be used on commercial refrigeration



systems, chillers, sterilization equipment, and air-conditioners. Powerful unit weighs only 60-lbs. and comes with shoulder harness for carrying to remote locations and rooftops. It simultaneously discharges and evacuates the A/C-R system's high and low sides, ensuring all moisture is removed. Reclamation includes removal of acid, moisture, non-condensable gases, particulates, and air.

R.S.I. Co., 1427 E. 328th St., Eastlake, OH 44095.

FOR INFO - WRITE IN IPB 475

NPS team designs space refrigerator

Scientists won't know for three weeks whether it worked on spacelab orbit

BY KEVIN HOWE
Herald Staff Writer

Scientists at the Naval Postgraduate School in Monterey won't know for at least three weeks whether the refrigerator they designed for space actually worked.

Tom Hofler, adjunct professor in the physics department of NPS, said he and a team of scientists and technicians have been working for five years on developing the world's first independently operating acoustical refrigerator – a device that operates on sound waves rather than the mechanical compression of chlorofluorocarbon gases used in conventional refrigerators.

Their prototype, designed to overcome the problems of providing refrigeration in zero gravity, made its maiden flight on the space shuttle Discovery, which landed yesterday at Edwards Air Force Base after an eight-day mission that began Jan. 22.

The refrigerator project, headed by Professor Steve Garrett, was developed from Hofler's invention, which in turn sprang from work he began at Los Alamos National Laboratory under the tutelage of the late John Wheatley.

Whether it produced frost in space will be determined when other members of the project team – technicians Dave Rigmaiden and Jay Adeff, computer programmer Jim Horning and machinist Glenn Harrell – examine the data gathered from the Discovery flight.

Hofler said the refrigerator wasn't actually used to cool items, but its performance was measured throughout the flight and recorded by computers.

That data, he said, will be downloaded at Kennedy Space Center and brought back to NPS.

The acoustic refrigerator operates through a speaker that generates a sound pulse into a tube of helium gas, Hofler said.

The gas passes through heat exchange units made up of strips of parallel copper plates, separated by a cylindrical stack of spiral-wound sheets of polyester plastic film, at a much greater rate than the sound pulse.

The expanding gas cools the refrigerated space.

Conventional refrigerators haven't worked well in a weightless environment, and some life-science experiments on previous shuttle flights were lost because of those failures, Hofler said.

He noted that weightlessness has caused problems because lubricants don't stay among the moving parts where they're supposed to, and liquid-to-gas conversions sometimes produce damaging vibrations in the refrigeration piping, similar to the groaning of household plumbing when taps are turned on and off suddenly, a phenomenon called "slugging."

The acoustic refrigerator, he said, should be able to overcome those limitations, since there are few moving parts other than the vibrating speaker, or piston, that produces the sound and no changes from liquid to gas.

There are no ozone-depleting chemicals involved in the acoustic refrigerator's operation, Hofler said, and the technology can eventually be applied to ordinary commercial or household air conditioning or refrigeration.

At the moment, Hofler is working on the next generation acoustic refrigerator, which will be able to cool areas down to cryogenic temperatures – cold enough to liquefy nitrogen. The refrigerator that went into space, he said, has a temperature cooling range of 80 degrees centigrade, down from room temperature.

The entire unit that flew on the space shuttle was fabricated by the team, assisted by a succession of officer students at NPS, Hofler said, in its basement workshops in the Navy school's Spanagel Hall, and the final assembly was done by the team at Cape Canaveral.

GLOSSARY

TERMS USED IN THIS SERIES

chlorofluorocarbons — Known widely as CFCs, these chemicals in recent years have been shown to deplete ozone in the atmosphere. U.S. law and an international treaty will ban production for most uses by the turn of the century. The main class of CFCs, known as the chloromethanes and including CFC 11 and CFC 12, achieved stunning success as refrigerants, replacing flammable chemicals such as ammonia. CFC 113 belongs to a chemically distinct class, the chloroethanes, known for their solvent properties. These compounds can exist for up to 400 years in the atmosphere.

Freon — Du Pont's trade name for the family of chlorofluorocarbons used as refrigerants, solvents and blowing agents to make foams.

greenhouse effect (global warming) — Naturally occuring water vapor and carbon dioxide trap infrared rays from the Sun, warming the atmosphere. Without this, Earth's average temperature would be 20 degrees below zero instead of 60 degrees Fahrenheit. Human activities have increased the amount of carbon dioxide and trace gases in the atmosphere, which traps more of the infrared rays. Because warmer air holds more water vapor, the warming effect would be compounded. In the view of many scientists the average temperature of the Earth is already increasing. Anticipated effects of global warming include sea level rise and a change in the areas that are suitable for farming.

hydrochlorofluorocarbon — A chlorofluorocarbon with a hydrogen atom, which makes it much more reactive in the lower atmosphere than a simple CFC. Because of their life span is shorter, HCFCs are less likely to reach the upper atmosphere and deplete the ozone layer.

hydrofluorocarbons — Fluorocarbons that contain no chlorine and have no known effect on the ozone layer. They contribute to global warming. HFCs being considered to replace CFCs

Blocking a cleaner chemical

By MERRITT WALLICK

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Key chemicals in the lineup of new refrigerants the Du Pont Co. promotes as "environmentally enlightened" have liabilities the company doesn't advertise.

The chemicals Du Pont has targeted for an emerging multi-billion-dollar world refrigeration market waste energy, overheat the Earth's atmosphere or deplete the ozone layer, which protects life from harmful radiation.

Nonetheless, Du Pont has waged war against a less environmentally harmful refrigerant favored by the U.S. Environmental Protection Agency. The company has mounted a scare campaign against the potentially less lucrative alternative.

Behind the scenes, DuPont also has influenced the rewriting of national building codes to ban the competitive refrigerant from U.S. homes.

At stake for Du Pont is selling chemicals for the next generation of air conditioners and refrigerators as U.S. law and international treaties phase out the ozone-damaging chlorofluorocarbons those appliances now use.

Du Pont favors the refrigerant known as 134a for home refrigeration and car air conditioners, a chemical that contributes to global warming and wastes electricity. Du Pont wants to keep producing the ozone-depleting refrigerant 22 for residential heat pumps, retail refrigeration and commercial air conditioners.

Du Pont has bet heavily that it will win the replacements war. It recently completed a $30 million plant in Corpus Christi, Texas, to produce 134a and last week announced plans for a $100 million expansion there. It also has approved plans for a 134a plant in Japan. Joseph P. Glas, vice president and general manager of Du Pont fluorochemicals business, calls 134a "the workhorse product of the future."

Du Pont so far has refused to consider selling the refrigerant known as 152a, favored by the EPA because of its less harmful environmental effects.

In terms of global warming, Du Pont's 134a is 10 times worse than 152a. In terms of energy efficiency, Du Pont's 134a is 3 percent less efficient than the CFC refrigerant it would replace and is 8 percent less efficient than the EPA-favored 152a. In addition to costing more to operate, less-efficient cooling systems indirectly contribute to global warming by consuming more electrical energy. Electricity is usually created by burning coal or oil, which in turn releases carbon dioxide, the main cause of global warming.

"We are concerned about the safety of the products we sell out

REPLACEMENTS FOR CFCS

HCFCs, HFCs can also affect ozone, global warming

Chlorofluorocarbons — used as refrigerants, solvents and blowing agents in making plastic foam — deplete the ozone layer and contribute to global warming. The two classes of chemicals scheduled to replace them are hydrochlorofluorocarbons and hydrofluorocarbons. HCFCs deplete ozone at a slower rate than CFCs, and they add to global warming. HFCs do not deplete the ozone layer but can add to global warming.

CHEMICAL	COULD REPLACE CFCs IN:	OZONE THREAT Does it cause more harm than CFC 11 — one of the most ozone-unfriendly CFCs?	GLOBAL WARMING Does it warm the Earth more than carbon dioxide — the main cause of global warming?	ATMOSPHERE How long does it stay in the atmosphere?	ENERGY Does it waste or save energy compared with CFC it replaces?	TOXICITY When does it become toxic? (Lower numbers indicate greater threat.)	FLAMMABILITY Does it burn?
HCFC 22 ($CHClF_2$)	Car air conditioner, residential refrigeration, chillers, retail food refrigeration, cold storage warehouse, refrigerated transport, process refrigeration, aerosol propellant	5% as bad as CFC 11	637 times as bad	20 years	Uses 4% more energy	1,000 ppm	No
HCFC 123 ($CHCl_2CF_3$)	Chiller, blowing agent for flexible foams, solvent	2% as bad as CFC 11	34 times as bad	2 years	Uses 1% more energy	10 ppm	No
HCFC 124 ($CHClFCF_3$)	Chiller, blended for car air conditioner and residential refrigeration	2% as bad as CFC 11	182 times as bad	8 years	Uses 3% less energy	Unknown	No
HFC 134a (CH_2FCF_3)	Car air conditioner, residential refrigerator and freezer, chiller, process refrigeration, cold storage warehouse, retail food refrigeration, refrigerated transport, rigid non-polyurethane foam insulation, packaging	No threat to ozone layer	507 times as bad	21 years	Uses 3% more energy	1,000 ppm	No
HCFC 141b (CH_3CCl_2F)	Blowing agent for rigid polyurethane foam insulation and packaging, solvent	8% as bad as CFC 11	156 times as bad	9 years	NA	Unknown	Yes
HCFC 142b (CH_3CClF_2)	Blowing agent for rigid non-polyurethane foam insulation and packaging, aerosol propellant	6% as bad as CFC 11	663 times as bad	25 years	NA	1,000 ppm	Yes
HFC-143a (CH_3CF_3)	Refrigerant	No threat to ozone layer	1,261 times as bad	54 years	Unknown	NA	Yes
HFC 152a (CH_3CHF_2)	Residential refrigerator and freezer, chiller, refrigerated transport, aerosol propellant, car air conditioning	No threat to ozone layer	59 times as bad	2 years	Uses 5% less energy	1,000 ppm	Yes

NA - Not applicable

HOW CFCS ARE USED NOW:

CFC 11: Chiller; rigid polyurethane foam (residential refrigeration, other refrigeration, refrigerated transport, structure insulation, packaging, flexible foam); rigid non-polyurethane foam (packaging); aerosol.

CFC 12: Car air conditioning; residential refrigeration; chiller; process refrigeration; cold storage warehouse; retail food storage; other refrigeration; refrigerated transport; rigid polyurethane foam (residential refrigeration, structure insulation, packaging); rigid non-polyurethane foam; aerosol; sterilization.

CFC 113: Solvent cleaning (cold cleaning, vapor degreasing).

CFC 114: Rigid non-polyurethane foam (packaging).

CFC 115: Process refrigeration; cold storage warehouse; other refrigeration; refrigerated transport.

Source: EPA

from a refrigerator containing 152a.

How was this blaze started? Du Pont ignited the chemical by running 15,000 volts throu... a spark

Du Pont manufacturers and sells 152a as the sole ingredient of its Dymel 152 aerosol propellant. Dymel literature promotes its "low flammability" and u... 152a as a

CFC use in the

Commercial air

11%

areas that are suitable for farming.

hydrochlorofluorocarbon — A chlorofluorocarbon with a hydrogen atom, which makes it much more reactive in the lower atmosphere than a simple CFC. Because of their life span is shorter, HCFCs are less likely to reach the upper atmosphere and deplete the ozone layer.

hydrofluorocarbons — Fluorocarbons that contain no chlorine and have no known effect on the ozone layer. They contribute to global warming. HFCs being considered to replace CFCs include HFC 125 for refrigeration, HFC 134a for auto and residential air conditioning, HFC 143a for refrigeration, HFC 152a for many refrigeration and air conditioning applications and HFC 123 for commercial air conditioning.

ozone — An unstable form of oxygen formed when three oxygen atoms bind together. Atmospheric oxygen normally consists of two oxygen atoms. At ground level, ozone irritates the lungs and is a major component of smog. In the upper atmosphere, it forms the protective ozone layer.

ozone layer — A high concentration of ozone gas about 25 miles above the Earth, blocking much of the harmful ultraviolet radiation from the sun. Increased ultraviolet radiation causes cataracts and, in light-skinned people, skin cancer. It also reduces crop yields and may harm such life forms as phytoplankton, part of the basis of the marine food chain.

parts per million — A measurement of the concentration of a gas, liquid or solid mixed with another substance. Used to indicate the maximum safe dose of a chemical as determined by toxicological studies. Often abbreviated as ppm.

refrigerant — A chemical used in air conditioning and refrigeration systems. It absorbs heat when it evaporates, removing it from the air that is to be cooled. The heat is later released away from the cooled space when the chemical is compressed into a liquid state.

consider selling the refrigerant known as 152a, favored by the EPA because of its less harmful environmental effects.

In terms of global warming, Du Pont's 134a is 10 times worse than 152a. In terms of energy efficiency, Du Pont's 134a is 3 percent less efficient than the CFC refrigerant it would replace and is 8 percent less efficient than the EPA-favored 152a. In addition to costing more to operate, less-efficient cooling systems indirectly contribute to global warming by consuming more electrical energy. Electricity is usually created by burning coal or oil, which in turn releases carbon dioxide, the main cause of global warming.

"We are concerned about the safety of the products we sell out in the market," said A. Dwight Bedsole, business director of Du Pont's fluorochemicals business. "We have tried to take a very neutral position on this issue of 152a vs. 134a."

But the battle between Du Pont and the EPA over 152a had reached such a pitch last fall that the company declared a truce with the agency.

EPA accuses Du Pont officials of playing favorites

Eileen B. Claussen, director of the EPA Office of Atmospheric and Indoor Air Programs, in October 1990 accused Du Pont of not giving 152a a fair chance.

"We are concerned about statements we have heard from some of your customers that they perceive an even-handed policy is not being followed. There is also some concern that, even though we have a verbal agreement to objectively assess R-152a, Du Pont representatives state that 152a will never be sold in the refrigeration market and that 152a has not been widely available for testing purposes," Claussen wrote.

Glas wrote back, promising that Du Pont would cooperate with "an objective assessment of the risks and benefits" of 152a if EPA would drop "its advocacy role" in favor of the chemical.

Critics of Du Pont tactics say the company's contribution to an "objective assessment" of 152a so far been limited to exaggerating the flammability of the chemical.

When the EPA recently suggested that Du Pont's favored refrigerants may not be the best choice for the environment, Du Pont produced a videotape that portrays the refrigerant favored by the EPA as dangerously explosive. Du Pont circulated that video and another produced in Germany throughout the refrigeration industry and among regulatory officials. They show a ball of flame shooting from a drum and

lant, car air conditioning

NA - Not applicable

HOW CFCS ARE USED NOW:

CFC 11: Chiller; rigid polyurethane foam (residential refrigeration, other refrigeration, refrigerated transport, structure insulation, packaging, flexible foam); rigid non-polyurethane foam (packaging); aerosol.

CFC 12: Car air conditioning; residential refrigeration; chiller; process refrigeration; cold storage warehouse; retail food storage; other refrigeration; refrigerated transport; rigid polyurethane foam (residential refrigeration, structure insulation, packaging); rigid non-polyurethane foam; aerosol; sterilization.

CFC 113: Solvent cleaning (cold cleaning, vapor degreasing).

CFC 114: Rigid non-polyurethane foam (packaging).

CFC 115: Process refrigeration; cold storage warehouse; other refrigeration; refrigerated transport.

Source: EPA

from a refrigerator containing 152a.

How was this blaze started? Du Pont ignited the chemical by running 15,000 volts through a spark plug set in a specially designed drum. A match head was wedged into the spark plug gap to ensure ignition. In the German test, the fire was ignited after glass was removed from a light bulb, exposing the electrified filament to 152a that had been pumped into the closed refrigerator.

In contrast, recent tests of 152a for the EPA by Underwriters' Laboratory Inc. and analyzed by technology consultant Arthur D. Little Inc. concluded that, at most, one additional kitchen fire a year may occur in the United States if 152a were used in a properly designed refrigerator. Refrigerators with existing nonflammable refrigerants are believed to cause about 3,000 fires annually.

"We really haven't been able to show that a typical switch with 110 volts [the standard household current] is able to ignite the refrigerator [cooled using 152a]. We haven't been able to show that a cigarette would ignite it," said Donald P. Grob, managing engineer for heating, air conditioning and refrigeration at Underwriters Laboratories.

The eight ounces of 152a that would be found in a home refrigerator could not reach flammable concentrations in an enclosed room 10 feet square, he said. In the unlikely event that high concentrations of 152a would leak into a closed refrigerator, the gas would be diluted almost immediately when the refrigerator door is opened, Grob said. In a properly designed refrigerator there would be no spark to ignite it, he said.

Grob said the Du Pont videos were "designed to make sure you ignite it." He added, "You don't have a 15,000-volt arc in your kitchen."

Videos allege explosive quality of one refrigerant

Du Pont has been inconsistent with its characterization of 152a. Du Pont manufacturers and sells 152a as the sole ingredient of its Dymel 152 aerosol propellant. Dymel literature promotes its "low flammability" and u[illegible] 152a as a way "to reduce the flammability of many aerosol products."

Du Pont's videos depicting the explosiveness of 152a, nevertheless, has had dramatic effect.

In January, Du Pont employee Ward D. Wells showed the videos to members of the Standard 15 Committee of the American Society of Heating, Refrigeration and Air-Conditioning Engineers.

The committee recommends national standards for residential and commercial heating, air conditioning and refrigerations, standards typically adopted by ASHRAE. Municipal building codes across the United States refer to ASHRAE standards.

At Du Pont's urging, the committee in July voted to ban 152a for home refrigeration. Earlier ASHRAE regulations permitted up to 6.6 pounds of 152a in a home in the future. A refrigerator would use 8 ounces.

"We didn't know how to handle 152a after looking at a film from Du Pont showing a fireball in a refrigerator," said William V. Richard, chairman of ASHRAE Committee 15. "One of the Du Pont men, a member of my committee, showed it to us."

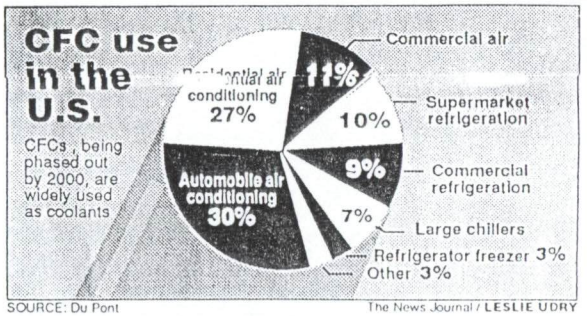
The board of directors is expected to vote on the recommendation this fall.

Wells said he showed the tape "in response the persistent advocacy of 152a" by the EPA. C. Curtis Lawson of Du Pont, who is on another ASHRAE refrigerants committee, said the video showing the drum test fire represented actual conditions in the kitchen.

"I think it is a technically fair demonstration of how 152a burns and of the fact that, if you had a refrigerant leak inside the refrigerator, based on the volume of the refrigerator you would be well within the flammable limits and could get an ignition."

Lawson said that static electricity could ignite 152a.

Asked how the EPA viewed the video and Du Pont's use of it, EPA's Claussen said, "Du Pont is a big corporation and has a lot of clout. We didn't like it."



SOURCE: Du Pont

The News Journal / LESLIE UDRY

John Hoffman, director of EPA's Global Change Division under Claussen, accused ASHRAE of acting "in an arbitrary manner" and of "imposing unnecessary restrictions that are costly to the economy and harmful to the environment."

Hoffman and Grob questioned why Du Pont frets over the small chance of a fire, when kitchens are loaded with dangers ranging from natural gas appliances to pressurized aerosol cans filled with highly explosive butane propellants.

Much of the market for replacements still up for grabs

But 134a would appear to be winning the battle.

The European appliance market has already tilted toward the Du Pont-favored 134a. Only an order by the EPA can force a reversal of the U.S. auto industry's choice of 134a. But EPA officials concede privately that they hold out little hope of stemming the tide for 134a in the automotive markets.

Still at stake, however, is the large U.S. refrigeration and air conditioning market, traditionally about half the existing $1.5 billion world refrigerant market, and the fast-developing markets of China, India, the Pacific Rim and Latin America.

On the surface, Du Pont would appear to be in a good position to make 152a.

Despite its opposition to 152a, it is the only U.S. manufacturer of the chemical, which it uses in a nonflammable industrial refrigerant blend.

But 152a is much easier to manufacture than 134a. None of the CFCs or their replacements is patented. Anyone who has the technical ability is legally free to make them. China has already begun experimenting with 152a for home refrigerators.

Ease of manufacture could become a competitive disadvantage to companies, like Du Pont, that shy away from selling low-profit commodity chemicals like 152a. Companies selling such chemicals normally compete on price alone.

Many companies lack the money and manufacturing expertise to make complex chemicals. The companies that can make them often protect their market share by patenting the complex manufacturing process. Du Pont holds 13 new U.S. patents on production processes for the more complex 134a. It holds six remaining patents on 152a processes.

Bedsole of Du Pont denied that Du Pont would earn higher profits selling 134a, saying it costs five times as much as 152a to produce. He also denied that Du Pont would face less competition making 134a.

Continued on next page

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FROM: DELAND, MICHAEL: COUNCIL ON ENVIRONMENTAL QUALITY

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 03/24/92

SUBJECT: COPY OF THE 22ND ANNUAL REPORT "THE COUNCIL ON ENVIRONMENT QUALITY", "THE BUSH ADMINISTRATION AND THE ENVIRONMENT: ACCOMPLISHMENTS AND INITIATIVES"..

****
DIRECTORATE ASSIGNED: STAFF ASSIGNED:

ACTION REQUIRED: STAFF ACTION:

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EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON, D.C. 20500

March 24, 1992

Michael R. Deland
Chairman

(202) 395-5080

The Honorable D. Allan Bromley
Assistant to the President
Office of Science & Technology Policy
Room 358
Old Executive Office Bldg.

Dear Allan:

On behalf of President Bush, I am pleased to send you a copy of his environmental message to Congress today, along with the 22nd annual report of the Council on Environmental Quality.

In his message to Congress, President Bush notes 1991's twin victories over Communism and aggression in the Persian Gulf and declares that "environmental protection requires international commitment and strategic American leadership in yet another just and moral cause."

The President asserts U.S. leadership by calling on the community of nations to adopt six specific initiatives in June at the United Nations Conference on Environment and Development (UNCED). The President challenges the Congress to follow through on three of his domestic environmental initiatives that can and should be enacted without delay. He pledges that the Bush Administration "will continue to take action predicated on sound science and efficient solutions."

The CEQ annual report consists of 24 brief sections outlining environmental conditions and trends and Federal policies in these areas. The report also contains over 200 tables and illustrations that provide additional detail in such categories as air quality, water, agriculture, biodiversity, public lands, population, the economy, energy, forestry, education, science and technology, and solid wastes.

We at CEQ greatly appreciate your assistance and that of your staff in the preparation and review of the report. We would welcome your comments and suggestions for future editions.

Sincerely,

Michael R. Deland

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FACT SHEET

On July 23, 1991, President Bush named 25 environmental, business, academic and foundation leaders to serve as members of the President's Commission on Environmental Quality.

Mission. The Commission's mission is to develop and pursue an action agenda to improve the environment in a way that integrates environmental, economic, and quality of life goals and emphasizes innovative private sector initiatives.

Guiding principles. The Commission's guiding principles are:

- *o* Harness the power of the marketplace -- its vitality, flexibility, and efficiency;
- *o* Encourage people and institutions to act voluntarily;
- *o* Foster cooperative partnerships among governmental and nongovernmental groups and interests; and
- *o* Disseminate useful information to all segments of society.

Initiatives. The Commission has developed four major areas of emphasis, being addressed by four Committees; Pollution Prevention and Environmental Quality Management, Natural Resources Management, International Cooperation, and Education and Communications. Additional organizations have been invited to assist the Commission through participation in subcommittees and task forces. The Commission has decided to launch initiatives in the following areas:

- *o* *Quality Environmental Management.* Preventing pollution is generally more cost effective than trying to repair environmental damage after it occurs. In this initiative, several corporations are voluntarily undertaking demonstration projects to test the application of integrated Total Quality Management (TQM) and pollution prevention principles at specific facilities. Using the methods of quality control to prevent pollution and reduce environmental "inefficiencies," this project will rely on rigorous analysis of production processes and practices. It will result in a "blueprint" for using quality management to achieve pollution prevention, identifying process, measurement techniques, obstacles and barriers, and incentives to achieve a successful program.

- *o* *Energy Efficiency.* Increased efficiency in the use of electricity and fuel improves air quality, saves money, reduces emissions of greenhouse gases, conserves resources, and improves the economy. The Commission is seeking to encourage energy efficiency improvements on a national scale through the application of free market principles. Commission members are making voluntary investments in

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THE BUSH ADMINISTRATION AND THE ENVIRONMENT: ACCOMPLISHMENTS AND INITIATIVES

February 25, 1992

Environmental Quality

22nd Annual Report
The Council on Environmental Quality

THE PRESIDENT'S MESSAGE

1991 IN REVIEW

AGRICULTURE

AIR QUALITY

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THE WHITE HOUSE
Office of the Press Secretary

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ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

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FROM: THORNDIKE, Elizabeth: CENTER FOR ENVIRONMENTAL INFORMATION

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 01/31/92

SUBJECT: SHE IS AKING DR. BROMLEY TO CALL WILLIAM REILLY TO SEE WHAT CAN BE DONE TO PROVIDE SUPPORT FOR EXPANSION OF THEIR PROGRAMS.

****

DIRECTORATE ASSIGNED: ENVIRONMENT STAFF ASSIGNED:

ACTION REQUIRED: AS APROPRIATE STAFF ACTION:

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THE WHITE HOUSE

WASHINGTON

February 21, 1992

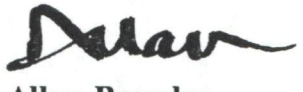
Dear Elizabeth:

Your letter to Bill Reilly was an excellent one and I have talked to him about it and hope that some action can be forthcoming. Obviously, your group has developed an international position of leadership in making available environmental information in convenient and attractive fashion.

Thanks too for sending me the excellent volume of articles. It already has been and will continue to be of very real use to me as we work to develop responsible and sensible policies in the climate change area.

With all best wishes,

Sincerely yours,



D. Allan Bromley
The Assistant to the President
for
Science and Technology

Mrs. Elizabeth Thorndike
Center for Environmental Information, Inc.
46 Prince Street
Rochester, New York 14607

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January 31, 1992

Hon. D. Allan Bromley
Assistant to the President
for Science and Technology
Old Executive Office Building
17th Street and Pennsylvania Ave., NW
Room 358
Washington, D.C. 20506

Dear Allan,

Enclosed is a copy of the material sent to William Reilly, as you suggested.

We would be most pleased if you would call him on our behalf to see what can be done to provide support for expansion of our programs, as per your letter of December 2, 1991.

Many, many thanks for your interest in our endeavors.

Sincerely,

Liz

Elizabeth Thorndike
President

ET/sc

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Center for Environmental Information, Inc.

46 Prince Street Rochester, New York 14607-1016
Phone 716-271-3550 • Fax 716-271-0606

January 31, 1992

Mr. William Reilly
Administrator
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

Dear Mr. Reilly,

Allan Bromley, who was the speaker at our 1991 annual meeting this past November, has suggested that I write to you, in the hope that support can be found to expand our activities.

CEI's services and programs have achieved a reputation for excellence, not generally associated with the image of a small nonprofit organization located in upstate New York.

We were founded in 1974 as an answer to the growing dilemma of where to find timely, accurate and comprehensive information on environmental issues. Our mission is to provide a link among the scientific community, educators, decision makers and the public, so that informed action follows the free interchange of information and ideas. We achieve this mission through a program of publications, educational activities and information services.

Our information services offer reference and referral on grassroots to global environmental issues; provide access to a broad spectrum of users, including educators, students, practitioners in government and industry, environmental groups, concerned citizens and the media; and emphasize the inter- disciplinary nature of environmental problems.

Two projects of special interest to EPA are our Air Resources Information Clearinghouse (ARIC) and our Program in Environmental Risk Communication (PERC).

ARIC publishes the two enclosed Digests which summarize current research, news and events; organizes an annual Washington conference; and has capability to respond to information requests. It provides a unique

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link among scientists, educators, decision makers and the grassroots public on issues such as acid rain, global climate change and ozone depletion. On the premise that climate change needs to be seen as the cumulative impact of countless local decisions about energy use and resource allocation, we are striving to provide states and localities with up-dated information which can assist the decision-making process at that level.

PERC was established to improve the quality of environmental decision-making by offering essential tools needed to help set environmental priorities. PERC is expected to make a unique contribution to the avoidance of community-based environmental gridlock. Consensus-building cannot resolve every environmental controversy but, as you know from championing the cause of mediation at the Conservation Foundation, it can be an effective alternative.

Most current risk communication efforts are directed to training industry and government officials. CEI expects to focus its efforts on assisting communities and affected individuals to obtain needed information, ask the right questions, gain credibility and establish some sense of comparative environmental priorities.

Over the years we have received relatively small grants and contracts (range of $5,000-50,000) from several federal agencies including EPA. It has always been difficult to learn the opportunities for, and distinctions among, grants, contracts, cooperative agreements, purchase orders, sole source suppliers, etc. – an understanding which apparently is routine for the Beltway-based firms and organizations which are immediately in the federal sphere. Thus, a small nonprofit organization based in the provinces is at a decided disadvantage in providing services which may be more cost-effective and more pertinent to the Agency's mission, because the organization is ill-equipped to "market" in the way larger or near-by institutions may do.

I have appended to this letter:

a. a representative list of current or recent projects already funded by federal agencies
b. a descriptive summary of four projects for which we are currently seeking support
c. a summary of proposed projects which address unmet needs, undoubtedly critical to the success of EPA programs

I have also enclosed with this letter:

- Global Climate Change Digest, January, 1992
- Acid Precipitation Digest, Nov.-Dec., 1991
- Brochure describing Digest and commendations
- Global Climate Change: Linking Energy, Environment, Economy and Equity - conference brochure

- Program in Environmental Risk Communication - brochure
- "A Question of Risk" - brochure
- EnviroSEARCH Marketing Plan
- 1990 Annual Report

Finally, I am sending under separate cover, three of our recent publications:

- Global Climate Change and Public Health, 1990
- Global Climate Change: The Economic Costs of Mitigation and Adaptation, 1991
- A Question of Risk, videotape with leader's guide, 1991

Milton Russell at the University of Tennessee, Mohamed El-Ashry at the World Bank, and Vincent Covello of Columbia University have all served on CEI Advisory Panels and would, I am sure, be most favorable references regarding our capabilities, as would Terry Davies (who is probably more familiar with my other "hat" as an Adirondack Park Agency commissioner).

In addition, we have many current EPA associations. Alex Cristofaro, Office of Policy and Planning, has been a speaker and has provided program support for our annual Washington conference on climate change. Alan Hecht of the International Activities Office and Edith Brown-Weiss both serve on the editorial board of the Global Climate Change Digest and Lynn Luderer, Risk Communication Program, is on our PERC Advisory Panel. Linda Spencer, director of INFOTERRA has agreed to serve on the editorial board of our planned new publication, EnviroSEARCH.

At Region II, James Marshall, long-time chief of staff, is very familiar with the calibre of our work, as is David Savetsky. The regional office has provided several grants (and awards) to CEI.

We would be most grateful if you could direct this request to the most appropriate staff. I would be happy to come to Washington to discuss these projects further at your earliest convenience.

Thank you very much for your consideration.

Sincerely,

Elizabeth Thorndike

Elizabeth Thorndike
President

ET/sc

Encls.

cc: D. Allan Bromley

Center for Environmental Information

Appendix I

Current and recent projects - Federal agencies

- Oak Ridge National Laboratory, 1991-92

  Directory of U.S. Global Change Research Centers

- U.S. Geological Survey, 1991-92

  USGS National Water Information Clearinghouse-Directory of Water Resource Agencies and Organizations in Maryland, Virginia and D.C.

- National Acid Precipitation Assessment Program, 1989-90

  Compilation of Private Sector and State Acid Rain Research

- U.S. EPA, Office of Risk Communication, 1990

  Partial funding for video production - A Question of Risk

- EPA, NOAA, ORNL, USFWS

  Partial support for global climate change and acid rain conferences, 1985-92

- EPA, Region II

  Support for training programs and identification of small quantity generators; non-traditional materials recycling workshops

Appendix II

Current requests for partial support – (For each project, CEI is contributing substantially from other sources)

Project	Description	Amount Sought
Acid Precipitation Digest	To help underwrite the costs of producing this publication, whose continued existence is critical to insuring the continuity and currency of information about acid rain research and policy	$50,000
Global Climate Change Digest	To underwrite the costs of providing approximately 500 subscriptions to U.S. agencies, and to scientists and policy-makers in developing countries who need to keep abreast of timely information	$150,000
"A Question of Risk" - video	To develop curriculum guide and to duplicate and distribute 10,000 copies of the video and leader's guide to 5,000 school district media/resource centers and 5,000 junior college, college, university and special libraries. At 200 viewers per district or institution per year, 2 million people would be reached – a conservative estimate	$250,000
EnviroSEARCH	A monthly newsletter, whose central feature will be annotated references to current non-technical literature covering 26 categories of environmental concern. It will also review the current contents of major non-technical environmental publications (including EPA Journal), provide access to evolving primary sources of information and provide for interactive Q & A about environmental information resources. The audience will be public, school, academic and special libraries, educators, practitioners and environmental groups.	$100,000

(Appendix II cont.)

This publication is expected to become self-supporting but will require start-up funds. Ironically, the sheer mass of nontechnical environmental information is not available in orderly citations; thus there is a void in the midst of plenty. Much of the information lies beyond the reach of its intended users and outside the ken of information "brokers" such as librarians and teachers.

Appendix III

Proposed projects - new

- Air Resources Information Clearinghouse

  A public phone and mail query center for reference and referral on all aspects of climate change and ozone depletion. 800 number widely publicized through major metropolitan directories. Clearinghouse would respond to environmental, energy, social and economic aspects. Especially targeted to reach states, localities, educators, consultants.

- Environmental Risk Clearinghouse

  800 number widely publicized. Would provide credible, yet supportive source of information for localities and individuals attempting to address environmental risks in their community; where to get information, how to gain credibility, how to assess and understand information, how to find the experts, how to ask the right questions.

- Environmental Risk Intervention

  – Development of <u>pro-active</u> community-based, consensus-building model for addressing clean-up of hazardous military/nuclear weapons production and storage sites using Seneca Army Depot in central New York as a case study.

  – Environmental Dialogue: Making Contact with the Other Side. Regional training programs to assist the establishment of community dialogue. The Russell study, Hazardous Waste Remediation: The Task Ahead, emphasizes the need for timely dialogues with community members about sites and their cleanup.

A summary of current news, research, and events

ACID PRECIPITATION DIGEST

Volume 9, Number 11–12 November–December 1991

PROFESSIONAL PUBLICATIONS

GENERAL INTEREST AND POLICY

■ "Increasing the Efficiency and Effectiveness of Environmental Decisions: Benefit-Cost Analysis and Effluent Fees. Critical Review Discussion Papers," *J. Air Waste Mgmt. Assoc.*, **41**(10), 1319-1333, Oct. 1991.

Consists of four independent critiques on the theme paper published in the same journal (p. 680, May 1991; *APD*, p. 81, July-Aug.), followed by closing remarks from the paper's authors, H. Gruenspecht and L. Lave.

"Using Benefit-Cost Analysis for Better Environmental Policies," A. Fisher (Dept. Agric. Econ., Pennsylvania State Univ., Univ. Pk. PA 16802), 1319-1322. Discusses the practical aspects of how decision makers can determine whether a proposed action is worthwhile.

"Economics, Ecology, and the Limits of Conventional Analysis," W.E. Rees (Sch. Commun. & Reg. Planning, Univ. British Columbia, Vancouver, B.C., Can.), 1323-1327. Conclusions reached in the paper have more dramatic implications for forests. Monitoring and long-term, ecosystem-scale research are urgent needs.

■ "Airborne Particles on Global and Regional Scales," G.E. Gordon (Dept. Chem., Univ. Maryland, College Pk. MD 20742), *Environ. Sci. Technol.*, **25**(11), 1822-1829, Nov. 1991.

A report of a recent American Chemical Society symposium (Atlanta, April 14-19) dealing with effects of airborne particles on the environment and techniques being used for investigation. The use of tracer ratios might provide a much-needed way of distinguishing anthropogenic from

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PIRLA Lake Project
Aquatic Biology
Effects on Vegetation
O₃ Effects on Vegetation

Center for Environmental Information

Elizabeth Thorndike
President

46 Prince Street
Rochester, New York 14607-1016

Phone 716-271-3550
Fax 716-271-06