

## MEMORANDUM

PUBLIC AFFAIRS DEPARTMENT

~~PAA~~ Shocking  
~~JAF~~ grammar!  
~~WTF~~ Terrible  
 grammar!

TO: Messrs. A. W. Atkiss  
 D. L. Baird  
 E. R. Cattarulla  
 T. M. Frois  
 E. J. Hess  
 T. P. Townsend

FYB PER - let  
 → Mary R

FROM: A. N. Vela, III

DATE: October 31, 1990

SUBJECT: Shareholders' Environmental Report

For your expedited review, attached is the second draft of the shareholders' Environmental Report. Attached also is a revised schedule (including all review deadlines) which must be adhered to in order to allow for printing to be completed by December 10, 1990.

Please note carefully the deadlines for required responses.

CRB:ew  
 Attachments

*Bob Ball*

c: C. R. Ball  
 J. J. Conley  
 D. E. Cornet/Winner Wagner -- EUSA  
 A. M. DiNovo  
 J. B. Davis  
 G. L. Graves  
 D. L. Guttormson -- EUSA  
 W. E. Hale/J. A. Morakis -- ECI  
 H. H. Hubble  
 Ms. J. B. Johnson -- ECA  
 T. Kalina/W. B. Wood -- ER&E  
 L. L. Lamberton  
 R. F. Lipsett -- IOL  
 A. G. Randol, III -- ECC  
 C. M. Shaughnessy -- EPRCo  
 T. L. Torget -- ECMC

**SHAREHOLDER'S ENVIRONMENTAL REPORT SCHEDULE**  
(REVISED)

The following schedule must be adhered to in order to meet December 10, 1990 print completion:

<u>DATE</u>	<u>EVENT</u>
10/31	Second draft distributed to E&S, Law, Secretary's, IR, PA, ROO PA Managers (to coordinate PA/E&S reviews), consultants.
11/2	<u>All</u> E&S, IR, PA comments must be reviewed at morning meeting to be scheduled.
11/5	Deadline for receiving ROO, consultant, remaining functional organizations' comments.
11/7	Revised draft with mock-up to LGR, LRR, REW for comments. (ERC, EJH, FR to advise executives of schedule.)
11/9	Deadline for receiving comments from LGR, LRR, REW.
11/15	Refined mock-up to LGR, LRR, REW.
11/16	Final refined mock-up <u>returned</u> from LGR, LRR, REW.
11/19	Send to printer.
12/10	Printing of <u>Environmental Report</u> completed.



Suggested title for publication: **Exxon and the Environment  
A Progress Report**

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(this would be the fold out matrix or time line)
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A Message from the Chairman

Long before the beginning of the modern-day environmental era, Exxon recognized its responsibility to manage its operations in an environmentally sound manner. Over the past twenty years in particular, Exxon has been in the forefront of developing and applying environmental practices and technologies throughout all our operations. But in today's world, that is not enough. In an era of heightened concern for the environment, we must also have dialogue to understand the concerns of others and communicate what we are doing to protect the environment. Hence, the preparation of this Progress Report, which is a part of that communication process.

Moreover, Exxon has a special obligation to report on our environmental record, which in light of the tragic Valdez accident, has overshadowed both our record of achievement and our continuing commitment, and has led to public concern over whether Exxon is a good steward of the environment. It is to this concern also, that this Report is addressed.

Exxon is committed to maintaining the high level of trust we have earned through over 100 years of outstanding performance. Our recent incidents have been as unacceptable to me as they have been to all of you, and our 100,000



employees worldwide fully realize that to retain the level of trust you have given us, we must re-double our commitment to the environment. I am happy to report that we have ... at all levels in the corporation's organization.

While we can never guarantee the elimination of all incidents, we can commit to doing all we can to prevent their occurrence. Since the Valdez accident, management at all levels has thoroughly reviewed all of our environmental, health and safety operations, with a view to building on what was already an impressive record of progress towards fostering a cleaner and healthier environment. For as tragic as that event was, an even greater tragedy would be our failure to learn from it.

As you read this Report, you will see an outstanding record of performance, a renewed dedication to improve upon what has gone before, and a recognition that while we have much to be justifiably proud of, we also recognize there is still more to do.

The Progress Report that follows this message does not encompass every aspect of our record on the environment. In a corporation as large as Exxon, that simply would not be feasible. However, as a glance at our time line in this Report will hopefully show, it is illustrative of what we have done and of the efforts currently underway.

And as we enter the decade of the nineties, dubbed by some as "the decade of the environment", rest assured that Exxon managers and employees are committed to work successfully toward striking a positive balance between the need to provide safe, economic, and reliable energy and chemical products, and the requirements of a clean environment.

These goals are fully compatible and provide the foundation on which all our actions are guided.

**L. G. Rawl**

**Chairman of the Board**

**Exxon Corporation**



## MANAGEMENT COMMITMENT

The cornerstone of any successful company program to provide a clean, safe and healthy environment is the unswerving commitment of its management. At Exxon, our management commitment led to the development of a wide array of environmental policies, practices and technologies, with many pre-dating the advent of the modern environmental era.

### Taking an Early Lead

Going back to the late 19th Century, when Exxon was Standard Oil of New Jersey, we began to introduce company programs and technologies that provided a healthy, clean environment both inside and outside the workplace. For example, in 1885 we developed a process to remove sulfur from crude oil, resulting in cleaner burning kerosene lamps. In 1918 we were one of the first in the industry to take direct responsibility for the safety and health of our employees by establishing an in-house medical department. And in the 1920's, we pioneered the establishment of occupational health standards for the industry, long before such standards were required by any government or public agency.

### Reinforcing Our Commitment

As technologies advanced, and public concern for environment, health and safety issues became more pronounced, our commitment to developing policies and guidelines to assist management in achieving environmental excellence has likewise been enhanced. As the "History of Commitment to Environment and Safety" foldout section of this report shows, Exxon has been in the vanguard of developing and applying technologies to make our operations cleaner and safer.

### Creating A Management Structure

Technology, of course, is only part of the equation in successfully dealing with environmental challenges. Providing a set of environmental policies and an organizational structure to ensure continuing environmental progress is also essential.

The genesis of building this structure goes back as far as 1964, when Exxon appointed the first environmental executive in the petroleum industry. Our management commitment was reinforced even further in 1971, when our Corporate President at the time, M. M. Briscoe stated at our first worldwide conference on environmental conservation that:



"Today's manager will be judged not merely upon his ability to run a taut ship and turn a neat profit, but upon the sensitivity and good judgement with which he handles problems of broad social concern."

Most recently, Exxon has redoubled its management commitment, and enhanced our management structure to manage environmental issues by:

- \* Establishing a Public Issues Committee of the Board to bring added focus on public issues, like the environment;
- \* Electing a highly respected senior scientist with the Woods Hole Oceanographic Institution as an additional outside director to the Board to give new perspective on environmental concerns;
- \* Creating a Corporate Environmental and Safety Department which is headed by a Corporate Vice President, and has overall responsibility for the corporation's environmental and safety efforts;
- \* Reinforcing the environment and safety organizations of each affiliate company. For example:

- In our domestic petroleum affiliate, a new environment and safety department was established reporting directly to its president
- Our international petroleum affiliate added eleven environment and safety related personnel to its headquarters staff
- Canadian oil company created a corporate environment department and a vice president of environment
- Our chemicals company appointed new environmental affairs executives to each of its three chemicals business groups
- Our coal and minerals company established a management committee to serve as environmental contact to each of its operations.

#### Management Implementation

In addition to these structural enhancements, policies on environment and safety already long in place were revisited throughout Exxon. The already established policies included, but were not limited to, placing responsibility on line managers and operating affiliates, training employees, undertaking necessary technology development and enhancing information exchanges with environmental coordinators. Then, in the process of revisiting these already established



policies, each affiliate critically examined its operations with an aim to reduce the level of risk, or in the unfortunate event of an accident, enhance our capabilities to respond. Specifically:

- \* Our domestic petroleum affiliate established task forces in each operating department. In 1990 the task forces visited over 90 facilities and had discussions with over 600 employees.
- \* Our Canadian affiliate completed risk assessment and management system surveys in 1990.
- \* In 1990 our coal and minerals company reviewed all their operations and developed recommendations for improvements.
- \* Our chemical affiliate intensified their scheduled risk assessments and accelerated the schedule to complete all sites by the end of 1990.
- \* Our international petroleum affiliate accelerated its scheduled site surveys, so that all principal sites, worldwide, will be reviewed by mid 1992.



### Responsible Care of Chemicals

In early 1989, Exxon's chemical company committed itself -- and played a lead role in developing -- a new program initiated by the the Chemical Manufacturer's Association (CMA) which is designed to improve the chemical industry's performance in health, safety and environmental quality. Known as the Responsible Care program, it consists of guiding principles and management practices which must be agreed to as a condition of membership in the CMA, along with a detailed manual pertaining to chemical manufacture, handling, and use.

### Adoption of API Principles

As members of the American Petroleum Institute (API), Exxon played a leading role in developing, and then adopting, a set of guiding environmental principles which express a dedication to continuous improvement in the areas of health, safety and stewardship of the environment. As with the CMA's Responsible Care program for chemicals, adherence to these principles is a condition for membership in API.

### Financial Commitment

Management commitment can also be measured in financial resources. Exxon's environmental expenditures from 1970 to



1989 has totalled over \$16 billion, with an average of over \$1 billion a year spent between 1979 and 1989.

### Tangible Results

Most importantly, and as will be shown in the pages that follow, management commitment can be measured in results. From reductions in air emissions to improved emergency response capabilities, Exxon's record has been one of steady improvement. Management commitment has made this possible, and management commitment will propel Exxon to make further progress in the years to come.

### Environmental Policy Statement

Underlying our entire management commitment is our Environmental Policy Statement. All of our managers are required to abide by this statement and use it as a guidepost to direct their actions, with responsibility for its implementation residing with the operating companies.

In 1971 Exxon was one of the first in the industry to adopt a position on environmental conservation. It was reaffirmed in 197\_, and has since been revised to become what is now our Environmental Policy Statement. It reads:

[newly revised policy to be inserted here]

## PROVIDING FOR SAFETY AND HEALTH

Integral to the success of any environmental program is providing for safety and health. While other environmental issues like air quality, risk minimization and response to emergencies are among the most visible and obvious components in environmental protection, the important role safety and health programs play cannot be overestimated. Indeed for Exxon, providing for safety and health represents the most important aspect of any environmental issue in terms of resources, personnel and management commitment.

Within the context of our industry, safety and health issues involve policies and practices which prevent injuries or illness to those most directly involved in our operations, such as employees, customers, and communities adjacent to our facilities.

As technology and medical science have advanced over the years, we have become more aware of the potential impacts our operations might have on safety and health. Consequently, our programs have been enhanced to the point where we now have one of the most extensive health and safety programs in the industry.



### Occupational Safety and Health

Exxon's commitment to occupational safety is a continuation of a long history we have of being a pioneer in the field. Going back to 1917, Exxon established a medical service organization for its employees which has been in operation, worldwide, ever since. Beginning in the 1920's, Exxon's medical departments participated in corporate decision making on the highest level; doctors accompanied exploration teams to assess risks to worker health, and identified programs to ensure the safe operation of refineries and toxic substances.

### Operational Safety

In recent years, Exxon's record on operational safety, as measured in terms of number of incidents, has improved markedly. And while any incident is one too many, it is encouraging to see the steady progress we are making toward our ultimate goal: zero incidents. For example, over the past 15 years, the number of fires and explosions in refineries and chemical plants has declined 50 percent. The average annual number of incidents of all kinds have gone down approximately 25 percent from the late 1970's to the late 1980's. For the petroleum business alone, the decline was nearly 35 percent.

Yet, while the frequency of incidents may be an appropriate index of safety stewardship, we can, nevertheless, be reminded that the severity of any one incident can be disastrous. The tragic explosion and fire at our Baton Rouge Refinery during record-setting cold weather in December, 1989, resulted in two deaths and several injuries. Fire safety has always been a deep and abiding concern to Exxon and continuing programs to improve our performance remain firmly in place.

Exxon employs an inter-disciplinary approach to occupational safety which includes:

- \* Physicians who coordinate our occupational health program and evaluate any health affects related to work assignments;
- \* Toxicologists who study toxicity potential for our products and processes for employees, customers and the environment, and who recommend protective exposure standards;
- \* Industrial hygienists who work to assure exposure standards are being met in our plants, and who help establish safe procedures;



- \* Epidemiologists who assess health and disease standards of employees and other groups as they relate to the work environment;
- \* Safety Engineers and other safety experts who work closely with medical and health professionals to recommend and implement detailed safety practices and programs; and
- \* Product Testing through Exxon Biomedical Sciences, Inc., a central technical resource employing nearly 87 full-time scientists and their staff.

#### Recent Initiatives and Results

Exxon has recently intensified its efforts to improve its performance in safety and health related activities. A few examples, and their results, include:

- \* Our chemical affiliate accelerating its safety compliance reviews so that 35 have been completed in 1990. Compliance review training was conducted eight times in 1990 for over 200 employees, many more than in the past.

- \* Our domestic petroleum affiliate's medical department is pursuing long-term studies to determine the psychological and physical effects of large oil spills on those involved. The goal is to help us deal proactively with potential health problems in the event of future incidents.
  
- \* Our domestic shipping affiliate taking top honors at the annual 1990 American Institute of Merchant Shipping safety award ceremonies, with our vessels receiving 20 out of 58 total awards.
  
- \* Twelve of our overseas refineries received US National Safety Council awards in 1989 for having no disabling injuries.
  
- \* Nineteen of our foreign and domestic chemical operations became eligible for the National Safety Council's Award of Honor in 1989.



## CONTROLLING AIR EMISSIONS

Among the environmental issues concerning the public today, such as soil contamination and water pollution, perhaps none is more pervasive than air quality. Beginning with the Clean Air Act passed by the United States Congress in 1970, our government launched a broad-based, comprehensive effort to clean the nation's air. Subsequently, this effort has been reinforced on a global scale, as scores of industrialized nations have tightened their air emissions standards.

### Applying Early Technologies

Even prior to 1970, Exxon was aggressively applying innovative technologies to reduce air emissions from its operations. For example:

- \* Floating Roofs. Exxon was one of the first to develop and install floating roofs on our storage tanks at refineries and chemical plants. These roofs float directly atop the stored products, moving up or down as the tank is filled or emptied. This eliminates vapor space between the product's surface and the roof, thereby reducing evaporation of hydrocarbons into the air.

- \* Electrostatic Precipitators. This is a process where an electrically charged screen that is installed on smokestacks prevents dust from going up the stack. The process functions on the same principle as static electricity attracting lint to clothing.
  
- \* Bottom Filling. Pumping petroleum products into tank cars, trucks and storage tanks at terminals and service stations is another potential source of emissions because splashing liquid causes vapors to escape into the air. To prevent this, Exxon has long applied a method of pumping through "drop tubes" that reach the bottom of the tank. In filling an 80,000-barrel gasoline tank, this loading method saves as much as 160 barrels of product that would otherwise escape into the air.
  
- \* Smokeless Safety Flares. On occasions when safety factors require flaring of certain gases, incomplete burning of these gases can result in smoke emission. To eliminate this emission source Exxon installed smokeless safety flares at our refineries which injects steam into the flame at the top of the stack, causing greater combustion efficiency. The reaction is similar to what occurs when smoke is blown on the end of a lit cigarette.



### Developing New Technologies

Following 1970, a dramatic acceleration in the development of new air emission technologies occurred. Exxon has been an acknowledged leader in this field, and was responsible for introducing some of the most significant technologies, many of which are used by other companies worldwide. Included among them are:

- \* Exxon Wet Gas Scrubbers, which reduces particulate and sulfur dioxide emissions at our refineries. Exxon has eight such units currently in operation, with two more on the drawing boards. Since the first unit began operation in 1974, it is estimated that Exxon designed scrubbers have prevented 150,000 tons of particulates and 350,00 tons of sulfur dioxide from entering the atmosphere in the United States alone. This technology has been extensively licensed to other companies, and is now a key part of most U.S. and foreign refineries.
  
- \* Thermal DeNOx, an Exxon patented process which reduces ozone-forming nitrogen oxide emissions from combustion facilities by converting them into harmless nitrogen and water. This process, which has been applied to over 90 domestic and foreign units, can remove 50 to 90 percent of nitrogen oxide emissions. Its broad application is particularly noteworthy. Boilers fired



by gas, coal and oil have utilized Thermal DeNOx, as well as municipal incinerators that burn everything from garbage to tires.

- \* Flexsorb, a solvent developed by Exxon which reduces nitrogen oxide by 50 to 90 percent from combustion facilities. First applied at Exxon's Baton Rouge refinery in 1983, it is now used at over 20 units, where it is removing over one million pounds a day of sulfur. The removed sulfur is then sold for use in a variety of commercial and industrial applications. Exxon has made this technology widely available to other companies.
  
- \* Gofining and Residfining processes which eliminate over 80 percent of the sulfur in fuel oils used in power plants. Twenty six power units now employ Gofining and Residfining, resulting in an estimated 7500 tons per day of sulfur being removed from the atmosphere.
  
- \* Flexicoking, which converts high sulfur oil into low sulfur fuel oils, where 60 to 70 percent of the original sulfur is removed. At a time when the world's crude oil supply is becoming higher in sulfur content, this process is gaining ever greater application in refining the world's oil.



The combined results of these emission technologies amounts to over 250 million pounds of sulfur and 20 million pounds of nitrogen oxide per year that will not enter the atmosphere due to their application.

#### Additional Technologies and Applications

Other technologies invented by Exxon to control emissions includes the Evaporative Loss Control Device, which Exxon introduced in 1967, and which was mandated on all U.S. vehicles in 1971. It is used to reduce hydrocarbon vapor losses. Exxon produced the first research vehicle with catalytic converters to meet U.S. clean air requirements. And Exxon produced the first research vehicle with an exhaust gas recycle mechanism to help reduce nitrogen oxide emissions from vehicle tailpipes.

In Europe, our Exxon affiliate, Esso, was among the first in the industry to offer high octane unleaded fuel, making it possible for many cars requiring super premium grades to switch to unleaded gas. In the United States, the aggressive introduction of reduced-emissions gasolines in 20 states has established Exxon as the volume leader in such gasolines.

In our coal operations, the primary source of emissions comes from dust stirred up by earth moving activities.



Techniques used to control these emissions include spraying haul roads and fixed locations such as coal dumps with water. This has achieved a 50 percent reduction in emissions where applied. Providing wind erosion protection on stockpiles by using a quick growing grass mixture and mulches has reduced emissions there by 75 percent. And storing coal wherever possible in enclosed facilities reduces emissions from those sources by 99 percent.

Through "coal washing" at our underground mines in the Eastern U.S., sulfur content is reduced 25 percent and particulate matter, or dust, by 50%. Then, when the coal is burned at power stations, a proportional reduction in sulfur and dust is removed from the atmosphere.

### Resources and Results

To show results, technologies must be applied to real life situations. Here, our record is equally successful. To date, our cumulative efforts to reduce air emissions in our own company operations, worldwide, has produced:

- \* A 50 percent reduction in emissions from our refineries from 1973 to 1989, which includes a 66 percent reduction in sulfur dioxide, an 85 percent in particulates, and an 85 percent reduction in volatile organic compounds.



- \* A 70 percent reduction from our chemical plants between 1979 and 1989, including a 29 percent reduction since 1987 alone; and
- \* A 40 percent reduction from marine facilities between 1979 and 1989.

In terms of resources, we have spent about \$8.4 billion in capital investment and operating expenses between 1970 and 1989 to control air pollution.

#### Looking to the Future

While we are proud of the level of commitment and measure of success we have achieved in reducing air emissions, Exxon is committed to further improvement. As part of our management commitment, all our operating affiliates are reviewing with the Corporation's Management Committee their plans for achieving future emissions reduction. Within Exxon's chemical operations, for instance, some goals have already been set, such as an additional reduction of 50 percent in emissions within five years.

## PROTECTING OUR WATER RESOURCES

Co-equal to air and land, water is Earth's most precious resource. Keeping it clean and conducting our operations in a manner which protects animal and plant life living in the water is our responsibility to future generations.

Historically, Exxon has always taken this responsibility seriously and have endeavored to ensure that our activities will preserve and protect this resource now and in the future. Besides the efforts discussed below, other major Exxon programs to protect our water resources may be found in the chapter on reducing risk.

### Petroleum Exploration and Production

Before petroleum can be refined and brought to market, it must of course first be discovered and extracted from the Earth. In the marine environment this poses special challenges. Yet the major portion of untapped reserves now lie under our oceans, so the demands of the marketplace compel us to explore and produce petroleum from these regions. Therefore, Exxon has made a concerted effort early on to develop technologies in this area to meet our twofold responsibility of meeting the demands of the marketplace while protecting the environment. Among our technological contributions has been the development in 1967 a Sleeve Exploder as an alternative to dynamite for marine seismic



exploration. Dynamite is environmentally detrimental because its acoustic pulse produces fish kills. With the sleeve exploder, acoustic pulses are produced with much slower rise times which limits its impact on fish.

In 1987 Exxon participated in a joint research project with Western Geophysical and Hydra-Acoustics to produce the Marine Vibrator. This produces even less impact than the sleeve exploder, and is therefore particularly effective in environmentally sensitive areas such as whale spawning areas.

Exxon developed and applied technology for early sensing of petroleum leaks from subsea production systems. Known as the Hydrocarbon Sensing and Collection Systems, it has found application in the Gulf of Mexico in the 1970's and the North Sea in 1982.

Drilling for oil in areas subject to earthquakes requires careful planning and state-of-art engineering technologies. At Exxon, we met this challenge with the Santa Ynez Production Facility off the California Coast. More than twice the length of any previous offshore platform, it was designed in conjunction with the California Institute of Technology to withstand the strongest earthquake California could expect.



Yet concern for the ocean and its habitats does not end with the exploration and production of petroleum. Exxon has been a pioneer in transforming offshore structures into man-made reefs which literally become cornucopias for marine life. A notable example is Exxon's donation of its Submerged Production System to the State of Florida for use as an offshore reef.

### Petroleum Transportation

At Exxon, we have developed a substantial array of technologies and procedures to minimize pollution from transportation activities. Illustrative of these are:

- \* Load on Top. This technique, which has been in use since 1964, minimizes release of oily wastes to the sea during tank cleaning operations by separating the oil and water which mixes during cleaning. New cargo is then loaded on top of retained oil, resulting in recovery of over 95 percent of the oil remaining in the tanker after discharge of its cargo.
  
- \* Crude Oil Washing is another technique used to clean cargo tanks. In this procedure, some of the tanker's oil is used to wash the cargo tanks during discharge. This eliminates the necessity for mixing of oil and



water during cleaning, thereby substantially reducing discharge of oily waste.

- \* Six Inch Guardrails. Not all pollution prevention measures are complex or expensive. In the early Seventies Exxon USA equipped its inland barges with Six Inch Guardrails to contain deck spills. This proved so effective the Coast Guard now requires it as standard equipment on such barges.

#### Refining, Mining and Distribution Operations

Once petroleum has been removed from its source and transported to refineries, it must be refined into petroleum and petrochemical products, and distributed to its points of purchase. Extreme care must be taken whenever such operations have the potential to affect water quality. Likewise with our mining products, which also require processing and distribution.

Over the years, Exxon has employed innovative approaches to prevent water pollution in our refining, mining and distribution operations. They include:

- \* Wastewater Treatment. Since the early 1970's dramatic reductions in wastewater discharges have been achieved throughout Exxon's refining and petrochemical



operations. The Bayway refinery in New Jersey has achieved a reduction of about 95 percent in wastewater discharge through the installation of a variety of steps such as stormwater retention and advanced filtration. In 1976, our Baton Rouge refinery and petrochemical complex started up an activated sludge treatment plant, which reduced discharge of pollutants by more than 95 percent. During this period, the reduction in wastewater volume from all our U.S. refineries has been 47 percent, release of oil and grease by 96 percent, and release of total suspended solids by 88 percent.

- \* Reducing Water Consumption. Traditionally, cooling water needed for oil refineries is drawn from an adjacent water sources, and then returned directly to the source. This causes considerable water loss through evaporation. Conservation programs instituted on a large scale at our refinery and chemical plants enable us to save precious resources. In the mid 1970's, for example, our Baton Rouge refinery completed the installation of cooling towers to replace once-through cooling water. This has reduced water consumption from 200 million gallons per day to zero.
  
- \* Upgrading Underground Tanks. Over time, metal underground tanks can corrode and leak gas into the



groundwater if no action is taken. To prevent this, Exxon has embarked on an accelerated program of upgrading its underground tanks by lining them with fiberglass and providing additional monitoring systems.

\* Water Quality Related to Coal Mining. Exxon's coal and mineral operations employ many control techniques to prevent seepage from coal mines include:

- Using reed grass to control wave erosion of slurry ponds and to reclaim delta areas
- Controlling and treating surface runoff from disturbed land to remove sediment by treating water in a sedimentation pond prior to discharge off-site.
- Constructing diversion dikes and channels in surface operations to prevent water from contacting disturbed land, thereby avoiding contamination.
- Lining coal slurry ponds with clay or synthetics to prevent groundwater contamination.
- Collecting water in underground operations in mine sumps where it is then pumped to the surface for treatment.

\* Pipeline Leak Detection. Pipelines hold another potential area for leakage into groundwater and under-water aquifers. At our Exxon affiliate in Canada, we



developed a new technique to locate pin-hole leaks in buried pipelines. Using an injected odorant, trained Labrador Retrievers have identified 15 places where leaks were occurring at levels which couldn't be detected by instrumentation. This technology is now being marketed to other companies.

But as we have learned, even with continual emphasis on performance, incidents can occur. In January, 1990, a leak occurred in a pipeline under the Arthur Kill waterway separating New Jersey from Staten Island, resulting in the loss of some 500,000 gallons of heating oil. The pipeline, protected by a corrosion-prevention system, had been tested successfully a month earlier. Ultimately, an independent laboratory analysis conducted under the aegis of an inter-agency task force, confirmed that the pipeline had been in excellent condition, indicating that it had been split by some external force.

Response was quick and coordinated. Although most of the oil evaporated, our people, working with government personnel, waterfowl experts and cleanup contractors, recovered 140,000 gallons. But that wasn't all.

Environmental studies of the short-term effects of the oil on the waterway were conducted. Additionally, Exxon took the unprecedented step of halting all marine operations to allow for a top-to-bottom study of overall operations and



facilities, focusing on how to achieve significantly higher safety and environmental performance.

The study team, consisting of international experts from both inside and outside Exxon, concluded that while operations were already above the industry standard, improvements could be achieved. Exxon will therefore invest over \$10 million to sustain higher levels of performance which will significantly enhance marine safety in New York Harbor.

The above is but a small sample of the worldwide efforts being taken by Exxon to protect water resources. Moreover, these efforts are illustrative of the commitment we have taken in all areas of environmental operations.

## SAFEGUARDING THE LAND

Like air and water, Exxon's businesses are integrally related to the land. Therefore, managing land resources always includes the objective of minimizing impacts during field operations, and reclaiming the land when operations are concluded. Some past and present examples in applying this approach to land management include:

### Petroleum Exploration and Production

- 
- \* Land Seismic Source Technology. In petroleum exploration, dynamite, which can damage surface structures and freshwater aquifers, has historically been used to provide seismic readings. In the mid-1970's Exxon patented a "Broadband Vibrator", which uses acoustic energy instead of dynamite to obtain readings on land formations. In the late 1970's a "Vibrator Force Controller" was developed which expanded this technology's use on almost any land surface.
  
  - \* Blowout Preventers. In the early days of petroleum exploration, "blowouts" of oil or gas due to a well drilling operations were fairly common occurrences. In response, Exxon took the lead in developing "blowout preventers" to lower the risks of blowouts. The



technology involved consists of a mechanical means of blocking off underground pressures that may be excessively high or dangerous. As a result, blowout incidents have been reduced dramatically.

- \* Cluster Drilling. In 1960 Exxon and a partner discovered a natural gas field under intensively cultivated farmland in Holland, where arable land is at a premium. In order to minimize surface disturbance, cluster drilling was carried out, in which six to ten wells were drilled from one site. After drilling, the terrain was restored to its previous condition.
  
- \* Spray Ice Islands. To minimize disruption of environmentally sensitive areas such as tundra regions in or near the Alaskan and Canadian Beaufort Seas, Exxon has made significant contributions to the development of spray ice technology. It involves spraying ice from natural seawater to create an island from which drilling operations can take place. After drilling is completed, the ice simply melts and disappears. This avoids the use of gravel islands which may have negative impacts on the environment.
  
- \* Arctic Exploration/Production Operations. Thick gravel pads to insulate the ground under buildings, or use of piles to let cold air circulate under them, are used to



prevent permafrost thawing. To protect the tundra surface, extra large tires which exert less pressure per square inch than a man's footsteps are used on construction vehicles.

- \* Trans-Alaska Pipeline. During construction of the trans-Alaska pipeline in the 1970's, special measures were needed to protect the fragile ecology of the area. To prevent thawing of the Arctic's permafrost from the frictional heat that occurs when petroleum moves through underground pipelines, Exxon, in conjunction with the seven company group which built the line, devised a method of sending chilled air through it.

#### Mining With the Environment in Mind

Land related environmental impacts from mining are the most visible and challenging to mitigate. Thus, Exxon employs a wide array of procedures to protect and restore the land. For instance, we restore disturbed lands to a condition equal to what it was before mining activities began. Surface erosion is prevented by using erosion control practices such as revegetation and mulching to prevent surface erosion. And rangeland is reclaimed for grazing through selective placement of trees and shrubs, such as was



reduce the total amount of solid waste from the site by  
about 70 percent.

- \* Our Chilean copper mine, Compania Minera Disputada de las Condes, was recognized by the Institute of Mining Engineers of Chile as the outstanding mining company in the nation. This recognition was owed, in large part, to our leadership in the environment.

### Preserving Wetlands

In sensitive wetland areas where Exxon has petroleum operations, special care has been taken to protect the local ecology. In 1968 we sold 55,000 acres to the state of Louisiana to create the Salvador and Pointe au Chien coastal wildlife refuges. They are managed by the state with funds provided by royalty payments from our petroleum operations there. Under the skillful supervision of game management experts, a multiple use of controlled activities is permitted, resulting in the creation of a thriving diversity of wildlife which contrasts very favorably to the unprotected areas surrounding the refuges. Moreover, our oil operations cause no disruption.

A similar arrangement was made at the Marsh Island and Rockefeller Refuges which are also in Louisiana wetland areas. Thanks to the sound land management practices made possible through Exxon royalties, the refuges carry the heaviest concentrations of wild alligators of any area in North America. So many, in fact, that some of them were



exported to Alabama, Mississippi and Arkansas to stock their depleted marshes and bayous.

At Avery Island, Louisiana, where we've been operating for over 45 years, Exxon shares 5,000 acres with snowy egrets and exotic trees and plants from around the world -- all living in harmony with the 117 oil wells we have on the island.

#### Creating A Wildlife Refuge

Britain's largest oil refinery, the 1,000-acre Esso refinery at Fawley is an unlikely place to find a refuge literally teeming with wildlife. Yet that's exactly what exists there, with 88 separate species of birds, twelve different types of butterflies, and a good representation of fish, reptiles, amphibians and mammals as well.

The clue to this variety lies in the wide diversity of habitats enclosed within the refinery, such as a marine environment, a freshwater pond, a marsh and woodland. By preserving these natural habitats through careful land management, the Fawley refinery is living proof that industry and nature can co-exist harmoniously, side-by-side.



## CONSERVING ENERGY

A key element in reducing emissions and effluents into the air, water and land, is energy conservation. The less energy we consume in the first place, the less potential for pollution. At Exxon's worldwide refineries and chemical plants, our conservation measures have reduced energy consumption by 35 percent from 1973 to 1989. Today, that means a savings of 70 million barrels of oil a year, with a cumulative total of over half a billion barrels. The fuel saved resulted in the prevention of Co2 emissions to the atmosphere totalling over 600 billion pounds.

As the examples that follow will show, Exxon has been a pioneer in the research, development and application of energy conservation technologies. In many cases we have shared these technologies with others, as well as applying them to our own operations.

- \* Process Improvements. Energy efficiencies are achieved, in part, through process improvements, such as new catalysts at refineries which operate at lower temperatures, yet give higher product yields. Or separation processes which, for example, take 40 percent less energy to remove hydrogen sulfide gases and use 30 percent less energy to clean up oils for use as lubricant bases.



- \* Plant Maintenance. Good plant maintenance, like good auto maintenance, can result in considerable energy savings. For Exxon, our plant maintenance program consists of such elements as tuning combustion systems and regular cleaning of heat exchangers, making them more efficient. Maintenance and facility improvements were helped by Site Energy Survey Teams, a program started in 1976, which has conducted over 60 surveys since then.
  
- \* Cogeneration. In any industrial process which produces energy, a significant amount of heat energy is wasted. The heat you feel from your car engine when you lift the hood is an example of this. Cogeneration is a process which recaptures some of this heat energy, and applies it to other uses, producing steam and electricity simultaneously. Cogeneration has been practiced by Exxon for decades, and has resulted in energy savings of between 10-30 percent compared to separate generation. Through cogeneration, Exxon has recovered about 1500 mega-watts of capacity, the equivalent of one and a half large electric generating stations, or enough electricity to provide for the average consumption of 625,000 U.S. households.
  
- \* Low Friction Lube Oils. In response to concerns over uncertain energy supplies that existed during the



1970s, Exxon patented the first low friction lubricating oil in 1977 under the brand name UNIFLO. It increased fuel economy by 5.5 percent over competing products of the time, while reducing emissions. In 1978 it was reformulated to provide an additional fuel economy of 4.8 percent.

\* Equipment Leak Detection and Repair. There is a large potential for energy and product loss through leaks from plant equipment such as valves and pumps. Exxon has an extensive program of detecting and repairing leaks that may exist at the tens of thousands of seals and pumps in our facilities. Just at Exxon's chemical operations alone, our vigilance has resulted in a more than 60 percent reduction in losses from leaks.

\* Customer Education. Our marketing departments play a major role in our energy conservation efforts. It has included the development and distribution of a handbook on energy conservation techniques and workshops for industrial and commercial customers to help advise them on how they can save energy.

#### Future Commitment

The above examples are but a small sample of the wide-ranging efforts being made by Exxon to improve



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## MINIMIZING WASTE

In recent years, waste from industrial processes has become an area of increasing attention and concern. This concern is understandable. Landfills in many parts of the world are reaching, or have reached capacity, and siting new ones has become increasingly difficult. Moreover, concern over the possible impact disposed wastes may have on the surrounding environment and human health have also risen, leading to increased research on how to dispose wastes in a safe and environmentally sound manner.

One part of the solution is to reduce the amount of waste generated at the industrial source. This is essential in order to provide long term protection to the environment, as well as our employees and the general public. Therefore, Exxon has made a concerted effort to achieve waste reduction, and we've achieved some impressive results. The examples that follow provide a broad overview of where stand of reducing waste.

### Reducing Waste from Chemical Operations.

At Exxon's domestic chemical operations, aggressive recycling initiatives have been primarily responsible for a 60 percent reduction, on a production adjusted basis, of



waste generation between 1982 and 1990. We now have a goal to reduce waste from these operations by an additional 50 percent by 1995.

At our chemical operations in Rotterdam, Holland, we are converting to a new technology for plastics manufacture that will reduce the total amount of solid waste from the site by 55-70 percent, or about 1800 tons a year.

At our Baton Rouge, Louisiana, Chemical Plant, a drier/incinerator project which (Need to insert basic description of project here) will reduce the volume of waste by 55 percent. This means on an annual basis there will be 1000 less truck shipments of waste going to landfills.

#### Plastics Recycling.

Exxon chemists and engineers are working hard to develop new ways in which plastics can be more easily sorted, processed and recycled. At Exxon's Summerville, South Carolina fabrics plant, increasing amounts of recycled material are being used to produce the final product. We are also proceeding in a joint-venture which would recover recyclable materials from municipal solid waste, and then develop and identify markets for the recycled materials.



Recently, we succeeded in developing a process to convert polypropylene, previously disposed in landfills, to consumer items such as sealant and caulking material. This has led to a 98 percent reduction in polypropylene waste at our Baytown facility.

Exxon's oil and chemical affiliates have recently joined forces in another program to encourage plastics recycling. It involves using recycled plastic from our one-quart SUPERFLO motor oil bottles, which will result in an estimated removal rate of two million pounds of plastic annually from the solid waste stream.

#### Waste Reduction at Petroleum Refineries.

Since the mid-1970's, waste disposal from our refinery operations, worldwide, has been cut in half. For example, at our Antwerp refinery in Holland, we are reclaiming and sending to a recovery plant, metals that were formerly disposed at landfills. At our Fawley refinery in Britain, we have recovered over 200 tons of spent cobalt-molybdenum rather than taking the traditional route of landfill disposal. And at our Rotterdam refinery in Holland, we are reclaiming sulfur contaminated soil for commercial use by sending it to a sulfur acid manufacturing plant. We've also converted to a new manufacturing technology which will



## REDUCING RISK

The primary businesses that make up Exxon: petroleum, chemicals and mining, are essential industries in a modern industrial world. Our standards of living depend on them. Yet as the Valdez oil spill and other accidents have shown us, they are also businesses which by their nature function with a certain element of risk to man and the environment. While it will never be possible to completely eliminate all risk, there are measures we can and have taken to reduce it.

To reduce the risk of oil spills, we have taken a number of steps, with some also being adopted by the industry at large. In Alaska, we have extended pilot coverage, provided a two tug escort to all outgoing tankers, reduced the speed of tankers in the Port of Valdez to ten knots, and restricted transits to daylight if ice poses a hazard. In New York Harbor, we have provided additional tug boat escorts, new equipment installation, improved fendering systems to decrease the chance of dock collisions, and improved cargo transfer systems.

### Training to Reduce Risk

The first line of defense against the risk of an unanticipated event is Exxon's employees. Therefore, we



have a time-honored tradition of hiring the best qualified individuals, and building upon their capabilities through rigorous programs of continuous training and development. In this way we minimize the risk of human error.

Just a few of the measures we have taken over the years to improve the risk management performance of our employees include:

- \* Blowout Prevention School. In the late 1960's, Exxon established one of the earliest formal training programs in well blowout prevention at the King Ranch in Texas. Thousands of domestic and overseas employees have been trained in Texas, and the program has been taken as seminars to worldwide locations. The techniques and programs developed by the school have likewise been shared with other oil companies.
  
- \* The Grenoble Tanker Training School. In 1967, Exxon established a school in Grenoble, France where shiphandling and maneuvering skills were taught with the use of scale models operating on simulated waterways in a lake. This facility was the only one of its kind, and was subsequently turned over to a third party operator, where it was made available for the benefit of the industry.



- \* Computerized Bridge Simulators. Since the establishment of the Grenoble School, more advanced training methods have come into being. Starting in the early Seventies, Exxon took an early lead in helping develop computerized bridge simulators. Similar to those used in the aviation industry, these simulators duplicate the bridge environments of some of the largest oil tankers and are used to train the officers of Exxon's international shipping fleet.

#### Reducing Risk with Technology

While the human element often plays a prominent role in either causing or preventing accidents, perhaps equally critical in risk avoidance is the use and application of technology. Exxon historically has been in the forefront of developing and sharing new technologies to prevent accidents, or among the first to apply new technologies developed by others.

Moreover, whatever technologies are used, Exxon recognizes that they are of little value unless maintained on a regular and conscientious basis. The following are a few examples of how Exxon applies technology for risk reduction:



- \* Inert Gas Systems. Exxon was an industry leader in retrofitting inert gas systems to its new class of super tankers. These systems act as a "blanket" in cargo tanks that minimizes risk of fire or explosion.
  
- \* Advanced Inspection Technology. To reduce the risk of rupture due to corrosion of storage tanks, Exxon is now using sophisticated technology such as flash radiography/eddy tank floor scanners to check the condition of tank bottoms.
  
- \* Navigation and Maneuvering Aids. Exxon uses the most advanced navigation equipment available today for our tanker fleet. Computer-based collision avoidance systems and Doppler based speed detection systems to aid in docking are representative of the kind of advanced technologies we employ to improve navigation safety for our tankers.  
  
To improve maneuvering capability, oversize rudders and upgraded steering systems are standard for most of Exxon's larger vessels. Many of our smaller vessels are equipped with bow thrusters to aid in harbor maneuvering and docking.
  
- \* Technology Transfers. On an international scale, we are improving our internal systems for transferring innovative technologies among Exxon's 19 principal



affiliates conducting oil and gas operations in Europe, the Far East, Australia, the Middle East, and Central and South America.

### New Initiatives Begun

Exxon has continued to intensify its efforts to reduce risks. We realize that achieving a "no-risk" environment for our operations is not possible. However, we are committed to minimizing the risks associated with all aspects of our operations and products. The costs to the corporation and the environment are simply too great to function under any less demanding a criterion.

The initiatives outlined below are built upon a solid foundation of long-term commitment to risk reduction.

- \* Operations Excellence Reviews. Following the Bhopal catastrophe in 1986 and later the Valdez oil spill in 1989, management identified eight areas where additional safety reviews should be implemented to further reduce risk. They range from reviewing the potential for release of toxic chemicals, to identifying ways to reduce the risk of major oil spills. Operations excellence reviews to date have found that, while existing programs are sound, improvements can be achieved. To that end, a number of risk reduction efforts been undertaken, including:



- Pipeline Replacement. Exxon's domestic petroleum affiliate is now in the process of expediting replacement of all pipelines that are approaching retirement thickness, are underwater, near environmentally sensitive areas, or located near public facilities such as public beaches and parks.
- Marine Terminal Survey Program. The greatest risk for an oil spill exists in or near port. For that reason, we enhanced our already extensive Marine terminal survey program with special focus on risk assessment and improving interface between ship and shore facilities.
- Leak-detection. We are now in the process of upgrading our leak-detection and emergency shutdown systems in offshore and marshland production operations.

#### The Foundation for Reducing Risk

Just as no man-made structure will stand for long without a proper foundation, our risk reduction efforts must rely on sound fundamentals. These elements include the highest standards of equipment design and construction, operational audits, and extensive product testing. They represent an integrated approach to risk minimization, and are given a high priority as part of our management commitment to the environment.



## RESPONDING TO INCIDENTS

Despite our best efforts to prevent accidents and reduce risk, human error, natural events or mechanical failure occasionally lead to incidents which cause environmental damage. Exxon is committed to respond by using the most advanced technologies, deploying well trained personnel, and executing emergency response plans which are thoroughly tested beforehand.

Demonstration of that commitment was shown throughout the cleanup of Prince William Sound following the Valdez accident. Exxon did not flinch from its responsibility, as evidenced by the many thousands of workers and billions of dollars applied to the clean-up effort. We are justifiably proud of our accomplishments. And while the Valdez experience has been a tragic one for everyone involved, the combined efforts of nature and man over eighteen months has restored Prince William close to its original condition.

As the following examples will show, Exxon will continue to respond effectively to emergency situations related to our operations through an integrated approach involving planning, training and technology.



Planning, Preparation and Resources

- \* Equipment Stockpiles. In conjunction with other companies, Exxon stockpiles large quantities of oil spill containment equipment, such as booms, skimmers and dispersants. The stockpiles are located in strategic locations worldwide, and are subject to ongoing reviews to determine their adequacy.
  
- \* Providing Leadership. Exxon has long recognized that effective response to emergencies requires the cooperative efforts of the industry as a whole. Therefore, we have taken a leadership role in improving emergency response through industry-wide cooperation. Elements of this cooperation includes:
  - Active involvement and promotion of an International Oil Spill Organization in the early 1980's;
  - Key involvements in oil spill response efforts by industry groups such as the American Petroleum Institute;
  - Encouragement of prompt oil spill clean up through the formation of international agreements such as the "Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution" (TOVALOP), which provides reimbursement by owners to national



governments of clean up costs, and the "Contract Liability for Oil Pollution" (CRISTAL), which supplements TOVALOP coverage from cargo owners.

- \* Emergency Response Teams. Throughout Exxon's operations, emergency response teams have been established to provide rapid deployment of trained professionals to the site of an emergency. Exxon Chemical, for instance, has established a 24 hour response system which is instantly activated by a telephone call.
  
- \* Marine Spill Response Corporation. In response to growing public concern over oil spills in U.S. coastal waters, Exxon has banded together with 19 other oil companies to form the Marine Spill Response Organization (MSRC). This unprecedented effort will provide the industry large-scale capability to respond to oil spills, at a cost of \$800 million over five years. Consisting of five strategically located regional response centers, each center will have the capacity to respond to spills up to the size of the Valdez accident.
  
- \* International Response Capability. Along with the domestic effort, as witnessed by our involvement in MSRC, oil response capabilities have been strengthened



considerably in our overseas operations as well. In 1990, Exxon spent almost \$20 million to increase our response capability to as much as seven times what existed previously.

- \* Added Response Capability. As part of an oil spill study begun in 1989, Exxon has identified where more response equipment is needed. In addition to the beefed up efforts both internationally and through the MSRC, Exxon has also added two emergency response tugs to the two it already has in operation in New York Harbor and San Francisco Bay. Surplus equipment from the Alaska cleanup is being shipped to various locations, as needed.
  
- \* Community Involvement. At Exxon's domestic refineries and chemical plants, we have developed emergency response plans which directly involves the community. Aspects of this involvement include:
  - Participation in city-wide catastrophic-event drills;
  - Working with local agencies to install emergency siren warning systems;
  - Educating the community on actions to take in the event of an emergency; and
  - Providing financial and technical support to local fire departments.



### Training

- \* Oil Spill Response. Since 1981, 4,000 Exxon supervisors have had formal training in oil spill response, which has included simulation exercises in 10 countries.
  
- \* Oil Spill Manuals. In the late 1960's, Exxon undertook an extensive review of oil spill response capabilities and issued its first comprehensive oil spill manual in 1969. It defined the basic responsibilities of company affiliates, the need for preplanning and the requirements for personnel and equipment. This effort has culminated in what is now a widespread distribution of a five volume Oil Spill Manual. For field personnel, ready access to key information is also available in a pocket size manual.
  
- \* Drills. Throughout our land and marine operations, numerous drills are performed which replicate disasters such as underground mine fires or collisions of ocean vessels. These drills entail the participation of as many as 100 people.



## Technology

- \* Chemical Dispersants. To minimize the impact of oil spills on shorelines and sensitive marine environments, Exxon recognized early on the potential of chemical dispersants. Beginning in the early 1950's Exxon began research on developing chemical formulations designed to break up oil slicks on the water surface into tiny droplets. Wave action then disperses the droplets, where they are diluted and rapidly decompose, thereby greatly reducing the extent and duration of ecological harm.

As a result of our extensive research, Exxon began commercial introduction in 1967 of a family of dispersants known as Corexit which the U.S. Coast Guard and many national governments have acknowledged as safe and effective.

- \* Bioremediation. In the Valdez spill clean-up, impressive results were achieved by a new process we helped develop called bioremediation. It is a process whereby micro-organisms literally eat spilled oil. It was used with great success on 75 miles of Alaskan shoreline in 1989. In 1990, widespread application was completed at over 350 locations in Prince William Sound and the Gulf of Alaska.



- \* Sharing Technology. In the interest of helping others improve their response capability, we have participated in numerous forums to develop and share oil spill technology with private organizations and governmental agencies. An example of this is sharing the knowledge we gained from the Valdez cleanup effort, where we provided 265 formal presentations, 180 briefings, and produced 250 videotapes for widespread distribution.



## WORKING WITH OTHERS

Regardless of the level of expertise or commitment a corporation has towards the environment, no company can function effectively in this area without the active involvement of others. Whether it be government agencies, private organizations, outside environmental groups or individual citizens, Exxon has long recognized the importance of working with others.

Such an approach enhances our ability and knowledge in managing our operations on behalf of the environment.

### Interaction with Government Agencies

In order to assist governments on all levels in making well-informed decisions on environmental policy, Exxon representatives provide technical information and counsel on the environment, safety and health. Exxon serves as technical advisors to such bodies as the European Economic Community, the United Nations Environmental Program, the U.S. Environmental Protection Agency, and many others.



Often, Exxon participates in joint government/industry research projects, where public and private sector resources and expertise can be pulled together to find technical solutions to complex environmental problems.

### Leadership in Private Sector Efforts

Despite Exxon's extensive research capabilities, there is only so much we can do on our own. Therefore, we have helped establish and fund private research organizations that are doing pathbreaking work in finding solutions to environmental problems. Four such organizations are:

- Clean Sites, Inc., founded in 1984 for the purpose of accelerating the clean up of hazardous waste sites.
- The Chemical Industry Institute of Toxicology. Established in 1974 with Exxon and seven other chemical companies. Its charter is to improve scientific understanding of the potential adverse effects of chemicals and consumer products on human health.
- American Industrial Health Council. Currently chaired by Exxon's Director of Toxicology, this research organization works to gain better understanding of environmental health risks, and to open dialogue with government to encourage the application of sound



scientific principles as the basis of regulatory and legislative action.

- The Council for Solid Waste Solutions. The Council's mission is to develop technologies that will facilitate recycling, waste-to-energy incineration and landfilling in an environmentally sound manner. The Council is also active in helping shape responsible environmental legislation on the federal, state and local levels.

#### Supporting Environmental Groups

As important as it is for us to work together with private research organizations and government, we likewise support environmental groups who are working constructively to resolve pressing environmental problems. Exxon's involvement with such groups is extensive and far reaching, with the main focus of support centering on scientific environmental research and development of sound public policy. Grants from Exxon to public sector groups totalled \$13.2 million from 1970 through 1989.

Representative examples of programs from among hundreds Exxon has supported are:

- Providing assistance to the Louisiana Nature Conservancy for the acquisition of wetlands to protect



wildlife habitats near New Orleans and the Bluebonnet Swamp.

- Studies of the environmental impacts on North American bird populations by Cornell University, Laboratory of Ornithology.
- Support for a program by Nature Conservancy International to preserve ecologically valuable islands, forests, streams, lakes and beaches.
- Expanding environmental protection expertise in developing countries by supporting the work of the World Environment Center.
- Through the World Wildlife Fund, we are supporting the development of a world conservation strategy by utilizing environmental case studies.
- Through the Bermuda Biological Station for Research, we support vital research on marine environments and provide grants for visiting marine research scientists and graduate interns.
- Under the auspices of the Smithsonian Institution, we provide assistance to the Tropical Research Institute for studies of coastal mangrove forests in Belize and



for training of Latin American nationals in environmental protection.

### Global Environmental Concerns

A growing appreciation of environmental and health issues that extend beyond national boundaries to become global concerns has led Exxon to take an active role in seeking answers to some of the global issues which confront us. Three such issues are ozone depletion, global warming and destruction of tropical forests.

With ozone depletion, Exxon was a participant in a 10 year joint industry/government research program which evaluated the impact of man made gases on the ozone layer of the atmosphere. The reason for concern is that the ozone layer shields the Earth's surface from intense ultra-violet rays. Overexposure to these rays can lead to increased incidences of skin cancer. Based upon the findings of Exxon-sponsored research, a link between ozone depletion and man-made gases was determined. Therefore, we have endorsed the Montreal Protocols; an international agreement calling for the gradual phase-out of the manufacture and production of gases that deplete the ozone layer.



Regarding global warming, Exxon initiated research and analysis of the issue long before it became prominent with the public. Going back to the early 1980's, we were the first in the petroleum industry to investigate the greenhouse theory, and have committed about \$2 million to basic research.

At this point, our scientists believe much more research still needs to be done to either confirm or deny a cause and effect relationship between emissions from man-made sources and global warming. Moreover, a consensus among scientists has yet to be reached on whether the global warming theory can hold up in the face of additional evidence. In fact, there is some evidence which indicates that the Earth's climate is not warming at all. Until these uncertainties are resolved, Exxon is committed to supporting additional research.

Destruction of tropical forests for pastures, farmland and timber has become a major international issue in recent years. Exxon has played a role in helping to restore tropical forest in Costa Rica by supporting an ambitious program to rebuild a 270-square-mile park just south of the Nicaraguan border. Called the Guanacaste National Park project, it is receiving funding from Exxon through the World Wildlife Fund and the international program of the Nature Conservancy.



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In Cameroon, Africa, Exxon employees worked directly with the Cameroon government and the World Wildlife Fund to build an operating base for the Korap National Rain Forest project in that country. And in 1989, Exxon made a three year special grant to the New York Botanical Garden to support their research on identifying effective and economical alternatives to deforestation taking place in Brazil.



RECOMMITTING OURSELVES TO THE ENVIRONMENT  
by Edwin J. Hess, Corporate Vice President  
Environment and Safety

As the preceding pages of this Progress Report reveal, Exxon has a long and proud history of responsible management in regard to the environment. The commitment to environmentally compatible products and operations has always been there. But Exxon, like all companies whose businesses affect the environment, is faced continually with new challenges and opportunities. The most notable of these challenges is to meet ever higher standards of performance in response to ever increasing public expectations. We accept that challenge, and have recommitted ourselves in every facet of our operations to demonstrate a meaningful and visible response to those expectations.

Fortunately, the challenge put before us comes at a time when continued technological innovation gives us added capability to make good on our commitment. Over the last twenty years, we have experienced a proliferation of innovative technologies which have allowed us to make great strides in making our operations cleaner and safer. This progress shows every sign of continuing into the future. This gives me great cause for optimism that we will be successful in further improving our performance regarding



the environment, and do it without sacrificing economic growth and opportunity. This is part of the legacy which Exxon will help leave for future generations.

Technology alone, however, is only part of the solution. All the technological advancement in the world will do little good in the absence of high standards of operating performance. Therefore, Exxon's management and employees are redoubling their efforts in this regard. The creation of the Environment and Safety Department at the corporate level, which is responsible for overseeing and coordinating environmental activities of operating organizations, is but one example of that commitment.

In the years ahead, Exxon will not relax its resolve to provide its customers and the public with the environmental performance they demand, while supplying efficiently the energy products they require. These goals, as stated by Exxon chairman Larry Rawl in his introduction to this Report, are "fully compatible", and we remain dedicated to successfully accomplishing them both.