

*Annual Report to the Congress: January 1
to September 30, 1983*

March 1984

**annual
report**

To the Congress

**January 1
to
September 30
1983**

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Section I.-Statements by the Chairman and Vice Chairman of the Board, TAAC Chairman, and the Director of OTA

CHAIRMAN'S STATEMENT- CONGRESSMAN MORRIS K. UDALL

The year 1983 was very productive for the Office of Technology Assessment. OTA made substantive contributions to about 60 different committees and subcommittees. They ranged from major, comprehensive reports to testimony and special analyses. Considering the complex and controversial nature of the issues OTA must deal with, it is commendable that its work continues to be given uniformly high marks for quality, fairness, and usefulness.

During 1983, OTA was active in such diverse areas as hazardous and nuclear waste management, acid rain analyses, cost containment of health care, technology and trade policy, Love Canal, wood use, and polygraphs. The evidence of testimony, briefings, other requests for assistance, as well as reception of OTA's products by committees emphasizes the contribution made by OTA to the legislative process.

VICE CHAIRMAN'S STATEMENT- SENATOR TED STEVENS

The lives of our citizens and the issues of government have increasingly been influenced by science and technology. Congressional committees and Members are drawn into the complexity of science and the controversies involving technology as they face the necessary decisions of government. OTA serves as a shared resource of technical and analytical expertise for all committees. OTA's organization and procedures enable it to draw on diverse outside sources of information and advice. This enables OTA to bring to committees a synthesis of national wisdom about key issues, and alternative options for Congress to consider.

The problems faced by Congress are getting increasingly complicated and technical. Over its first decade of existence, OTA has developed and tested a way of providing information that now makes it an essential tool of Congress.

TAAC CHAIRMAN'S STATEMENT- CHARLES N. KIMBALL

During 1983, the Technology Assessment Advisory Council (TAAC) examined several current and recently completed assessments, reconfirming that OTA effectively uses information and advice from across the Nation in carrying out its analyses and critically reviewing its work before publication. TAAC also reviewed the various activities associated with "delivery" of OTA's work, mainly to Congress.

In this regard it is important to note that, from the outset, effective communication with interested committees needs to be maintained. Delivery is far more than transmittal of a document; it is a process that begins with scoping of the work plan, continues in the form of briefings, testimony, and some interim documents, is formalized in publication of the formal report, and then is further employed (sometimes for years) in the form of selected deliveries and follow-on analyses.

Thus OTA's relatively small staff plays several key roles: formulation of studies, organization of work, analysis and synthesis of results, and delivery to Congress. We believe that no other Federal organization is comparably organized in this way, and that the agency is thus uniquely able to serve Congress in wrestling with complex sociotechnical issues.

TAAC has given some thought to the kinds of issues that continue to merit OTA's attention. These include:

1. long-term implications of advances in life sciences and their application to health care and biotechnology;
2. the general condition of science and technology in the United States, e.g., as it affects long-term economic competitiveness;
3. physical infrastructure issues, including transportation and utilities; and
4. national security questions, especially the impacts of technology.

During 1984, in response to TAB's invitation, TAAC will examine in more detail the kinds of issues we from outside Congress believe merit OTA's attention. At this point it is our impression that the present agenda of work is extraordinarily broad, clearly relevant to public policy questions, and of unusually high quality.

DIRECTOR'S STATEMENT-JOHN H. GIBBONS

“A sense of the future is behind all good politics. Unless we have it, we can give nothing—either wise or decent—to the world.”

C. P. Snow

By the time this report is printed we'll be well within Orwell's year. Of course Orwell picked 1984 rather arbitrarily—his famous novel was written in 1948 so he simply reversed the last two digits. But it serves to remind us of an enigma—the importance of thinking ahead, yet the impossibility to predict the long-term future of the human enterprise with any precision.

OTA was not created to predict the future, but rather to provide a perspective of implications for the future of alternative present actions, and to maintain for Congress a *sense* of the future and implications of emerging developments in science and technology.

The rapidly unfolding saga of science and technology was never more apparent than in 1983, and no abatement appears on the horizon. As usual, there is bad news along with the good. The microscopic world of cells, molecules, and solids of various kinds, combined with human scholarship and inventiveness, is yielding improved ways to communicate, save energy and other resources, diagnose and treat disease, better our crops, and entertain ourselves. But it also makes warfare all that more terrifying, undermines privacy, and revolutionizes our workplace in troublesome ways.

Since Orwell wrote “1984,” the molecules of heredity have been discovered. The understanding of the splendid and spectacular mysteries of living things is growing at a blistering pace. We now know the complete chemical structure of some viruses, and are within striking distance of determining the total genetic specification of bacteria. The implications of the extraordinary advance in knowledge are a continuing activity at OTA.

While new knowledge merits a lot of investment and attention, existing resources and institutions are also keys to our survival, growth, and quality of life. Therefore OTA devotes considerable effort to analyzing the state and health of such resources as air and water quality, land productivity, materials, energy, international competitiveness of U.S. industry, the quality and cost effectiveness of health care, and critical areas of national defense.

It is neither possible nor desired that OTA be the fount of wisdom on such a broad array of topics. Therefore, by design, OTA is organized to catalyze and synthesize information on controversial technical issues and to present the facts and alternative options to Congress. Since these issues are of interest to many different congressional committees, OTA acts as a shared, nonpartisan resource for Congress and, through Congress, for the American people.

Section II.-Year in Review

The assessments carried out by OTA cover a wide spectrum of major issues that Congress and the country are facing. A brief summary of each report, published by the Office during the year* is presented in this section. The reader is cautioned that these are synopses of reports. They do not cover the full range of options considered or all of the findings presented in any individual report.

Wood Use: U.S. Competitiveness and Technology

The United States could greatly expand its role in world forest products trade over the next decade and become a net exporter of solid wood and paper products before 1990. For the past 30 years, the United States typically has imported more forest products than it has exported. However, because exports have grown faster than imports, the trade deficit has narrowed. This trend is likely to continue.



Wood Use
U.S. Competitiveness
and Technology



Global demand for a wide range of forest products is growing rapidly, and the best trade opportunities for U.S. producers appear to be in the paper markets of other industrialized nations, particularly Western Europe and Japan. In contrast to many basic U.S. industries, the forest products industry has distinct advantages over its foreign competi-

tors. It is the most productive and among the most efficient in the world, benefiting from a vast and highly productive domestic forest resource.

To capitalize on international trade opportunities, the forest products industry and the Federal Government probably will have to make concerted efforts to promote exports. Although responsibility for developing foreign markets rests primarily with the private sector, Government action could assist in overcoming trade barriers which currently inhibit the competitiveness of U.S. wood products in foreign markets.

Past Government and private sector concerns regarding a possible domestic timber shortfall no longer seem justified. Future timber needs, especially for housing but also for other products, probably have been overestimated. The effects of intensive timber management and the ability of wood utilization technology to stretch the wood resource, have probably been underestimated.

If current trends toward more intensive forest management continue, domestic needs for wood probably can be met without dramatic price

*This OTA Annual Report represents a transition from calendar year reporting to fiscal year reporting. It therefore covers the period January 1 through September 30, 1983.

increases. To achieve the full economic potential of U.S. forestlands, however, some changes in policy would be needed, as would an estimated investment of \$10 billion to \$15 billion in intensive timber management over the next 35 to 50 years,

Although both the Government and private sectors are now investing in intensive timber management, it is unlikely that current trends will lead to full utilization of U.S. forests. Although the Federal Government does provide financial and technical assistance to nonindustrial private landowners, who own nearly 60 percent of the Nation's commercial timberland, this assistance is often limited by budget constraints and is not necessarily targeted to lands most capable of providing increased timber supplies. Greater emphasis on small-scale forestry research, technical assistance, education, and information programs, combined with more accurate channeling of such assistance to the most suitable recipients, could stimulate private forest productivity.

Under the guidance of the National Forest Management Act of 1976, the U.S. Forest Service periodically prepares programs for and assessments of the Nation's renewable resources. These programs, however, provide little analysis of policies and programs not administered specifically by the U.S. Forest Service, although there are many Federal, State, and local agencies which influence timber supply from public and private lands. The need for increased investments in forest productivity and research and development will be easier to establish with national timber production goals to serve as a guide.

Formulation of forest policy requires up-to-date information about forest acreage, inventories, and growth trends, and realistic assumptions about future demands for forest products. Improvements in the current system for estimating prospective timber supplies and demands are needed if decisionmakers are to have adequate information for design and funding of timber management programs, private landowner assistance, and research needs.

Existing and emerging technologies enable a broad range of wood products to be manufactured from currently underutilized hardwood species and from waste wood material. Expanded research in basic wood chemistry and engineering properties, and research on utilization of hardwoods and waste wood, could increase wood's long-term competitive position relative to other materials, as well as the competitiveness of the U.S. forest products industry. Increased research on hardwood and waste wood utilization could also extend U.S. wood supplies,

Commercial timber production is only one of the many uses for U.S. forestland. Broad-scale intensive forest management may result in increased soil loss, altered wildlife habitat, reduced water quality, and lower soil productivity. The environmental impacts of intensive forestry are not well understood, and further research on its effects will be needed if the practice becomes more widespread.

Significant changes in Federal programs and policies probably are not required to ensure that future domestic forest products needs are met. However, OTA has identified four general policy options which Congress could consider to increase the domestic and international competitiveness of the forest products industry:

1. Encourage research and development of forestry-related and wood utilization technologies, particularly small-scale forestry research suited to the needs of nonindustrial private landowners, basic wood chemistry and physical properties research, hardwood and waste wood utilization, and research on the environmental effects of intensive timber management.
2. Assist exporters through negotiated reduction in barriers to trade, including tariffs, quotas, and nontariff barriers.
3. Promote the use of U.S. wood products and building techniques overseas, using the Foreign Agriculture Service's experience in agricultural export promotion as a model.
4. Improve the quality of information needed for forest policy formulation. The greatest information needs are for up-to-date timber growth and inventory trends and improved forecasting methods which provide decisionmakers with realistic ranges of possible future timber supply and demand.

Industrial Energy Use

For many years to come, energy need not constrain economic growth in the United States. OTA projects that over the next two decades, investments in new manufacturing processes,



a shift to less energy-intensive products, and technical innovation will lead to substantially increased energy efficiency. At the same time, these improvements will increase industrial profitability and competitiveness. As a result, OTA projects that the rate of industrial production can grow considerably faster than the rate of energy use needed for that production.

Corporate investment decisionmaking appears to recognize this link between productivity and energy efficiency. All corporate projects are evaluated in terms of product demand, competition, cost of capital, cost of labor, energy and materials, and Government policy. Energy-related projects are only part of an overall strategy to improve profitability and enhance a corporation's competitive position. OTA has found that corporate capital projects directed solely at improving energy efficiency are not given special status, although energy cost is an important consideration in investment decisions.

OTA examined the four most energy-intensive industries in the U.S. manufacturing sector: paper, petroleum refining, chemicals, and steel. Historical energy use was analyzed, new technologies identified that could improve energy efficiency, and future energy demand projected. In the paper industry, energy use has risen slightly since 1972, but the industry is now more energy self-sufficient. In 1981, the pulp and paper industry generated half of its energy needs from wood residues.

From now through 2000, projections for the petroleum refining industry show a decline in product output, but continued, if only slight, improvement in energy efficiency. Efficiency gains will be offset by a shift to high-sulfur, heavier crude oil feedstock, and a need for additional processing of raw materials to meet market demand for high-octane, unleaded gasoline.

Projections for the chemicals industry indicate an increase in energy efficiency through a combination of technological improvements to existing process equipment, technical innovation in developing new processes, and a shift from commodity chemicals, such as chlorine, to less energy-intensive specialty chemicals, such as pharmaceuticals.

As the steel industry rebuilds to meet foreign competition, production will grow slowly, and will show a large reduction in energy intensity due to greater use of two new processes: the replacement of ingot casting by continuous casting, and the substitution of electric arc furnaces for the blast furnace/basic oxygen furnace combination of traditional steelmaking.

OTA examined four policy options for their effects on industrial energy use. Two options were directed specifically at energy conservation investments, while the remaining two were aimed at stimulating all investment.

OTA's findings suggest that the most effective Government policies to promote the efficient use of energy are not those specifically targeted to energy use, but those that improve the economic outlook and investment climate by lowering interest rates and expanding demand for goods and services. Specifically, OTA concludes that:

- Reduction in capital costs would be the most effective means of stimulating investments that increase energy efficiency. It would also enhance the effect of the recently enacted accelerated cost recovery system (ACRS).
- ACRS depreciation is a positive stimulus to investment, and thus to energy conservation. But, this effect is only significant when industry is profitable and growing.
- Energy investment tax credits at a 10-percent level have little direct influence on capital allocation decisions in large American firms, and thus have little or no effect on energy conservation. However, energy investment tax credits aimed at third-party financing of energy production, such as cogeneration of steam and electricity, would be effective,

- A tax on premium fuels would stimulate investment in energy-efficient processes and products but would also have negative effects. For example, a premium fuels tax would increase the chemicals industry's vulnerability to foreign competition and adversely affect product sales of the petroleum refining industry.

Technology and East-West Trade: An Update

The recent controversies over trade sanctions and export controls have focused attention on the Export Administration Act, whose renewal is now before Congress. *Technology and East-West Trade: An Update*, discusses a range of legislative proposals in terms of four key policy perspectives:

Technology
and East-West Trade
An Update



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- national security: making Soviet acquisition of militarily relevant Western technology as difficult and costly as possible;
- foreign policy: safeguarding the President's flexibility in using export controls to advance U.S. foreign policy interests;
- efficiency: making the licensing system more predictable, consistent, and efficient to enable U.S. exporters to plan ahead and to increase compliance; and
- trade promotion: reducing trade restrictions, especially foreign policy controls.

Some of these views are mutually compatible. For example, it is perfectly possible to strengthen national security controls while promoting flexibility in foreign policy controls. Some combinations, however, are inherently in conflict. The conflict between national security and export promotion is obvious, but there are others. For example, the very existence of foreign policy controls over exports introduces an element of unpredictability into export licensing, which works against both efficiency and trade promotion.

The perceived importance of national security controls has risen, as evidence has accumulated that the Soviets have a coordinated and effective program to obtain and exploit Western technology for military purposes. Soviet efforts include both legal and illegal transfers. More effective administration and enforcement of existing controls may be more productive than controlling additional items or categories.

While U.S. trade with the U.S.S.R. is small and likely to remain so, it is important for particular sectors (e. g., grain) and firms (e. g., Caterpillar). Retroactive and extraterritorial controls may have an adverse impact on West-West trade, which far exceeds East-West trade in importance to the United States.

The embargoes on grain and oil and gas technology dramatically illustrate the difficulties of a policy of trade leverage against the Soviet

Union. The sanctions did hurt vulnerable sectors of the Soviet economy, but probably not enough to make a real economic difference. In fact, although such calculations are highly uncertain, the sanctions may have done more damage to the U.S. economy than the Soviet economy. Nor did they change Soviet behavior. The Soviet Union may even have benefited from the public display of Western disunity following the imposition of the pipeline sanctions, which were applied to preexisting contracts of U.S. subsidiaries and licensees based overseas.

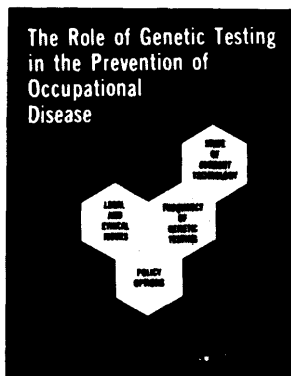
Moreover, tight U.S. export controls require the cooperation of our Allies to have a real effect on the U.S.S.R. Allied cooperation works reasonably well only where there is agreement on what should be controlled. Despite their agreement to conduct policy studies on East-West trade, there is little evidence that the West European countries and Japan will endorse the Reagan administration's position. Their future trade relations with the U.S.S.R. will be shaped more by their own domestic imperatives and worldwide economic forces than by U.S. concerns.

Although the principal issues remain much the same, the stakes in East-West trade have escalated since 1979, when Congress passed the Export Administration Act. Congress was unwilling then to make consistent choices between the goals of national security and export promotion. The result was ambiguous legislation, which has allowed Presidents Carter and Reagan to pursue their own policies, in each case giving foreign policy considerations priority over U.S. export trade.

This report is an update of a more comprehensive OTA report published in 1979.

Role of Genetic Testing in the Prevention of Occupational Disease

Genetic testing in the workplace is an emerging technology that could help reduce occupational disease, but there is concern about its potential misuse. Although none of the genetic tests evaluated by OTA meets established scientific criteria for routine use, existing evidence suggests the value of further research. Routine use of genetic testing, however, would raise significant legal, ethical, and policy questions.



Occupational disease has a serious and far-reaching impact both on society as a whole and on individuals. Genetic testing may be helpful in reducing the incidence of disease resulting from exposure to chemicals and ionizing radiation (e.g., X-rays). The testing encompasses two types of techniques. Genetic screening involves examining an individual

for certain inherited genetic traits on the assumption that the traits may predispose the person to disease when he or she is exposed to potentially hazardous chemicals. Genetic monitoring involves examining a group of workers for environmentally induced changes in the genetic material of certain cells in their bodies. The underlying assumption is that the changes indicate exposure to hazardous agents (chemicals or radiation) and that the group may be at an increased risk for disease. The information that might be provided by genetic testing would allow employers or employees to take preventive actions, but some people fear that it could result in employees being unfairly excluded from jobs.

Because of conflicting accounts about the extent of testing in the workplace and the use of the results, OTA surveyed the Fortune 500 industrial companies, the 50 largest private utilities, and 11 major unions representing the largest number of employees in these companies. Of the 366 organizations responding, 6 currently were using one or more tests. 17 used some of the tests in the past 12 years, 4 anticipated testing in the next 5 years, and 55 stated they possibly would test in the next 5 years. Actions taken as a result of testing ranged from informing an employee of potential problems to changing or discontinuing a product. In view of the small number of organizations testing and inherent methodological limitations in the survey, generalization of the results to the entire survey population or US. industry as a whole is not warranted.

Although the law has generally not dealt with genetic testing, many existing legal principles are directly applicable to the issues raised by this technology. An employer is responsible for workplace safety, but would not be required to use genetic testing. Under the Occupational

Safety and Health Act of 1970, the Secretary of Labor could require genetic testing, if the techniques were shown to be reliable and reasonably predictive of future illness, or could regulate testing, but only in relation to employee health. The act grants no direct authority to protect employees or job applicants from employment discrimination.

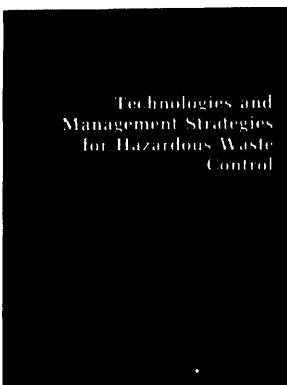
Job applicants or employees who were victims of adverse job actions because of their genetic makeup may have some rights under Federal and State antidiscrimination statutes, and, if genetic makeup were considered a handicap, under the Rehabilitation Act of 1973.

Ethical principles provide some guidance for the appropriate uses of genetic testing. Because of the low correlation between genetic traits or genetic damage from exposure and disease, it would be unethical, for instance, for an employer to deny an applicant a job because of test results.

Congress could take a number of specific actions to promote or control genetic testing. The options include funding additional research for the development of more reliable and predictive tests and constraining employment actions that may be taken on the basis of genetic testing.

Technologies and Management Strategies for Hazardous Waste Control

The Environmental Protection Agency's (EPA) regulations do not assure consistent nationwide levels of protection for human health from the potential effects of massive annual accumulations of hazardous waste.



These regulations for hazardous waste management do not effectively detect, prevent, or control the release of toxic substances into the environment, particularly over the longer term. Yet every year 1 metric ton (tonne) of hazardous waste is added to the environment for every individual in the Nation. Moreover, financial restraints and lack of technical resources will make it difficult for States to fulfill their increased responsibility for waste management policy.

Industry and government are spending \$4 billion to \$5 billion annually to manage the approximately 250 million tonnes of regulated hazardous waste generated each year. The annual costs are expected to rise to more than \$12 billion (in 1981 dollars) in 1990. Some States have stricter definitions for hazardous waste than the Federal program, which regulates about 40 million tonnes annually.

As their responsibilities mount, States fear reductions in Federal support and seek a stronger policy role. States sometimes cannot raise even the required minimum 10 percent of initial Superfund cleanup costs—and they must assume all future operation and maintenance costs.

Because there are no specific Federal technical standards for determining the extent of Superfund cleanup, and because there is an incentive under EPA rules to minimize initial costs, remedial actions may be taken that will prove ineffective in the long term. Much of the \$10 billion to \$40 billion which will be needed for cleaning up the 15,000 uncontrolled sites of previous disposals so far identified maybe wasted. When Superfund expires in 1985, many uncontrolled sites still will require attention. It is estimated that only \$1,6 billion will be collected under Superfund by 1985 for cleanup of these sites.

Inappropriate disposal of hazardous waste on land creates the risk of contaminating the environment, including ground water, which could cause adverse health effects and for which cleanup actions are costly and difficult. As much as 80 percent of regulated hazardous waste—some of which may remain hazardous for years or centuries—is disposed of in or on the land.

In addition, millions of tonnes of federally unregulated or exempted hazardous wastes are disposed of in sanitary landfills (meant for ordinary solid wastes) and pose substantial risks. Such exemptions cover all types of hazardous wastes from generators producing less than 1 tonne a month, and other types of waste, such as infectious waste.

Current policies are likely to lead to the creation of still more uncontrolled sites which will require Superfund attention. The unregulated burning of wastes as fuel supplements in home and industrial boilers may result in toxic air pollutants.

Greater use of alternatives to land disposal could increase industry's near-term costs significantly. However, years or decades from now, cleaning up a site and compensating victims might cost 10 to 100 times today's costs of preventing releases of hazardous wastes.

Federal policies may reduce industry's costs of land disposal by shifting some long-term cleanup and monitoring costs to government or to society as a whole. The effect may be to retard the adoption by industry of alternatives such as waste reduction and waste treatment.

A key policy issue is: Can unnecessary risks and future cleanup costs be eliminated by limiting the use of land disposal, and by making alternatives to it more attractive?

The Federal regulatory program for hazardous waste management was established by the 1976 Resource Conservation and Recovery Act (RCRA), primarily concerned with the proper management and permitting of present and future wastes; and the Comprehensive Environmental, Response, Compensation, and Liability Act of 1980 (CERCLA), or Superfund, enacted to deal with the many substantiated and potential hazards posed by old and often abandoned uncontrolled hazardous waste sites. The OTA study supports the need for greater integration by EPA of these two programs.

Policy Options

OTA has identified four policy options—beyond maintaining the current Federal program—which could form the basis for an immediate and comprehensive approach to protecting human health and the environment from the dangers posed by mismanagement of hazardous waste:

1. Extend Federal controls to more hazardous wastes, and establish national regulatory standards based on specific technical criteria. Also restrict disposal of high-hazard wastes on land and improve procedures for permitting facilities and deregulating wastes.
2. Establish Federal fees on waste generators to support Superfund and to provide an economic incentive to reduce the generation of waste and discourage land disposal of wastes; impose higher fees on generators of high-hazard wastes that are land-disposed; provide assistance for capital investments and research and development for new waste reduction and treatment efforts.
3. Study the costs and advantages of classifying wastes and waste management facilities by degree of hazard to match hazards and risks with levels of regulatory control.
4. Examine the need for greater integration of Federal environmental programs to remove gaps, overlaps, and inconsistencies in the regulation of hazardous waste, and to make better use of technical data and personnel.

Key Issues and Findings

- Current monitoring practices and EPA requirements under RCRA—especially for land disposal sites—do not lead to a high level of confidence that hazardous releases will be detected and responsive action quickly taken.
- There are numerous technically feasible management options for hazardous wastes, but they are not being used to their full potential. On the whole, Federal programs indirectly provide more incentive for land disposal than for treatment alternatives that permanently remove risks, or for waste reduction—although technologies are available to reduce waste,
- States are being given increasing responsibilities by EPA without matching technical and financial resources. A lack of State funds often prevents Superfund cleanups. A Federal fee system on waste generators could also be used to support State programs. EPA should make better use of State data and expertise.
- Actions that enhance public confidence in the equity, effectiveness, and vigorous enforcement of government programs may reduce public opposition to siting hazardous waste facilities. Opposition may also be reduced by improvement in the dissemination of accurate technical information on issues such as waste treatment alternatives to land disposal,

- EPA's risk assessment procedures for selecting Superfund sites and for developing RCRA regulations have serious technical inadequacies that weaken protection of the public.
- Data inadequacies conceal the scope and complexity of the Nation's hazardous waste problems and impede effective control. There is a need for a long-term, systematic EPA plan for obtaining more complete, reliable data on hazardous waste, facilities, sites, and exposure to and effects from releases of harmful substances.
- Wastes can be classified into at least three categories of hazard and, combined with facility classes, might form a technical base for Federal regulatory policies.

Industrial and Commercial Cogeneration

Cogeneration—the combined production of electricity and useful thermal energy—could contribute significantly to reduced costs and greater planning flexibility for electric utilities, and to increased energy efficiency in industrial facilities, commercial buildings, and rural/agricultural areas. But cogeneration's potentially large market will be limited by technical, economic, and institutional constraints. These include the difficulties in using lower cost solid fuels; competition with conservation measures; mismatches between the ratio of need for electric and thermal energy and the ratios typically produced by a cogenerating unit. The high cost of investment capital will limit opportunities further.



To achieve potential long-term benefits for electric utilities, cogeneration systems must use abundant solid fuels and produce high ratios of electricity to steam (E/S). But the available high E/S systems can use only oil or natural gas. Therefore, research and development efforts should concentrate on developing high E/S cogenerators that can burn solid fuels cleanly, and on advanced combustion and conversion systems such as fluidized beds and gasifiers.

Utility ownership could increase the amount of production as well as the reliability of cogenerated electricity. However, such ownership is at a competitive disadvantage because the Public Utility Regulatory Policies Act of 1978 (PURPA) limits qualifying projects to those in which a utility owns less than 50 percent equity. If the PURPA limitation were removed, concerns about the possible anticompetitive effects of utility ownership could be alleviated through careful State review of utility ownership schemes.

For the near term, natural gas will be the preferred cogeneration fuel where the marginal or avoided cost rates for utility purchases of cogenerated electricity are based on the price of oil, and where natural

gas is available. In the long term, however, natural gas is likely to be too costly for natural-gas-fired cogeneration to compete economically with electricity generated at central station coal, nuclear, or hydroelectric powerplants.

Cogeneration also must compete for investment capital with conservation, which reduces steam loads—and therefore cogeneration's technical potential—and which often has lower unit capital costs and shorter payback periods than cogeneration.

Costs.—The mean capital costs for commercially available cogenerators tend to be 20 to 40 percent lower per kilowatt than central station generating capacity. Also, the relatively small unit size and the shorter construction leadtimes of cogeneration systems mean substantial interest cost savings during construction, and greater flexibility for utilities in adjusting to unexpected changes in electricity demand than the overbuilding of central station capacity.

Electricity Prices.—Cogenerators have potentially lower unit costs for generating electricity than central station powerplants. However, these savings will not necessarily mean lower electricity rates if the price paid to the cogenerator—based on avoided costs—is higher than the utility's retail rates. A price that is less than the utility's full avoided cost, with the difference going toward rate reduction, would share any cost savings from cogeneration with the utility's other ratepayers, but would not provide the maximum possible economic incentive to potential cogenerators.

Interconnection.—The primary issues are the utilities' legal obligation to connect generators with the grid, the cost of the equipment, the lack of uniform guidelines, and the uncertain potential for utility system stability problems. Most of the technical aspects of interconnection are well understood, but additional research is needed to determine whether many cogenerators not centrally dispatched will cause utility system stability problems. If PURPA is not amended to require interconnection, and if utilities do not interconnect voluntarily, then the cost of obtaining an interconnection order from the Federal Energy Regulatory Commission could be prohibitive for many potential cogenerators.

Air Quality Impacts.—Cogeneration will not automatically offer air quality improvement or degradation compared to the separate conversion technologies it will replace. Rather, its impact will vary considerably from case to case. Adverse local air quality impacts from cogeneration are most likely to occur in urban areas,

TECHNICAL MEMORANDA

U.S. Natural Gas Availability: Conventional Gas Supply Through the Year 2000

Describes and evaluates alternative estimates of the conventional natural gas resource base of the lower 48 States; describes and interprets past and current trends in discovery and production of this gas resource; and projects a credible range of potential (conventional) gas production for the next 15 to 20 years.

Quality and Relevance of Research and Related Activities at the Gorgas Memorial Laboratory

Examines the Gorgas Memorial Institute of Tropical and Preventive Medicine, Inc., and its research arm, the Gorgas Memorial Laboratory (GML). It focused on: the quality of research and related activities at GML, and the relevance of GML's work to Panama, tropical America, the United States, and the advancement of tropical medicine knowledge.

Diagnosis Related Groups (DRGs) and the Medicare Program: Implications for Medical Technology

Examines diagnosis related groups, their use in the Medicare payment system, and the potential impact on medical technology use and adoption and on technological change. Also examines the construction of DRGs, and discusses issues in implementation of the system.

Habitability Issues Related to Love Canal

Based on a report published by the U.S. Environmental Protection Agency (EPA) in May 1982, which was reviewed by a multidisciplinary team of consultants for several Federal agencies, the U.S. Department of Health and Human Services judged the Love Canal, N. Y., to be "as habitable as the control areas with which it was compared." OTA critically reviewed EPA's habitability decision.

Agricultural Postharvest* Technology and Marketing Economics Research

Examines the role of the public sector in postharvest technology and marketing economics research. It describes the development of the public sector research effort; measures the cost, benefits, burdens, and quality of the research; presents guidelines for the public and private research participants; and evaluates the public sector management and policy programs.

Unispace '82: A Context for International Cooperation and Competition

Discusses the issues that arose at this international conference, the positions taken by the United States, and the lessons that can be applied to future international cooperation and future civilian activities in space.

Automation and the Workplace: Selected Labor, Education, and Training Issues

Discusses concepts for evaluating the impacts of manufacturing automation, and describes the conduct of education, training, and retraining for persons seeking or holding jobs in manufacturing industries.

BACKGROUND PAPERS

The Impact of Randomized Clinical Trials on Health Policy and Medical Practice

Provides materials about the history and conduct of randomized clinical trials (RCTS), a family of experiments designed to evaluate the efficacy and safety of medical technologies. It examines the levels of funding over time and the actual and potential use of RCTS in forming health policy. The paper also reviews the ways in which RCTS have affected different areas of medical practice. Finally, it draws together suggestions from the literature and from people knowledgeable in the field for more effective use of RCTS in policymaking and in improving the practice of medicine.

Water-Related Technologies for Sustainable Agriculture in U.S. Arid/Semiarid Lands: Selected Foreign Experience

Highlights examples of water-related technologies that have been successfully applied in arid and semiarid foreign countries in a manner not being applied in the United States—integrated irrigation management in Pakistan, intensive water use planning in Israel, cooperative plant breeding in Senegal, native game ranching in Kenya, and guayule production in Australia.

Sustaining Tropical Forest Resources: U.S. and International Institutions

Describes Government, academic, and private sector institutions in the United States that are developing or implementing technologies to sustain tropical forest resources.

Sustaining Tropical Forest Resources Reforestation of Degraded Lands

Describes the state of the art in use of forestry technologies to restore the productivity of tropical lands that have been degraded because of human activity.

Technology, Innovation, and Regional Economic Development: Census of State Government Initiatives for High-Technology Industrial Development

Identifies dedicated State government programs for high-technology firms.

The Information Content of Premanufacture Notices

The study assesses the extent to which current premanufacturing notice submissions either fulfill or compromise efforts to perform the preventive health and environmental protection mandate of the Toxic Substances Control Act.

Technology and Handicapped People, Background Paper #2: Selected Telecommunication Devices for Hearing-impaired Persons

Examines specific factors that affect the research and development, evaluation, diffusion and marketing, delivery, use, and financing of technologies directly related to disabled persons.

CASE STUDIES

Medical Technology and Costs of the Medicare Program: Variation in Hospital Length of Stay: Their Relationship to Health Outcomes

Examines evidence on how variations in length of hospital stay affect patient outcomes and the implications of changes in length of stay for quality of care, access, and Medicare program costs.

Medical Technology and Costs of the Medicare Program Efficacy and Cost Effectiveness of Therapeutic Apheresis

Examines the scientific literature on the safety, efficacy, and costs of the therapeutic apheresis (a costly procedure used to treat an increasing number of medical conditions) with particular emphasis on implications for the Medicare program.

Medical Technology and Costs of the Medicare Program:
The Effectiveness and Costs of Alcoholism Treatment

Examines the evidence of alcoholism treatment in a variety of settings: inpatient care, outpatient hospital care, community-based treatment centers, etc., as well as the effectiveness of various methods of treatment (chemical aversion therapy, group therapy, and Alcoholics Anonymous).

WORKSHOP PROCEEDINGS

Plants: The Potentials for Extracting Protein,
Medicines, and Other Useful Chemicals

OTA conducted a workshop designed to identify technological opportunities and constraints for commercially developing protein, pharmaceuticals, chemicals, and other associated extracts from plants generally and tobacco specifically. OTA examined the potential impacts that such technologies might have on improving nutrition and food quality by increasing the availability of high-quality protein. Issues addressed include: quality of current data bases on chemistry of plant extracts; status of bioassay technologies; and social, economic, environmental, and political impacts that such new technologies might generate.

Section III. -Work in Progress

More than 25 projects were in progress during the period January 1–September 30, 1983, including 11 new studies.

This section lists the titles of projects, as of September 30, 1983, by OTA's three divisions. For a fuller description of these projects, please refer to the current "Assessment Activities," OTA-PC-105. This booklet may be obtained from OTA by calling OTA's Publishing Office (202) 224-8996.

Energy, Materials, and International Security Division
Effects of technology on the American economic transition

Energy and Materials Program

Strategic responses to an extended oil disruption
Potential U.S. natural gas availability
Nuclear power in an age of uncertainty

Industry, Technology, and Employment Program

Wood in the U.S. economy, Vol. II—Technical Report
Technologies to reduce U.S. materials import vulnerability
Technology and structural unemployment: retraining adult displaced workers
Cleanup of uncontrolled hazardous waste sites under Superfund

International Security and Commerce Program

International competitiveness in electronics
Strategic command, control, communications, and intelligence systems
International cooperation and competitiveness in civilian space activities
Commercialization of land remote sensing (tech. memo)
Technology transfer to the Middle East

Health and Life Sciences Division

Food and Renewable Resources Program

Water-related technologies for sustainable agriculture in
U.S. arid/semiarid lands
Technologies to sustain tropical forest resources
Technology, public policy, and the changing structure of American agriculture

Health Program

Evaluation of Agent Orange protocol (mandated study)
Health and safety control technologies in the workplace
Medical technology and costs of the Medicare program
Federal policies and the medical devices industry
Status of biomedical research and related technology for tropical diseases
Blood policy and technology

Biological Applications Program

Commercial biotechnology: an international analysis
Technology and aging in America
Alternatives to animal use in testing and experimentation

Science, Information, and Natural Resources Division

Communication and Information Technologies Program

Patents and the commercialization of new technology

Computerized manufacturing automation: employment, education,
and the workplace

Effects of information technology on financial services systems

Information technology research and development

Information and communication technologies and the office

Oceans and Environment Program

Managing commercial high-level radioactive waste

Acid rain and transported air pollutants: implications for public policy

Wetlands: their use and regulation

Technologies to measure, monitor, and mitigate ground water contamination

Science, Transportation, and Innovation Program

Airport system development

Civilian space stations

Technology, innovation, and regional economic development

U.S. passenger rail technologies

Section IV.-Organization and Operations

Created by the Technology Assessment Act of 1972 (86 Stat. 797), OTA is a part of and is responsible to the legislative branch of the Federal Government. OTA received funding in November 1973 and began operations as the second session of the 93d Congress convened in January 1974.

The act provides for a bipartisan Congressional Board, a Director, and such other employees and consultants as may be necessary to conduct the Office's work.

The Congressional Board is made up of six Senators, appointed by the President pro tempore of the Senate, and six Representatives, appointed by the Speaker of the House, evenly divided by party. In 1983, Cong. Morris Udall (D-Arizona) and Sen. Ted Stevens (R-Alaska) served as the Chairman and Vice Chairman, respectively, of the Board. The two posts alternate between the Senate and House with each Congress. The Board members from each House select their respective officer.

The Congressional Board sets the policies of the Office and is the sole and exclusive body governing OTA. The Board appoints the Director, who is OTA's chief executive officer and a nonvoting member of the Board.

The act also calls for a Technology Assessment Advisory Council comprised of 10 public members eminent in scientific, technological, and educational fields, the Comptroller General of the United States, and the Director of the Congressional Research Service of the Library of Congress. The Advisory Council advises the Board and the Director on such matters as the balance, comprehensiveness, and quality of OTA's work, and OTA's nongovernmental resources.

In providing assistance to Congress, OTA is to: identify existing or probable impacts of technology or technological programs; where possible, ascertain cause-and-effect relationships of the applications of technology; identify alternative technological methods of implementing specific actions; identify alternative programs for achieving requisite goals; estimate and compare the impacts of alternative methods and programs; present findings of completed analyses to the appropriate legislative authorities; identify areas where additional research or data collection is required to provide support for assessments; and undertake such additional associated activities as may be necessary.

INITIATION, PROCESSING, AND FLOW OF ASSESSMENTS

OTA's primary function is to provide congressional committees with assessments or studies that identify the range of probable consequences, social as well as physical, of policy alternatives affecting the uses of technology. Requests for OTA assessments may be initiated by:

- . the chairman of any standing, special, select, or joint committee of Congress, acting alone, at the request of the ranking minority member, or at the request of a majority of the committee members;
- the OTA Board; or
- the OTA Director, in consultation with the Board.

The authorization of specific assessment projects and the allocation of funds for their performance is the responsibility of the OTA Board.

ORGANIZATIONAL STRUCTURE

The Office is organized into three operating divisions, each headed by an assistant director. The three divisions are Energy, Materials, and International Security; Health and Life Sciences; and Science, Information, and Natural Resources. They encompass assessments grouped in the areas of energy and materials; international security and commerce; industry, technology, and employment; biological applications; food and renewable resources; health; communication and information technologies; oceans and environment; and science, transportation, and innovation. See chart detailing OTA's organizational structure.

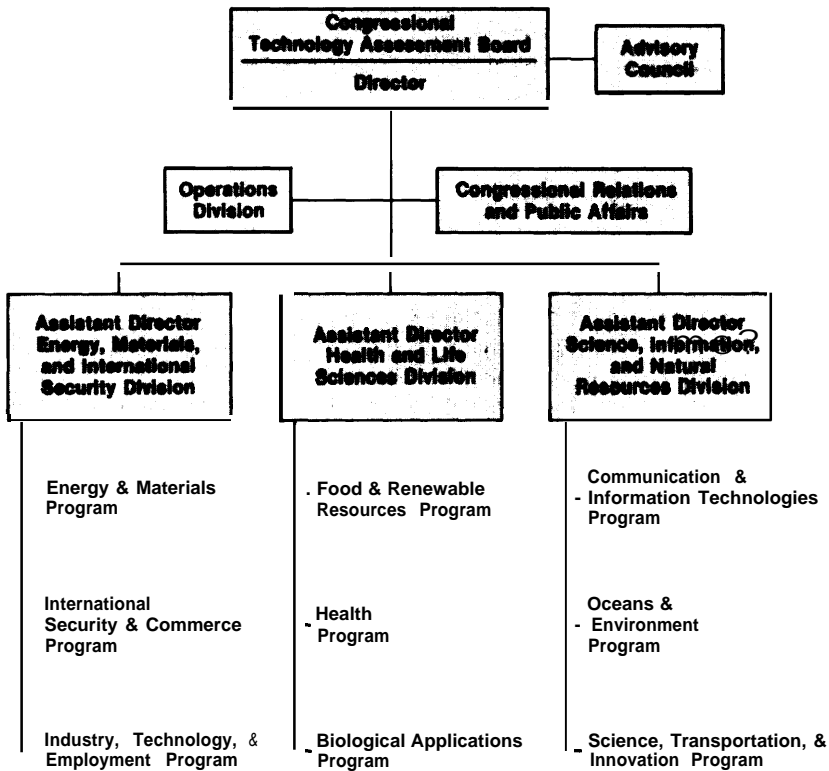
Staff professionals represent a wide range of disciplines and backgrounds, including the physical, biological, and environmental sciences, engineering, social sciences, law, and public administration. Professionals from executive branch agencies, detailed to OTA on a temporary basis, and participants in several congressional fellowship programs also contribute to the work of the Office.

Public Involvement

The private sector is heavily involved in OTA studies as a source of expertise and perspectives while an assessment is in progress. Contractors and consultants are drawn from industry, universities, private research organizations, and public interest groups.

OTA works to ensure that the views of the public are fairly reflected in its assessments. OTA involves the public in many ways—through advisory panels, workshops, surveys, and formal and informal public meetings. These interactions provide citizens with access to information and help OTA identify contrasts between the perspectives of technically trained and lay citizens.

OTA ORGANIZATION CHART



OPERATIONS

Publishing Activities

During the period January 1 through September 30, 1983, OTA delivered 36 published documents to Congress. These included: 11 assessment reports, 7 technical memoranda, 7 background papers, 3 health technology case studies, 1 workshop proceeding, and 7 administrative reports.

Requests for OTA Publications

During the period January 1 through September 30, 1983, OTA's Publishing Office received an average of 120 telephone and mail requests

per day. Additional requests were processed by OTA program offices and the OTA Congressional Relations and Public Affairs Office and are not included in the above statistics.

Private Sector Reprinting of OTA Publications

To date, 41 OTA publications have been reprinted (in whole or in part) by commercial publishers or private organizations. Among the reports reprinted during the 9-month period were the following:

- The International Council for Computers in Education, a nonprofit organization based in Eugene, Oreg., requested permission to reprint the *Summary: Information Technology and Its Impact on American Education* to be used in their international magazine THE COMPUTING TEACHER.
- Springer Publishing Co. (New York) reprinted the publication *Technology and Handicapped People*.
- The University of Phoenix requested permission to reprint the *Summary: The Implications of Cost-Effectiveness Analysis of a Medical Technology*. The document was used as learning material for a course on professional communications at the university.
- Harwood Academic Publishers (New York) requested permission to reprint the *Summary: Managing Commercial High-Level Radioactive Waste*.
- Pergamon International Information Corp. (Virginia) requested permission to reprint *MX Missile Basing* and *The Role of Genetic Testing in the Prevention of Occupational Disease*.
- Educational Research Service, Inc. (Virginia) reprinted the *Summary: Information Technology and Its Impact on American Education* in their periodical SCHOOL RESEARCH FORUM.
- ERIC Clearinghouse on Information Resources (funded by the National Institute of Education) requested permission to reprint the *Summary: Information Technology and Its Impact on American Education*.
- Nikkan Kogyo Shinbun-sha, a Japanese-based publishing company, requested permission to reprint in a Japanese version extractions of OTA's publication *Computer-Based National Information Systems*.

Private Sector Sales

The following is a partial listing of copies sold of reprinted OTA publications during calendar year 1983,

| | Number of copies sold |
|--|--------------------------|
| Westview Press | |
| • Genetic Technologies: A New Frontier | 3,905 |
| • Technology and Soviet Energy Availability. | 395 |
| c Cancer Risks: Assessing and Reducing the Dangers in Our Society | 887 |
| • Energy From Biological Processes: Technical and Policy Options | 304 |
| McGraw Hill Publishing Co. | |
| c World Petroleum Availability: 1980-2000. | 163 |
| • Enhanced Oil Recovery Potential in the U.S. | 75 |
| • Energy From Biological Processes: Technical and Environmental Analyses. | 50 |
| • An Assessment of Oil Shale Technologies | 191 |
| Allanheld, Osmun & Co. | |
| • Technology and East-West Trade | 159 |
| • Residential Energy Conservation | 115 |
| Q The Effects of Nuclear War. | 7,126 |
| Cheshire Books | |
| c The Day After Midnight: The Effects of Nuclear War . . | 12,000 |
| | 25,270 |

Sales of Publications

Government Printing Office.—Sales of OTA publications by the Superintendent of Documents continue to increase. In fiscal year 1983 the number of titles put on sale was 132 and GPO sold 33,125 copies.

National Technical Information Service.—NTIS sells scientific reports and papers that are, generally, not in great demand but are useful for scientific researchers. NTIS is the outlet for OTA's assessment working papers and contractor reports, plus those reports that are out of print by GPO. NTIS has sold 30,218 copies of OTA reports through September 1983.

Organizational Roster of OTA Staff as of September 1 9 8 3

OFFICE OF THE DIRECTOR

John H. Gibbons, *Director*
Sue Bachtel, Executive *Assistant*
Holly Gwin, *Secretary*
Barbara O'Bryan, *Secretary*

**Congressional Relations and
Public Affairs Office**

Edwin K. Hall, *Director of CRPA*
Linda Long, *Secretary*
Jean McDonald, *Press Officer*
Annette Taylor, *Assistant to the
Press Officer*
Eugenia Ufholz, *TAB/TAAC
Relations*

Medical Services

Rose McNair, *Resident Nurse*

**ENERGY, MATERIALS, AND
INTERNATIONAL SECURITY
DIVISION**

Lionel S. Johns, *Assistant Director*
Beth Alexiou, *Division Assistant*

**Technology and Economic
Transition**

Henry Kelly, *Project Director*
Debra Harris, *Administrative
Assistant*

Energy and Materials Program

Richard Rowberg, *Program Manager*
Thomas Bull, *Senior Analyst*
Alan Crane, *Project Director*
Nancy Naismith, *Project Director*
Steve Plotkin, *Project Director*
Mary Procter, *Senior Analyst*
Pidge Quigg, *Administrative
Assistant*
Jenifer Robison, *Project Director*
James Ryan, *Senior Analyst*
Edna Saunders, *Secretary*
Joanne Seder, *Analyst*
Richard Thoreson, *Senior Analyst*

**International Security and
Commerce Program**

Peter Sharfman, *Program Manager*
Douglas Adkins, *Senior Analyst*
John Alic, *Project Director*
Eric Bazques, *Analyst*
Bruce Blair, *Project Director*
Richard Dalbello, *Analyst*
Martha Harris, *Project Director*
Gordon Law, *Senior Analyst*
Nancy Lubin, *Analyst*
Dorothy Richroath, *Editorial
Assistant*
Jacqueline Robinson, *Administrative
Assistant*
Ray Williamson, *Project Director*

**Industry, Technology, and
Employment Program**

Audrey Buyn, *Program Manager*
Lance Antrim, *Project Director*
Patricia Canavan, *Secretary*
Carol Drohan, *Administrative
Assistant*
Wendell Fletcher, *Senior Analyst*
Julie Gorte, *Project Director*
Joel Hirschhorn, *Senior Associate*
Karen Larsen, *Senior Analyst*
Suellen Pirages, *Senior Analyst*

**HEALTH AND LIFE SCIENCES
DIVISION**

H. David Banta, *Assistant Director*
Ogechee Koffler, *Division Assistant*

Biological Applications Program

Gretchen Kolsrud, *Program Manager*
Susan Clymer, *Research Analyst*
Robert Cook-Deegan, *Analyst*
David McCallum, *Senior Analyst*
Nanette Newell, *Project Director*
Elma Rubright, *Administrative
Assistant*
Louise Williams, *Senior Analyst*

Food and Renewable Resources Program

Walter E. Parham, *Program Manager*
Phyllis Balan, *Administrative
Assistant*
Nellie Hammond, *Secretary*
Alison Hess, *Research Analyst*
Barbara Lausche, *Project Director*
Michael Phillips, *Project Director*
Bruce Ross, *Project Director*
Carolyn Swarm, *Secretary*
Phyllis Windle, *Analyst*

Health Program

Clyde Behney, *Program Manager*
Anne Kesselman Burns, *Project
Director*
Virginia Cwalina, *Administrative
Assistant*
Hellen Gelband, *Project Director*
Michael Gough, *Senior Associate*
Jack Langenbrunner, *Analyst*
Brenda Miller, Word *Processor/
P.C. Specialist*
Jennifer Nelson, *Secretary*
Gloria Ruby, *Analyst*
Jane Sisk, *Project Director*

SCIENCE, INFORMATION, AND NATURAL RESOURCES DIVISION

John Andelin, *Assistant Director*
Doris Smith, *Division Assistant*

Communication and Information Technologies Program

Rick Weingarten, *Program Manager*
Lauren Ackerman, *Research
Assistant*
Prudence Adler, *Analyst*
Marjory Blumenthal, *Project Director*
Beth Brown, *Project Director*
Elizabeth Emanuel, *Administrative
Assistant*
Linda Garcia, *Analyst*
Shirley Gayheart, *Secretary*
Zalman Shaven, *Project Director*
Jean Smith, *Analyst*

Donna Valtri, *Project Director*
Marsha Williams, *Secretary*
Fred Wood, *Project Director*

Oceans and Environment Program

Robert Niblock, *Program Manager*
Chris Ansell, *Research Analyst*
William Barnard, *Project Director*
Kathleen Beil, *Administrative
Assistant*
Thomas Cotton, *Project Director*
James Curlin, *Senior Associate*
Robert Friedman, *Project Director*
Joan Ham, *Analyst*
Peter Johnson, *Project Director*
Daniel Kevin, *Analyst*
Jacqueline Mulder, *Secretary*
Kay Senn, *Secretary*
Paula Stone, *Senior Analyst*

Science, Transportation, and Innovation Program

William Mills, *Program Manager*
Phil Chandler, *Analyst*
Marsha Fenn, *Administrative
Assistant*
Karen Gamble, *Analyst*
Bryan Harrison, *Word Processor
Specialist*
Larry L. Jenney, *Project Director*
Paul Phelps, *Project Director*
Paula Walden, *Research Analyst*

OPERATIONS DIVISION

Bart McGarry, *Operations Manager*
Ann Woodbridge, *Management
Analyst*

Administrative Services

Thomas P. McGurn, *Administrative
Officer*
Susan Carhart, *Director of Contracts
and General Counsel*
Alexandra Ferguson, *Contract
Specialist*
Edith Franzen, *Conference Center
Coordinator*
Lisa Raines, *Contract Specialist/
Attorney*

Budget and Financial Operations

Jane Easton, Budget and **Finance Officer**
Joan Camino, Budget **and Finance Assistant**
Carolyn Harris, Budget **Specialist and Clerical Assistant**
Loretta O'Brien, **Data Base Administrator**

Information Center

Martha Dexter, **Manager, Information Services**
Suzanne Boisclair, **Information Technician**
Vermille Davis, **Information Technician**
Diane Rafferty, **Asst. Manager, Information Services**

Personnel Office

William Norris, **Personnel Officer**
Lola Crow, **Personnel Specialist**
Denise DeSanctis, **Personnel Assistant**

Publishing Office

John C. Holmes, **Publishing Officer**
John Bergling, **Graphic Designer/ Illustrator**
Kathie S. Boss, **Technical Specialist**
Debra Datcher, **Administrative Assistant**
Joe Henson, **Deputy Publishing Officer**

Appendixes

Appendix A

List of Advisors and Panel Members

ENERGY, MATERIALS, AND INTERNATIONAL SECURITY DIVISION

Energy and Materials Program

Industrial and Commercial Cogeneration Advisory Panel

James J. Stukel, **Chairman**
Director
Public Policy Program
College of Engineering
University of Illinois
Roger Blobaum
Roger Blobaum & Associates
William H. Corkran
General Manager
The Easton Utilities Commission
Claire T. Dedrick*
Air Resources Board
State of California
Steven Ferrey
Energy Counsel
National Consumer Law Center, Inc.
Todd La Porte
Institute of Government Studies
University of California
Evelyn Murphy
c/o Evelyn Murphy Committee
Theodore J. Nagel
Senior Executive Vice President
American Electric Power Service Corp.
Thomas W. Reddoch
Associate Professor of Electrical
Engineering
University of Tennessee
Bertram Schwartz
Senior Vice President
Consolidated Edison Co. of New York
Harry M. Trebing
Director, Institute of Public Utilities
Michigan State University
Thomas F. Widmer
Vice President, Engineering
Thermo Electron Corp.
Robert H. Williams
Center for Environmental Studies
Princeton University

Industrial Energy Use Advisory Panel

Herbert Fufeld, **Chairman**
Director
Center for Science and Technology Policy
New York University
E. Milton Bevington
President
Servidyne, Inc.
Harold Bogart
Consultant
Carlton Burt
Equitable Life Assurance Society
William U. Chandler
Senior Associate
Worldwatch Institute
William Cunningham
Research Department
AFL-CIO
Gordon Geiger
Director of Technology
North Star Steel
J. M. Leathers
Vice President
Dow Chemical Co.
Harvey N. Morris
President
Harvey Morris Associates
John Myers
Professor
Department of Economics
Southern Illinois University
Henry Page
Manager
Federal Government Relations
Sun Refining & Marketing Co.
Rudolph G. Penner
Resident Scholar
American Enterprise Institute
Richard Pool
Associate Director of Energy
Kaiser Aluminum & Chemicals Corp.

*Ex-officio member from the OTA Technology Assessment Advisory Council

Rosalie Wolf
Treasurer
International Paper Co.

**Nuclear Power in an Age of Uncertainty
Advisory Panel**

George Rathjens, **Chairman**
Professor
Center for International Studies
Harvard University
James K. Asseltine
Commissioner
U.S. Nuclear Regulatory Commission
Jan Beyea
Senior Scientist
National Audubon Society
Richard Dean
Vice President
General Atomic Corp.
Thomas Dillon
Principal Deputy Assistant Secretary
for Nuclear Energy
U.S. Department of Energy
George Dilworth
Assistant General Manager
Tennessee Valley Authority
Linn Draper
Vice President
Gulf States Utilities
Victor Gilinsky
Commissioner
U.S. Nuclear Regulatory Commission
Fritz Heimann, Esq.
Counsel
General Electric Co.
Leonard Hyman
Vice President
Merrill Lynch, Pierce, Fenner & Smith
Robert Koger
Chairman
North Carolina Utilities Commission
Myron Kratzer
Vice President
International Energy Associates, Ltd.
Byron Lee
Senior Vice President
Commonwealth Edison
Jessica Tuchman Mathews
Vice President
World Resources Institute
Arthur Porter

David Rose
Professor of Nuclear Physics
Massachusetts Institute of Technology
Lee Schipper
Staff Scientist
Lawrence Berkeley Labs
James Sweeney
Director
Energy Modeling Forum
Stanford University
Eric Van Loon
Executive Director
Union of Concerned Scientists

**Potential U.S. Natural Gas
Availability Advisory Panel**

William Vogely, Chairman
Department of Mineral Economics
Pennsylvania State University
Marc Cooper
Research Consultant
Consumer Energy Council of America
Lloyd Elkins
Petroleum Consultant
Ed Erickson
Professor of Economics and Business
Department of Economics and Business
North Carolina State University
Daniel Grubb
Vice President, Gas Supply
Natural Gas Pipeline Co.
John Haun
Professor of Geology
Colorado School of Mines
Donald Kash
Director
Science and Public Policy Program
University of Oklahoma
Harry C. Kent
Director
Potential Gas Agency
Colorado School of Mines
Lawrence Moss
Independent Consultant
Roy E. Roadifer
Chief Geologist
Mobil Oil Corp.
Benjamin Schlesinger
Principal
Energy and Environment Division
Booz, Allen & Hamilton, Inc.

John C. Sharer
 Assistant Director
 Unconventional Natural Gas
 Gas Research Institute
 John Weyant
 Deputy Director
 Energy Modeling Forum
 Stanford University
Ex. Officio:
 John Schanz
 Senior Specialist in Energy Research
 Policy
 Congressional Research Service
 Library of Congress

**Strategic Responses to an Extended Oil
 Disruption Advisory Panel**

Rodney W. Nichols, *Chairman*
 Executive Vice President
 The Rockefeller University
 Al Alm
 Deputy Director
 U.S. Environmental Protection Agency
 Richard E. Archer
 Assistant Professor
 Design Program
 Southern Illinois University
 Jan Brinch
 Independent Consultant
 Energy Analysis and Planning
 Mueller Associates
 Nazli Choucri
 Professor
 Department of Political Science
 Massachusetts Institute of Technology
 Ernest L. Daman
 Senior Vice President
 Foster Wheeler Corp.
 Michael Del Grande
 Manager, Energy and Environment
 American Telephone & Telegraph Co.
 Bob Hemphill, Jr.
 Associate Director
 Applied Energy Services, Inc.

Brad Holloman
 New York State Energy Research
 Development Authority
 Robert L. Judd
 Director
 Governor's Office of Appropriate
 Technology
 State of California
 Terry Lash
 Deputy Director
 Department of Nuclear Safety
 State of Illinois
 Ray Maliszewski
 Assistant Vice President
 Bulk Transmission Planning
 American Electric Power Service Corp.
 Hal Miller, Jr.
 Vice President for Planning and Rates
 Transco Energy Co.
 Roberta Nichols
 Vice President
 Ford Motor Co.
 Christopher Palmer
 Director, Energy and Environment
 National Audubon Society
 Richard A. Rettig
 Professor
 Department of Social Sciences
 Illinois Institute of Technology
 Walter S. Salant
 Senior Economist (retired)
 The Brookings Institution
 Joanna Underwood
 Executive Director
 INFORM
 Fred Wilson, P.E.
 Assistant to the Senior Vice President
 Texaco, Inc.
 Herb H. Woodson
 Director, Center for Energy Studies
 University of Texas

International Security and Common. Program

**International Competitiveness in
Electronics Advisory Panel**

Katherine D. Seelman, **Chairperson**
Consultant
New York, N.Y.

Jack C. Acton
Executive Vice President
Kennemetal Inc.

Steve Beckman
Research Analyst
Industrial Union Department
AFL-CIO

A. Terry Brix
President
Temar Ltd.
Seattle, Wash.

Richard P. Case
Lab Director
IBM Corp.

Ruth Schwartz Cowan
Associate Professor of History
SUNY-Stony Brook

William Kay Dairies
Executive Vice President
American Retail Federation

Leonard Dietch
Vice President, Product Development
Zenith Radio Corp.

Isaiah Frank
William Clayton Professor of
International Economics
The Johns Hopkins University

F. Willard Griffith, II
President and Chief Executive Officer
GC International

Robert R. Johnson
Senior Vice President
Engineering and Information Systems
Energy Conversion Devices, Inc.

Richard A. Kraft
President
Matsushita Industrial Co.

E. Floyd Kvamme
Vice President and General Manager
National Advanced Systems

Geraldine McArdle
McArdle Associates
Reston, Va.

Charles Phipps
Vice President
Corporate Development
Texas Instruments, Inc.

K. M. Poole
Head, Integrated Circuit Planning
Department
Bell Telephone Laboratories
Benjamin M. Rosen
Partner
Sevin Rosen Management Co.

Kate Wilhelm
Author

Robert B. Wood
Director of Research
International Brotherhood of
Electrical Workers

Michael Y. Yoshino
Professor of Business Administration
Harvard Business School

**Command, Control, Communications,
and Intelligence Systems (C²I)
Advisory Panel**

John S. Toll, **Chairman**
President
University of Maryland

Lew Allen, Jr.
General, USAF (Retired)
Director
Jet Propulsion Laboratory

Al Babbitt
Vice President and General Manager
Command Systems
IBM Corp.

Neil Birch
President
Birch Associates, Inc.

Gerald Dinneen
Vice President
Science and Technology
Honeywell

Robert R. Everett
President
The Mitre Corp.

Edward Goldstein
Assistant Vice President
Financial Management
AT&T Co.

Arnold Horelick
The Rand Corp.

William Kaufman
Professor of Political Science
Massachusetts Institute of Technology

Glenn Kent
Lt. General, USAF (Retired)
The Rand Corp.
Isaac C. Kidd, Jr.
Admiral, USN (Retired)
Falls Church, Va.
Kostas J. Liopiros
Consultant
Annandale, Va.
William Perry
Managing Partner
Hambrecht & Quist
Jack Ruina
Professor of Electrical Engineering
Massachusetts Institute of Technology
Brent Scowcroft
Lt. General, USAF (Retired)
Bethesda, Md.
Walter Slocombe, Esq.
Kaplan & Drysdale
Leon Sloss
President
Leon Sloss Associates
John D. Steinbruner
Director
Foreign Policy Studies Program
The Brookings Institution
John Stenbit
Vice President
Requirements & Group Development
TRW Defense Systems Group
Jerome B. Wiesner
President Emeritus
Massachusetts Institute of Technology

**International Cooperation and
Competition in Space Advisory Panel**

Paul Doty, **Chairman**
Center for Science and
International Affairs
Harvard University
Benjamin Bova
President
National Space Institute
Robert Evans
Vice President
IBM Corp.
Robert A. Frosch
Vice President, Research
General Motors Research Laboratories
Eilene Galloway
Consultant
Washington, D.C.

Ivan Getting
Consultant
Los Angeles, Calif.
Mireille Gerard
Administrator, Corporate and
Public Programs
American Institute of Aeronautics and
Astronautics
Benjamin Huberman
Vice President
Consultants International Group Inc.
Walter McDougall
Associate Professor of History
Woodrow Wilson Space and
Science Division
National Air and Space Museum
Smithsonian Institution
John Mayo
Vice President
Bell Laboratories
John L. McLucas
President
COMSAT World Systems Division
Martin Menter, Esq.
Brigadier General (Retired)
Arthur Morrissey
Director, Future Systems
Martin Marietta Aerospace
Fred Raynes
Vice President
Grumman International Inc.
Gary Saxonhouse
Professor of Economics
University of Michigan
Jerome Simonoff
Vice President
CitiCorp Industrial Credit, Inc.
Leonard Sussman
Executive Director
Freedom House
John Townsend
President
Fairchild Space & Electronics Co.
Laurel Wilkening
Director
Lunar and Planetary Laboratory
University of Arizona
Elizabeth Young
President
Public Service Satellite Consortium

**Workshop: International Trading
Regime for Space-Related Equipment
and Services**

Edwin Barber
International Affairs Officer
Office of Trade Finance
U.S. Department of the Treasury
Willard Demory
Assistant Bureau Chief
International Common Carrier Bureau
U.S. Federal Communications
Commission
Ava Feiner
Director of Trade Policy
International Division
Chamber of Commerce of the USA
Sanford Rederer
Consultant
Kurth & Co.
Richard Self
Deputy Assistant
U.S. Trade Representative for Services
John Suomela
Director, Office of Economics
U.S. International Trade Commission

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Advisory Panel**

George Bugliarello, *Chairman*
President
Polytechnic Institute of New York
Fouad Ajami
Professor
School of Advanced International Studies
The Johns Hopkins University
J. S. Dana
Consultant and Former President
South Hampton Refining Co.
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Vice President
International Development
ITEK Optical Systems
Ragaei El-Mallakh
Professor
International Research Center for Energy
and Development
University of Colorado
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Worldwide Process Operations
M. W. Kellogg Co.
Eric Glasscott
Director of Marketing
Continental Page Consultants

Carl N. Hodges*
Director
Environmental Research Laboratory
University of Arizona
Gary Hufbauer
Consultant
Institute for International Economics
J. C. Hurewitz
Professor
Director of Middle East Institute
Columbia University
Charles Issawi
Professor
Near East Studies
Princeton University
T. R. McLinden
Manager, Special Projects
Transworld Airlines
Joseph Nye
Professor
Kennedy School of Government
Harvard University
Anthony Pascal
Consultant
The Rand Corp.
William H. Pickering
President
Pickering Associates Corp.
William B. Quandt
Senior Feller
The Brookings Institution
Joseph J. Sisco
Consultant
Sisco Associates
Joseph S. Szyliowicz
Professor
Graduate School of International Studies
University of Denver
Ted Taylor
Consultant
Appropriate Solar Technology Institute
William L. Weirich
Medical Advisor
Hospital Corp. of America
Sam Wells
Director
International Security Studies Program
The Wilson Center
Smithsonian Institution

* Ex-officio member from the OTA Technology Assessment Advisory Council.

industry, Technology, and Employment Program

**Technologies and Management
Strategies for Hazardous Waste Control
Advisory Panel**

Sam Gusman, Chairman
Senior Associate
Conservation Foundation

David Boltz
Director, Solid Waste Control
Environmental Control Division
Bethlehem Steel Corp.

Frank Collins*
Physical Chemist and Consultant
Oil, Chemical & Atomic Workers
International Union

Stacy Daniels
Research Specialist
Environmental Sciences Research
Laboratory
Dow Chemical, U.S.A.

Jeffrey Diver
Senior Environmental Counsel
Waste Management, Inc.

Philippa Foot
Professor
Department of Philosophy
University of California, Los Angeles

Thomas H. Goodgame
Director of Corporate Environmental
Control
Research and Engineering Center
Whirlpool Corp.

Diane Graves
Conservation Chairman
N.J. Chapter of the Sierra Club

Rolf Hartung
Professor of Toxicology
School of Public Health
University of Michigan

Robert L. Judd
Director
Office of Appropriate Technology
State of California

Kenneth S. Kamlet
Director, Pollution and Toxic
Substances Division
National Wildlife Federation

Terry Lash
Deputy Director
Illinois Department of Nuclear Safety

David Lennett
Attorney
Environmental Defense Fund

Joe J. Mayhew
Manager of Solid Waste Programs
Chemical Manufacturers Association

Randy Mott
Attorney
Hazardous Waste Treatment Council

John M. Mulvey
Director of Engineering Management
Systems
Princeton University
School of Engineering/Applied Science

Delbert Rector
Chief, Environmental Services Division
Michigan Department of Natural
Resources

Gerard Addison Rohlich
LBJ School of Public Affairs
University of Texas at Austin

Reva Rubenstein
Manager of the Institute of Chemical
Waste Management
National Solid Wastes Management
Association

Bernard Simonsen
Vice President
IT Corp.

George M. Woodwell
Director of the Ecosystems Center
Marine Biological Laboratory
Woods Hole, Mass.

**Wood Use: U.S. Competitiveness and
Technology Advisory Panel**

Larry Tombaugh, *Chairman*
Dean
Department of Forestry
Michigan State University

Darius Adams
Department of Forest Management
Oregon State University

Clark Binkley
Assistant Professor
School of Forestry and Environmental
Studies
Yale University

Carroll Brock
Vice President
M. J. Brock & Sons
Sacramento, Calif.

M. Rupert Cutler
Senior Vice President
The Audubon Society

* Resigned Sept. 30, 1982

Judge Ormond S. Danford
Private Forest Land Owner

Robert D. Day
Executive Director
Renewable Natural Resources Foundation

Brock Evans
Vice President for National Issues
The Audubon Society

Kirk Ewart
Director
Governmental and Environmental Affairs
Department
Boise Cascade Corp.

R. Rodney Foil
Director
Mississippi Agricultural and Forestry
Experiment Station

Carter Kiethley
Executive Director
Wood Heating Alliance

Peter Kirby, Esq.
Counsel
The Wilderness Society

Dudley Kircher
Vice President, Corporate
Communications
Mead Corp.

Bruce Lippke
Manager of Marketing and Economic
Research
Weyerhaeuser Corp.

Norma Pace
Senior Vice President
American Paper Institute

Carl Reidel
Director
The Environmental Program
University of Vermont

John Ward
Director, International Trade
National Forest Products Association

Henry Webster
Director
Forest Management Division
Michigan Department of Natural
Resources

John Zivnuska
Department of Forestry and Resource
Management
University of California

**Technologies to Reduce U.S. Materials
Import Vulnerability Advisory Panel**

Arden Bement
Vice President, Technical Resources
TRW, Inc.

Edwin Clark
Senior Associate
Conservation Foundation

Tom Clough ,
Director of Technology
Atlantic Richfield Co.

Robert G. Dunn
Senior Vice President
AMAX Metals Group

Robert Ellsworth
President
Robert Ellsworth & Co.

Michael E. Fisher
Professor of Chemistry, Physics
and Mathematics
Cornell University

Herbert H. Kellogg
Professor of Extractive Metallurgy
Columbia University

Hans Landsberg
Senior Fellow
Resources for the Future

Jessica Mathews
Vice President
World Resources Institute

William A. Owczarski
Manager, Technical Planning
Pratt & Whitney Aircraft Group

Walter S. Owen
Professor of Materials Science
Massachusetts Institute of Technology

R. Byron Pipes
Director, Center for Composite Materials
University of Delaware

R. K. Pitler
Senior Vice President and
Technical Director
Allegheny-Ludlum Research Center

W. Readey
Head, Department of Ceramic
Engineering
The Ohio State University

James K. Sebenius
Assistant Professor
John F. Kennedy School of Government
Harvard University

Albert Sobey
Director, Energy Economics
General Motors Corp.

Alex Zucker
Associate Director
Oak Ridge National Laboratory

**Cleanup of Uncontrolled Hazardous
Waste Sites Under Superfund
Advisory Panel**

Martin Alexander
Department of Agronomy
Cornell University

K. W. Brown
Professor of Soil and Crop Sciences
Texas A&M University

Morton Corn
Professor and Division Director
Department of Environmental Health
Sciences

School of Hygiene and Public Health
The Johns Hopkins University

Bonnie L. Exner
Consultant
Governor's Lowry Landfill Monitoring
Committee
State of Colorado

Ted Greenwood
Research Associate
Center for International Studies
Massachusetts Institute of Technology

Linda E. Greer
Science Associate
Environmental Defense Fund

Robert G. Kissell
Senior Consultant in Engineering
Service Division

E. I. du Pont de Nemours & Co., Inc.

Gary E. Kovall
Manager, Environmental Legislative
and Regulatory Affairs
ARCO Petroleum Products Co.

Stephen U. Lester
Consultant
Citizens Clearinghouse for
Hazardous Waste
Arlington, Va.

Adeline G. Levine
Professor of Sociology
State University of New York at Albany

Randy M. Mott, Esq.
Breed, Abbott & Morgan

Norman H. Nosenchuck
Director
Division of Solid and Hazardous Waste
New York State Department of
Environmental Conservation

James T. O'Rourke
Senior Vice President, Industrial Group
Camp Dresser & McKee, Inc.

James W. Patterson
Professor and Chairman
Pritzker Department of Environmental
Engineering

Illinois Institute of Technology

Robert Repetto
Senior Associate
World Resources Institute

Bernard L. Simonsen
Vice President, Administration and
Corporate Planning
IT Corp.

William A. Wallace
Director
Solid and Hazardous Waste
Management
CH2M HILL

HEALTH AND LIFE SCIENCES DIVISION

Biological Applications Program

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Arthur D. Bloom, *Chairman*
Professor of Pediatrics
College of Physicians and Surgeons
Columbia University
J. Grant Brewen
Director
Molecular and Applied Genetics Lab
Allied Chemical Corp.
Eula Bingham
Dean, Graduate School
Department of Environmental Health
University of Cincinnati
Patricia Buffler
Associate Dean
University of Texas School of Public Health
Ira H. Cisin
Director, Social Research Group
The George Washington University
Burford W. Culpepper
Medical Director
E. I. du Pont de Nemours & Co., Inc.
James D. English
Associate General Counsel
United Steelworkers of America
Neil Holtzman
Associate Professor
Johns Hopkins Hospital
Paul Kotin
Johns Manville Corp. (retired)
Thomas O. McGarity
Professor, School of Law
University of Texas at Austin
Rafael Moure
Industrial Hygienist
Health and Safety Department
Oil, Chemical, and Atomic Workers Union
Robert F. Murray, Jr.
Chief, Division of Medical Genetics
College of Medicine
Howard University
Elena Nightingale
Scholar and Resident
Institute of Medicine
National Academy of Sciences

Gilbert Omenn
Dean, School of Public Health
University of Washington
William N. Rom
Associate Professor
Rocky Mountain Center for Occupational and Environmental Health
University of Utah Medical Center
Stuart Schweitzer
Director
Program in Health Planning and Policy Analysis
School of Public Health
University of California
Robert Veatch
Professor of Medical Ethics
The Kennedy Institute of Ethics
Georgetown University

Commercial Biotechnology: An International Analysis Advisory Panel

Michael Hooker, *Chairman*
President
Bennington College
Howard Bremer
Patent Counsel
Wisconsin Alumni Research Federation
Robert Fildes
President
Cetus Corp.
Julian Gresser
Professor, Program in Science, Technology, and Society
Massachusetts Institute of Technology
Ralph Hardy
Director, Life Sciences
E. I. du Pont de Nemours & Co., Inc.
Zsolt Harsanyi
Vice President, Biotech Group
E. F. Hutton
Peter Hutt, Esq.
Covington & Burling
David Jackson
Scientific Director
Genex Corp.

William Maxon
 Group Manager, Fermentation Products
 Production
 Upjohn Co.
 Laura Meagher
 Acting Administrator
 North Carolina Biotechnology Center
 Robert R. Miller
 Director, International Business
 Courses
 University of Houston
 Dorothy Nelkin
 Professor, Program on Science,
 Technology and Society
 Cornell University
 Norman Oblon
 Oblon, Fisher, Spivak, McClelland &
 Maier
 David Padwa
 Chairman of the Board
 Agrigenetics
 David Parkinson
 Director of Occupational Medicine
 Program
 Falk Clinic
 University of Pittsburgh
 Phillip A. Sharp
 Professor of Biology
 Center for Cancer Research
 Massachusetts Institute of Technology
 William J. Whelan
 Chairman, Biochemistry
 School of Medicine
 University of Miami
 John Zysman
 Director, Roundtable for International
 Economics
 University of California, Berkeley

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 Director, Policy Center on Aging
 Brandeis University
 Ray Bartus
 Group Leader of Geriatrics
 Medical Research Division
 Lederle Laboratories
 Robert Berliner
 Dean
 School of Medicine
 Yale University

Robert Butler
 Chairman, Department of Geriatrics
 and Adult Education
 Mt. Sinai Medical Center
 Robert Clark
 Associate Professor
 Department of Economics and Business
 North Carolina State University
 Lee Davenport
 Senior Vice President and
 Chief Scientist
 GTE Corp.
 Ken Dychtwald
 President
 Dychtwald & Associates
 Caleb Finch
 Professor of Biological Sciences and
 Gerontology
 University of Southern California
 Velma Murphy Hill
 Director
 Civil and Human Rights Division
 Service Employees International Union
 Robert L. Kane
 Senior Researcher
 The Rand Corp.
 Paul A. Kerschner
 Associate Director for Programs,
 Legislation and Development
 National Retired Teachers Association
 American Association of Retired
 Persons
 Maggie Kuhn
 Founder and National Convener
 Gray Panthers
 Matt Lind
 Vice President
 Corporate Planning and Research
 The Travelers Insurance Co.
 Robert G. Lynch
 Vice President, Marketing Planning
 GTE Corp.
 Mathy D. Mezey
 Director
 Teaching Nursing Home Program
 University of Pennsylvania
 Hamish Munro
 Professor of Medicine and Nutrition
 Tufts University

Bernice Neugarten
Professor of Education and Sociology
Northwestern University

Sara Rix
Director of Research
The Women's Research and Education
Institute

Pauline Robinson
Research Professor of Gerontology
University of Southern California

John Rowe
Chief of Geriatrics
Beth Israel Hospital

Bert Seidman
Department of Occupational Safety,
Health and Social Security
AFL-CIO

Jacob Siegel
Senior Researcher
Center for Population Research
Georgetown University

Workshop: Impacts of Neuroscience

Barbara Mishkin, **Chair**
Hogan & Hartson

W. Kent Anger
Chief, Neurobehavioral Research
Section
Applied Psychology and Ergonomics
Branch
National Institute for Occupational
Safety and Health

Raymond Bartus
Group Leader
Department of Central Nervous
System Research
Medical Research Division
Lederle Laboratories
American Cyanamid Co.

David L. Bazelon
Senior Circuit Judge
U.S. Court of Appeals
District of Columbia Circuit

Floyd E. Bloom
Director, Davis Center for
Behavioral Neurobiology
Salk Institute

Greg R. Christoph
Principal Scientist
Neurobiology Group
Central Research and Development
Department

E. I. du Pont de Nemours & Co., Inc.

David Cohen
Leading Professor and Chairman
Department of Neurobiology and
Behavior
State University of New York,
Stony Brook

Joe Dan Coulter
Associate Professor
Marine Biomedical Institute
University of Texas Medical Branch

Miriam Davis
Science Policy Research Division
Congressional Research Service
Library of Congress

John Dowling
Professor, Department of Biology
Harvard University

John Hildebrand
Professor
Department of Biological Sciences
Columbia University

Jack Houck
President, Endorphin, Inc., and
Virginia Mason Research Center
Seattle, Wash.

Zaven S. Khachaturian
Chief, Physiology of Aging Branch
Biomedical Research and Clinical
Medicine Division
National Institute on Aging

Dennis Landis
Assistant Professor
Department of Neurology
Massachusetts General Hospital

Candace Pert
Chief, Section on Brain Biochemistry
Neuroscience Branch
National Institute of Mental Health

Dominick P. Purpura
Dean, School of Medicine
Stanford University

Michael Riddiough
Consultant
Syntex Corp.

Joshua Sanes
Assistant Professor of Physiology
Department of Physiology and
Biophysics
Washington University Medical Center

Alternatives to Animal Use in Testing and Experimentation Advisory Panel

Arthur L. Caplan, *Chair*
Associate for the Humanities
Hastings Center
Perrie M. Adams
Professor of Psychiatry
Department of Psychiatry and
Behavioral Research
University of Texas
Melvin Balk
Vice President and Scientific Director
Charles River Breeding Laboratories,
Inc.
Earle W. Brauer
Vice President, Medical Affairs
Revlon Research Center
David J. Brusick
Molecular Sciences Directorate
Litton Bionetics
G. Gilbert Cloyd
Human and Environmental Safety
Division
Miami Valley Laboratories
W. Jean Dodds
Division of Laboratories and Research
New York State Department of Health
Kurt Enslein
President
Health Designs, Inc.
Alan M. Goldberg
Director, The Johns Hopkins Center for
Alternatives to Animal Testing
Richard M. Hoar
Associate Director
Division of Toxicology and Pathology
Hoffmann-La Roche, Inc.

Peter Hutt, Esq.
Covington & Burling
Connie Kagan
Animal Political Action Committee
Ronald Lament-Havers
Director, Research Administration
Massachusetts General Hospital
John McArdle
Associate Director
Institute for Study of Animal Problems
Humane Society of the United States
Robert A. Neal
President
Chemical Industry Institute
of Toxicology
J. Wesley Robb
Professor of Religion
School of Religion
Professor of Bioethics
School of Medicine
University of Southern California
Andrew N. Rowan
Assistant Dean for New Programs
School of Veterinary Medicine
Tufts University
Jeri Sechzer
Associate Professor
Department of Psychiatry
The New York Hospital—
Cornell Medical Center
Henry Spira
Director
Coalitions to Abolish the LD50
and Draize Tests

Food and Renewable Resources Program**Water-Related Technologies for Sustainable Agriculture in U.S. Arid/Semiarid Lands Advisory Panel**

James B. Kendrick, Jr., *Chairman*
Vice President
Agriculture and University Services
University of California, Berkeley
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President
Adams & Associates
Wilbert H. Blackburn
Professor
Department of Range Science
Texas A&M University

William T. Dishman
Rancher
Idaho
Harold E. Dregne
Professor
Department of Plant and Soil Science
Texas Tech University
Chester E. Evans
USDA Research Director (retired)
Colorado
Larry J. Gordon
Director
Albuquerque Environmental Health
Department

Robert M. Hagan
Professor
Department of Land, Air, and
Water Resources
University of California, Davis
David E. Herrick
U.S. Forest Service (retired)
Western Agricultural Research
Committee
Colorado
Helen Ingram
Professor
Department of Government
University of Arizona, Tucson
Cyrus McKell
Director of Research
Plant Resources Institute
Utah
Michael F. McNulty
Director
Tucson Active Management Area
Arizona Department of Water
Resources
Milton E. Mekelburg
President
National Association of Soil
Conservation Districts
Colorado
Clifford J. Murino
President
Desert Research Institute
Nevada
Alice Parker
Farmer/Rancher
Washington
Cynthia Reed
Rancher
South Dakota
Luis Torres
Program Director
American Friends Service Committee
Northern New Mexico
Casey E. Westell, Jr.
Director of Industrial Ecology
Tenneco, Inc.
Texas
Norman K. Whittlesey
Professor
Department of Agricultural Economics
Washington State University, Pullman

**Technologies To Sustain Tropical
Forest Resources Advisory Panel**

Leonard Berry, **Chairman**
Research Professor
Center for Technology, Environment,
and Development
Clark University
Eddie Albert
Conservationist
Hugh Bollinger
Director
Plant Resources Institute
Robert Cassagnol
Member, Technical Committee
CONAELE
Robert Cramer
Former President
Virgin Islands Corp.
Gary Eilerts
Operations Representative
Appropriate Technology International
John Ewel
Associate Professor
Department of Botany
University of Florida, Gainesville
Robert Hart
Agronomist
Winrock International
Susanna Hecht
Assistant Professor
Department of Geography
University of California, Los Angeles
Marilyn Hoskins
Lecturer
Department of Sociology
Virginia Polytechnic Institute
Norman Johnson
Vice President, North Carolina Region
Weyerhaeuser Co.
Jan Laarman
Assistant Professor
Department of Forestry
North Carolina State University
Chuck Lankester
Forester
U.N. Development Programme
Robert Owen
Chief Conservationist (retired)
Trust Territory of the Pacific Islands

Christine Padoch
 Assistant Professor
 Institute of Environmental Studies
 University of Wisconsin, Madison

Allen Putney
 Principal Investigator
 Eastern Caribbean Natural Area
 Management Program
 West Indies Lab

Jeff Romm
 Assistant Professor
 Department of Forestry
 University of California, Berkeley

John Terborgh
 Professor
 Department of Biology
 Princeton University

Henry Tschinkel
 Forestry Advisor
 Regional Office for Central
 American Programs
 Agency for International Development
 U.S. Department of State

**Plants: The Potentials for Extracting
 Protein, Medicines, and Other
 Useful Chemicals Workshop**

Robert P. Adams
 Manager, Phytochemical Products
 Native Plants, Inc.

John Becker
 General Manager
 Leaf Protein International, Inc.

Frederick H. Buttell
 Department of Rural Sociology
 Cornell University

James Duke
 Chief, Economic Botany Lab
 U.S. Department of Agriculture

Norman R. Farnsworth
 Director, Programme for Collaborative
 Research in the Pharmaceutical
 Sciences
 College of Pharmacy
 University of Illinois

William Fewical
 Professor of Oceanography
 Institute of Marine Resources
 Scripps Institution of Oceanography
 University of California, San Diego

Cornelia B. Flora
 Professor
 Department of Sociology,
 Anthropology, and Social Work
 Kansas State University

Richard Harwood
 Director of Research
 Rodale Research Center

Martin Jacobson
 Laboratory Chief
 Biologically Active Natural Products
 Laboratory
 U.S. Department of Agriculture

Prachuab Kwanyuen
 Leaf Protein International, Inc.

Aklilu Lemma
 Senior Scientific Affairs Officer
 United Nations Center for Science and
 Technology for Development

Frederick L. Mann
 Assistant Director
 International Programs in Agriculture
 University of Missouri, Columbia

Ara der Marderosian
 Professor of Pharmacognosy
 Philadelphia College of Pharmacy and
 Science

Gordon H. Svoboda
 Visiting Research Professor
 in Pharmacognosy
 School of Pharmacy
 University of Pittsburgh

Howard Tankersley
 Director, Land Use Division
 Soil Conservation Service
 U.S. Department of Agriculture

Lehel Telek
 Chemist
 Mayaguez Institute of Tropical
 Agriculture
 U.S. Department of Agriculture

E. Richard Wheaton
 Manager, Natural Rubber Program
 U.S. Department of Agriculture

Samuel Wildman
 Leaf Protein International, Inc.
 (retired)

**Technology, Public Policy, and the
Changing Structure of American
Agriculture Advisory Panel**

Frank Baker
Director
International Stockmen's School
Winrock International Livestock
Research and Training Center

James Bonnen
Professor
Department of Agricultural Economics
Michigan State University

William Brown
Chairman of the Board
Pioneer Hi-Bred International, Inc.

Frederick Buttell
Associate Professor
Department of Rural Sociology
Cornell University

Willard Cochran
Consultant

Jack Doyle
Director
Agricultural Resources Project
Environmental Policy Center

Marsha Dudden
Dudden Farms, Inc.
Reinbeck, Iowa

Water Ehrhardt
Blue Ridge Farms
Knoxville, Md.

Dean Gillette
Executive Director
Bell Telephone Laboratory Systems
Research

Rogert Granados
Executive Director
La Cooperative

Richard Harwood
Director of Research
Rodale Research Center

Ralph Hofstad
President
Land-O' Lakes Cooperative

Charles Kidd
Dean, College of Engineering Science,
Technology, and Agriculture
Florida A&M University

Robert Lanphier 111
Chairman of the Board
Dickey-John Corp.

Edward Legates
Dean, College of the Agriculture and
Life Sciences
North Carolina State University

John Marvel
President and General Manager
Research Division
Monsanto Agriculture Products Co.

Donella Meadows
Adjunct Professor
Resources Policy Center
Dartmouth College

Don Paarlberg
Consultant

Don Reeves
Consultant
Interreligious Taskforce on U.S. Food
Policy

Milo Schanzenbach
Schanzenbach Farms

**Workshop: Technology, Public Policy,
and the Changing Structure of
American Agriculture**

Peter Barry
Professor
Department of Agricultural Economics
University of Illinois, Urbana

Hoy Carman
Professor
Department of Agricultural Economics
University of California, Davis

William Cochran
Consultant

B. R. Eddleman
Director, National Agricultural
Research Planning and Analysis
State Agricultural Experiment Stations
Mississippi

Robert Emerson
Associate Professor
Food and Resource Economics
Department
University of Florida, Gainesville

Ronald Knutson
Professor
Department of Agricultural Economics
Texas A&M University

Dean MacCannell
Associate Professor
Department of Applied and Behavioral
Sciences
University of California, Davis
Philip Raup
Professor
Department of Agriculture and Applied
Economics
University of Minnesota
Barry Richmond
Assistant Professor of Engineering
Resource Policy Center
Thayer School of Engineering
Dartmouth College
Vernon Sorenson
Professor
Department of Agricultural Economics
Michigan State University
Lauren Seth
Consultant
Tom Sporleder
Professor
Department of Agricultural Economics
Texas A&M University
Fred White
Professor
Department of Agricultural Economics
University of Georgia, Athens

**Workshop: Technology, Natural
Resources, and American Crafts**

Jan Halkett
Agricultural Marketing Specialist
Agricultural Cooperative Service
U.S. Department of Agriculture
Robert Hart
Executive Director
Indian Arts and Crafts Board
U.S. Department of the Interior
Mary Hufford
Folklife Specialist
American Folklife Center
Library of Congress
Linda McMahan
Director, TRAFFIC-U.S.
World Wildlife Fund
Robert Teske
Arts Specialist
Folkarts Program
National Endowment for the Arts
John Thomas
Special Agent Training Officer
Division of Law Enforcement
U.S. Fish and Wildlife Service

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President
Michael Reese Hospital and
Medical Center
Stuart H. Altman
Dean, Florence Heller School
Brandeis University
Kurt Deuschle
Professor and Chairman
Department of Community Medicine
Mount Sinai School of Medicine
New York
Carroll L. Estes
Chair
Department of Social and Behavioral
Sciences
School of Nursing
University of California, San Francisco

Rashi Fein
Professor
Department of Social Medicine and
Health Policy
Harvard Medical School
Melvin A. Glasser
Director
Health Security Action Council
Committee for National Health
Insurance
Patricia King
Professor
Georgetown Law Center
Joyce C. Lashof
Dean, School of Public Health
University of California, Berkeley

Margaret Mahoney
President
The Commonwealth Fund
New York

Frederick Mosteller
Professor and Chair
Department of Health Policy and
Management
School of Public Health
Harvard University

Mitchell T. Rabkin
President
Beth Israel Hospital
Boston

Dorothy P. Rice
Regents Lecturer
Department of Social and Behavioral
Sciences
School of Nursing
University of California, San Francisco

Richard K. Riegelman
Associate Professor
George Washington University School
of Medicine

Walter L. Robb
Vice President and General Manager
Medical Systems Operations
General Electric
Washington, D.C.

Frederick C. Robbins
President
Institute of Medicine

Rosemary Stevens
Professor and Chair
Department of History and Sociology
of Science
University of Pennsylvania

Kerr L. White
Deputy Director for Health Services
Rockefeller Foundation

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Vice President
Washington State Hospital Association

Robert Blendon
Senior Vice President
The Robert Wood Johnson Foundation

Jerry Cromwell
President
Health Economics Research

Karen Davis
Professor and Chair
Department of Health Policy and
Management
School of Hygiene and Public Health
The Johns Hopkins University

Robert Derzon
Vice President
Lewin & Associates

Howard Frazier
Director
Center for the Analysis of Health
Practice
School of Public Health
Harvard University

Cliff Gaus
Director
Center for Health Policy Studies
Georgetown University

Jack Hadley
Senior Research Associate
Urban Institute

Kate Ireland
Chair, Board of Governors
Frontier Nursing Service

Judith Lave
Professor
Graduate School of Public Health
University of Pittsburgh

Mary Marshall
Member
Virginia House of Delegates

Walter McNerney
Professor
Kellogg Graduate School of
Management
Northwestern University

Morton Miller
President
National Health Council
New York

James Mongan
Executive Director
Truman Medical Center

Seymour Perry
Senior Fellow and Deputy Director
Institute for Health Policy Analysis
Georgetown University Medical Center

Robert Sigmond
Community Programs for Affordable
Health
Blue Cross/Blue Shield of Philadelphia
Anne Somers
Professor
Department of Environment and
Community and Family Medicine
Rutgers University
Paul Torrens
Professor
School of Public Health
University of California, Los Angeles
Keith Weikel
Group Vice President
American Medical International

**Federal Policies and the
Medical Devices Industry**

Richard R. Nelson, Chair
Director and Professor
Institute for Social and Political Studies
Yale University
William F. Ballhaus
President
Beckman Instruments, Inc.
SmithKline Beckman Corp.
Ruth Farrissey
Associate Director
Department of Nursing
Massachusetts General Hospital
Peter Barton Hutt, Esq.
Partner
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Group Health Association
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National Service Director
Paralyzed Veterans of America
Robert M. Moliter
Manager
Government and Industry Affairs
Medical Systems Division
General Electric

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University of Pennsylvania
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Albuquerque, N. Mex.
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Associate Professor of Management
Sloan School
Massachusetts Institute of Technology
Edwin C. Whitehead
Chairman
Technicon Corp.

Workshop: Medical Device Regulation

Robert Britain
Associate Director for Device
Evaluation
Office of Medical Devices
Food and Drug Administration
Allen Greenberg
Staff Attorney
Public Citizen's Health Research Group
Linda Horton
Deputy Chief Counsel for Regulation
and Hearings
Office of General Counsel
Food and Drug Administration
Peter Barton Hutt, Esq.
Partner
Covington & Burling
Robert Leflar
Assistant Professor of Law and
Medicine
School of Law
University of Arkansas
David Meade
Assistant Counsel
Office of Legislative Counsel of the
House of Representatives
U.S. Congress

Richard Merrill
Dean, School of Law
University of Virginia

Rodney Muncie
Partner
Dickstein, Shapiro & Morin

Geoffrey Smith
Assistant General Counsel
Pharmaceutical Manufacturers
Association

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Department of Environmental Health
Sciences

School of Hygiene and Public Health
The Johns Hopkins University

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Medical Director
Ford Motor Co.

Richard F. Boggs
Vice President
Organization Resources Counselors,
Inc.

Mark R. Cullen
Professor of Statistics
Occupational Medicine Program
School of Medicine
Yale University

Philip E. Enterline
Professor of Biostatistics
School of Public Health
University of Pittsburgh

Melvin W. First
Professor
Department of Environmental Health
Sciences

School of Public Health
Harvard University

Matt Gillen
Industrial Hygienist
Amalgamated Clothing and Textile
Workers Union

Melvin Glasser
Consultant
Committee for National Health
Insurance

William J. McCarville
Director, Environmental Affairs
Monsanto Co.

Wilbur L. Meier, Jr.
Dean, School of Engineering
Pennsylvania State University

John Mendeloff
Associate Professor
Program in Science, Technology, and
Public Affairs
University of California

Samuel Milham, Jr.
Section Head, Epidemiology Section
Washington State Department of Social
and Health Services

Kenneth B. Miller
Consultant
Occupational Medicine

Ted E. Potter
Environmental Manager
Shepherd Chemical Co.

Milan Racic
Director, Safety and Health
Allied Industrial Workers Union

Mark A. Rothstein
Associate Professor
West Virginia University College of
Law

Marilyn Schule
Principal
Centaur Associates
Washington, D.C.

Michael O. Varner
Corporate Manager
Department of Environmental Sciences
American Smelting & Refining Co.

James L. Weeks
Industrial Hygienist
United Mineworkers of America

Roger H. Wingate
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New Hampshire

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University of Iowa

Margit Bleecker
Assistant Professor
Division of Occupational Medicine
School of Hygiene and Public Health
The Johns Hopkins Medical Institutes

George L. Carlo
Epidemiologist
Epidemiology, Health and
Environmental

Sciences
Dow Chemical U.S.A.

Neal Castagnoli, Jr.
Professor
Department of Chemistry and
Pharmaceutical Chemistry
University of California, San Francisco
Theodore Colton
Professor
School of Public Health
Boston University
Frederic Halbert
Delton, Mich.
George B. Hutchison
Professor
School of Public Health
Harvard University
Patricia King
Professor
Georgetown Law Center
Lewis Kuller
Professor
Department of Epidemiology
Graduate School of Public Health
University of Pittsburgh
Claire O. Leonard, M.D.
Salt Lake City, Utah
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National Veterans Affairs and
Rehabilitation Commission
The American Legion
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Veterans of Foreign Wars of the
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National Membership Director
Vietnam Veterans of America
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Senior Vice President
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Monsanto Co.
H. Michael D. Utidjian
Corporate Medical Director
American Cyanamid Co.

Blood Policy and Technology

Louanne Kennedy, **Chair**
Associate Professor
Department of Health Care
Administration
Mt. Sinai School of Medicine
Alvin W. Drake
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Electrical Engineering
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Massachusetts Institute of Technology

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Acute Communicable Disease Control
Section
Department of Health Services
Los Angeles County
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Vice President
Regulatory and Technical Affairs
Ethical Products Division
Revlon Health Care Group
Rosemary Stevens
Professor and Chair
Department of History and Sociology of
Science
University of Pennsylvania
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American Red Cross
National Headquarters
Martin J. Valaske
Medical Director
Medical Faculty Associates
George Washington University Medical
Center
William D. White
Associate Professor
Center for Policy Alternatives
Massachusetts Institute of Technology
Theodore Zimmerman
Professor
Department of Immunology
Department of Basic and Clinical
Research
Scripps Clinic and Research
Foundation

Wolf Zuelzer
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President
John E. Reid & Associates

Robert Edelberg
Professor of Psychiatry and Psychology
Rutgers Medical School

Frank Horvath
Associate Professor
School of Criminal Justice
Michigan State University

David T. Lykken
Professor of Psychiatry and Psychology
Department of Psychiatry
University of Minnesota Medical
School

Martin T. Orne
Professor of Psychiatry
Director, Unit for Experimental
Psychiatry
University of Pennsylvania Medical
School

Gail J. Povar
Assistant Professor of Medicine and
Health Care Sciences
The George Washington University
Medical Center

Steve Pruitt
Director of Congressional Affairs
Public Employees Department
AFL-CIO

Christopher H. Pyle
Associate Professor of Politics
Mt. Holyoke College

David C. Raskin
Professor of psychology
University of Utah

Harold Sigall
Professor of Psychology
University of Maryland

George B. Trubow
The John Marshall Law School

Althea M. I. Wagman
Research Associate of Psychiatry
Neuroscience Program
University of Maryland School of
Medicine

Paul M. Wortman
Associate Professor of Public Health
Program Director, Institute for Social
Research
University of Michigan

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Related Technology for Tropical
Diseases Advisory Panel**

Pedro Acha
Director of Programming and
Operations Coordination
Pan American Health Organization

George Alleyne
Chief
Research Promotion and Coordination
Pan American Health Organization

Karen Bell
Professional Associate
Board on Science and Technology for
International Development
National Academy of Sciences

William Campbell
Senior Director
Basic Parasitology
Merck, Sharpe, & Dohme

Richard Cash
Director
Office of International Health
Harvard School of Public Health

Barnett Cline
Professor and Chairman
Department of Tropical Medicine
Tulane Medical Center

Joseph Cook
Program Director
Tropical Disease Research
The Edna McConnell Clark Foundation

Robert Goodland
Ecologist
Office of Environmental Affairs
World Bank

Abraham Horowitz
Director Emeritus and Special
Consultant
Pan American Health Organization

Dieter Koch-Weser
Chairman
Department of Preventive and Social
Medicine
Harvard Medical School

Francisco Lopez-Antunano
Coordinator
Tropical Disease Programme
Pan American Health Organization

Arnold Monto
Professor
Department of Epidemiology
School of Public Health
University of Michigan

Ruth Nussenzweig
 Head
 Division of Parasitology
 New York University School of
 Medicine
 Richard Riegelman
 Associate Professor
 Department of Health Care Sciences
 The George Washington University
 Medical Center
 Gabriel Schmunis
 Medical Officer
 Tropical Diseases Programme
 Pan American Health-Organization

Thomas Simpson
 Director
 Eastern Shore Health District
 Accomack County Health Department
 Ronald Vogel
 Associate Professor
 Department of Management and Policy
 College of Business and Public
 Administration
 University of Arizona
 Kenneth Warren
 Director of Health Sciences
 The Rockefeller Foundation

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 The Harvard Business School

Workshop: Fiber Optics

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 Consultant

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| John Whinnery Professor Department of Electrical Engineering and Computer Science University of California, Berkeley | Neil Lincoln Executive Consultant Control Data Corp. |
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| Workshop: Advanced Computer Architecture | Fred Ris Manager Computation-Intensive Systems T. J. Watson Research Center |
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 Ohio State University
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 Consumers Union
 James L. Brown
 Associate Professor of Law
 Director of Center for Consumer
 Affairs
 University of Wisconsin-Extension
 Meredith M. Fernstrom
 Senior Vice President—Public
 Responsibility
 American Express Co.
 Edward J. Kane
 Everett D. Reese Professor of Banking
 in Monetary Economics
 Department of Economics
 The Ohio State University

Mark Leymaster
Staff Attorney
National Consumer Law Center
Barbara Quint
Money Management Editor
Family Circle
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Public Citizen for Senior Citizen
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Community Development Officer
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Technical Personnel Development
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Manufacturing Technical Group
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Lockheed-Georgia
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Engineering and Public Policy
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International Association of Machinists
and Aerospace Workers
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Director, Professional and
Governmental Activities
Society of Manufacturing Engineers
Executive Director
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Research Fellow
Massachusetts Institute of Technology
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Director
Forward Planning Program and
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Factory Automation Plant Services
Operation
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Coordinator
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Director
Interactive Computer Graphics Center
Rensselaer Polytechnic Institute
Robert Zager
Vice President, Policy Studies and
Technical Assistance
Work in America Institute

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 Anderson Reports
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 Prudential-Bache Securities, Inc.
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 Statistical Director
 National Machine Tool Builders
 Association
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 President
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 President
 Intergraph Corp.
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 Director of Professional and
 Governmental Activities
 Society of Manufacturing Engineers
 Philippe Villers
 President
 Automatix, Inc.
 Dennis Wisnosky
 Vice President
 Industrial Systems Group
 GCA Corp.

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David Grossman
 Manager of Automation Research
 IBM Thomas J. Watson Research
 Center
 Robert Hocken
 Chief, Automated Production
 Technology Division
 National Bureau of Standards
 Stuart G. Miller
 Manager
 Automation and Control Laboratory
 Corporate Research and Development
 General Electric & Co.
 Brian Moriarty
 Charles Stark-Draper Laboratories
 Richard Mueller
 Senior Consultant for Advanced CAD-
 CAM Research
 Control Data Corp.

Michael Radeke
 Vice President, Robotics
 Cincinnati Milacron
 Bernard Roth
 Design Division, Mechanical
 Engineering
 Stanford University
 Ali Seireg
 Professor
 Department of Mechanical Engineering
 University of Wisconsin-Madison
 Richard Simon
 Director, Product Management
 CAM Systems
 Computervision Corp.
 Theodore J. Williams
 Director, Laboratory for Applied
 Industrial Control
 Purdue University

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 Chairman, Science and Technology
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 Common Law Division
 American Bar Association
 David Burnham
 Reporter on Information Policy Issues
 The New York Times
 Michael Pertschuk
 Commissioner
 Federal Trade Commission
 John Shattuck
 Director of the Washington Office
 American Civil Liberties Union
 Christopher Sterling
 Director
 Center for Telecommunication Studies
 The George Washington University
 George Trubow
 Director, Center on Policy and
 Information Technology
 John Marshall Law School
 Willis Ware
 Corporate Research Staff
 Rand Corp.

Milton Wessel
General Counsel
Association of Data Processing Service
Organizations
Alan Westin
Professor
Department of Public Law and
Government
Columbia University

Mary Alice White
Professor of Psychology
Director, Electronic Learning
Laboratory
Teachers College
Columbia University

Oceans and Environment Program

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University of California
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Deputy Director
Department of Nuclear Safety
State of Illinois
Kai Lee
University of Washington
Institute for Environmental Studies
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Center for Environmental Studies
Princeton University

Glenn Paulson
Vice President for Science
National Audubon Society
Howard Raiffa
Frank P. Ramsey Professor of
Managerial Economics
Harvard Business School
William A. Thomas
Consultant
American Bar Foundation
Mason Willrich
Vice President—Corporate Planning
Pacific Gas & Electric Co.
Donald Wodrich
Rockwell International-Hanford
Operations
John Yasinsky
General Manager
Advanced Power Systems Divisions
Westinghouse Electric Corp.

Acid Rain and Transported Air Pollutants Advisory Panel

Norton Nelson, **Chairman**
Professor
Department of Environmental Medicine
New York University Medical Center
Thomas H. Brand
Director, Environmental Activities
Edison Electric Institute
Robert Wilbur Brocksen
Manager—Ecological Effects Program
Electric Power Research Institute
Jack George Calvert
Senior Scientist
National Center for Atmospheric
Research

David Hawkins
Senior Attorney
National Resources Defense Council,
Inc.

Edward A. Helme
Staff Director
Committee on Energy and Environment
National Governor's Association

Richard L. Kerch
Manager, Air Quality
Consolidation Coal

Anne LaBastille
Commissioner
Adirondack Park Agency

Gene E. Likens
Professor of Ecology
Section of Ecology and Systematic
Cornell University

Donald H. Pack
Consultant

Carl Shy
Professor of Epidemiology
School of Public Health
Professor of Epidemiology
University of North Carolina

Lester Thurow
Professor of Management and
Economics
Sloan School of Management
Massachusetts Institute of Technology

George H. Tomlinson, II
Vice President
Domtar Inc.

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Director, Laboratory for Wetland
Soils and Sediment
Louisiana State University

Hope M. Babcock
Director
Public Lands and Public Water
National Audubon Society

Earl H. Beistline
Fairbanks, Alaska
(Ex Officio Panel Member)

Charles E. Fraser
President
Sea Pines Co.
Hilton Head Island, N.C.

Donald E. Gilman
Alaska State Senator

Laurence R. Jahn
Vice President
Wildlife Management Institute

Joseph S. Larson
Chairman, Department of Forestry and
Wildlife Management
University of Massachusetts

Stanley L. Lattin
Director of Planning and
Economic Development
Port of Grays Harbor

Jay A. Leitch
Department of Agricultural Economics
North Dakota State University

Ralph Manna, Jr.
Division of Regulatory Affairs
Department of Environmental
Conservation

William Manning
Manager
Safety and Environmental Affairs
Louisiana Land & Exploration Co.

Eric Metz
Wetland Program Manager
California Coastal Commission

Mark Rey
Director, Water Quality Programs
National Forest Products Association

Laurence Sirens
President
Maryland Waterman's Association

Hobart G. Truesdell, II
President, First Colony Farms

Daniel E. Willard
Professor of Public and Environmental
Affairs
Indiana University

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Technology Advisory Panel**

Leslie Kanuk, **Chairman**
Professor of Marketing
Baruch College

Vera Alexander
Director, Division of Marine Science
University of Alaska

Richard F. Brunner
Senior Operating Officer
Avondale Shipyards, Inc.

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Metal Trades Department
AFL/CIO

H. Clayton Cook, Jr.
Partner
Cadwalader, Wickersham, & Taft
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American President Lines, Ltd.
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President
Lockheed Shipbuilding Co.

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and Mitigate Groundwater
Contamination Advisory Panel**

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Department of Hydrology and Water
Resources
University of Arizona

Harvey Banks
Belmont, Calif.
Robert Harris
Professor
Center for Energy and Environmental
Studies
Princeton University
Allen V. Kneese
Senior Fellow
Resources for the Future
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National Well Water Association
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Department of Civil Engineering
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Regulatory Management—Water
Monsanto Co.
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Director
Great Plains Office of Policy Studies
University of Nebraska
James T. B. Tripp
Counsel
Environmental Defense Fund

Science, Transportation, and Innovation Program

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Technology and Public Policy
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- Frank Stanton
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- James A. Van Allen
Head
Physics and Astronomy Department
University of Iowa
- Workshop #1: Lower Cost Alternatives
to One or More Space Stations**
- Wilbur Eskite
Deputy Chief
Systems Planning and Development
National Environmental Satellite, Data,
and Information Service
National Oceanic and Atmospheric
Administration
- Edmund J. Habib
Vice President for Engineering
Satellite Systems Engineering
- Tadahiko Inada
National Space Development Agency of
Japan
Scientific Section
Embassy of Japan
- Akihiko Iwahashi
Representative
Science and Technology Agency
Government of Japan
- Norbert Kiehne
Deutsche Forschungs-und
Versuchsanstalt fur Luft-und
Raumfahrt e.V.
Federal Republic of Germany
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National Space Development Agency of
Japan
Scientific Section
Embassy of Japan
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Head
European Space Agency
Washington Office
- Robert Noblitt
Senior Systems Analyst
Teledyne Brown Engineering
- Alain Perard
Long-Term Study Manager
CNES Paris
- Udo Pollvogt
President
ERNO-USA, Inc.
- Hans Traumann
Attache
Scientific and Technological Affairs
Embassy of the Federal Republic of
Germany
- H. J. Weigand
Consultant
Space Division
Messerschmitt-Bolkow-Blohm
- Workshop #2: Lower Cost Alternatives
to One or More Space Stations**
- Ivan Bekey
Director of Advanced Programs
National Aeronautics and Space
Administration
- Hubert Bortzmeyer
Special Assistant to the Director of
Programming
Center National d'Etudes Spatiales
- Joseph Carroll
Research Associate
Department of Chemistry
California Space Institute
University of California, San Diego

Jacques Collet
Head of Long-Term Preparatory
Program
European Space Agency Headquarters
David Criswell
Consultant
Department of Chemistry
California Space institute
University of California, San Diego
Troy A. Crites
Member of the Technical Staff
Test Analysis Section
Systems Evaluation Department
The Aerospace Corp.
Hubert P. Davis
Vice President
Eagle Engineering, Inc.
Russell Drew
president
Science & Technology Consultants
Jean-Pierre Fouquet
Scientific Attache for Space Affairs
Embassy of France
George F. Fraser
Chief Engineer, Advanced Engineering
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Rockwell International
Al Hill
MESA Program Manager
Space Systems Division
Boeing Aerospace Corp.
Tadahico Inada
Representative
National Space Development Agency of
Japan
Scientific Section
Embassy of Japan
William A. Johnston
Vice President for Engineering
Fairchild Space Co.
Charles Mathews
Consultant
Vienna, Va.
Wilfred Mellors
Head
European Space Agency
Washington Office
Udo Pollovogt
president
ERNO-USA, inc.
Wilbur L. Pritchard
president
Satellite Systems Engineering

Thomas C. Taylor
president
Taylor & Associates, inc.
Hans Traumann
Attache
Scientific and Technological Affairs
Embassy of the Federal Republic of
Germany
H. J. Weigand
Consultant
Space Division
Messerschmitt-Bolkow-Blohm
Paul Wunsch
Manager, Instrument Requirement
Branch
Teledyne Brown

Workshop: Skylab

Leland Belew
Consultant
Huntsville, Ala.
David Compton
Contractor
History Office
NASA/Johnson Space Center
John Disher
Consultant
Bethesda, Md.
Herbert Friedman
Chairman, Commission on Physical
Sciences, Mathematics, and
Resources
National Academy of Sciences
Owen Garriott
Astronaut
NASA/Johnson Space Center
Roger Hoffer
Professor, Department of Forestry and
Natural Resources
Purdue University
Kenneth Kleinknecht
Manager, Procurement, Manufacturing
and Tests for Spacecraft System
Martin Marietta
Charles Mathews
Consultant
Vienna, Va.
Jesco H. Von Puttkamer
Technical Engineer
Operations Management
NASA Headquarters

Edmond Reeves
Chief, Astrophysics Payload Branch
Spacelab Flight Division
NASA Headquarters

William Schneider
Vice President
Control Systems Activity
Computer Sciences Corp.

Robert Snyder
Chief, Separation Processes Branch
Marshall Space Flight Center

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Director
Science and Public Policy Program
University of Oklahoma
James H. Anderson
Director, Office Buildings Division
General Services Department
E. I. du Pont de Nemours & Co., Inc.

Joseph Blatt
Consultant
Washington, D.C.

Clifford W. Carpenter
Manager, Airport Development
Boeing Commercial Aircraft Co.

Pierre Champagne
Director of Airport Planning
Transport Canada

H. McKinley Conway
President
Conway Publications

Charilyn Cowan
Staff Director, Committee on
Transportation, Commerce and
Technology
National Governors' Association

Thomas J. Deane
Vice President, Operating Facilities
Avis Rent-A-Car, Inc.

John Drake
Professor of Air Transportation
School of Aeronautics and Astronautics
Purdue University

William Garrison
Professor
Institute of Transportation Studies
University of California, Berkeley

Aaron Gellman
President
Gellman Research

John Glover
Supervisor, Transportation Planning
Port of Oakland, Calif.

Leonard Griggs
Airport Director
Lambert St. Louis International Airport

Richard L. Harris
Vice President, Public Finance
First Boston Corp.

John Hoyt
Principal Project Manager
Ralph M. Parsons Co.

Jack R. Hunt
President
Embry-Riddle Aeronautical University

Richard Judy
Director of Aviation
Dade County, Fla.

Alfred Kahn
Robert Julius Thorne Professor of
Political Economy
Department of Economics
Cornell University

Leonard Martin
Vice President, Passenger Services
Piedmont Airlines

Dorn McGrath
Department of Urban and
Regional Planning
George Washington University

Sonny Najera
Director
Division of Aeronautics
State of Arizona

Edmund Nelle, Jr.
President
Butler Aviation International

Jan Roskam
Ackers Distinguished Professor of
Aerospace Engineering
University of Kansas

William Supak
Aviation Director
Port of Portland, Oreg.

William Wilson
Vice President, Properties and
Facilities
Federal Express Corp.

**Technology, Innovation, and
Regional Economic Development
Advisory Panel**

William C. Norris, **Chairman**
Chairman and Chief Executive Officer
Control Data Corp.

William J. Abernathy*
Professor
Graduate School of Business
Harvard University

William F. Aikman
President
Massachusetts Technology
Development Corp.

Henry Cisneros
Mayor, City of San Antonio, Texas

Ella Francis
President
Parkside Association of Philadelphia

Aaron Gellman
President
Gellman Research Associates, Inc.

Don Lee Gevirtz
Chairman
The Foothill Group, Inc.

George W. Haigh
President and Chief Executive Officer
The Toledo Trust Co.

Quentin Lindsey
Science and Public Policy Advisor
Office of the Governor
State of North Carolina

Neal R. Pierce
Contributing Editor
National Journal

David V. Ragone
President
Case Western Reserve University

John Stewart
Assistant General Manager
Tennessee Valley Authority

Ellen Sulzberger Straus
President
WMCA Radio

Alexander B. Trowbridge
President
National Association of Manufacturers

Thomas L. Yount, Jr.
Commissioner of Employment Security
State of Tennessee

**Assessment of U.S. Passenger Rail
Technology**

Workshop: Railcar Manufacturing

Frank Cihac
Director of Technical and Research
Services
American Public Transit Association

Ross Higginbotham
Director of Car Engineering
Mechanical Department
Amtrak

George Krambles
Consultant
Oak Park, Ill.

Richard Sklar
President
Entertainment Express Corp.

Jeffrey Stayer
Manager, Marketing, Planning, and
Administration
Westinghouse Electric

Workshop: Magnetic Levitation

Robert Borcherts
Research Scientist
Ford Motor Co.

Mike Daly
Economic Development Director
City of Las Vegas, Nev.

John A. Darling
Director of Cost Analysis and Research
Santa Fe Railway

Ross Higginbotham
Director of Car Engineering
Mechanical Department
Amtrak

Roger Katz
Research Section Head
Sperry Corp.

George Krambles
Consultant
Oak Park, Ill.

Myles Mitchell
Director, Office of Freight and
Passenger Research and Development
Federal Railroad Administration

Herbert Richardson
Associate Dean of Engineering
Massachusetts Institute of Technology

* Deceased.

Richard Sklar
President
Entertainment Express Corp.
William Wieters
General Manager, Passengers Transport
Conrail

***Workshop: Demand, Economic, and
Institutional Considerations***

Ross Capon
Executive Director
National Association of Railway
Passengers
Steve Ditmeyer
Director of Research and Development
Burlington Northern Railroad
John Fischer
Transportation Analyst
Economics Division
Congressional Research Service
Anthony Gomez-Ibanez
Professor
John F. Kennedy School of Government
Harvard University
Ross Higginbotham
Director of Car Engineering
Mechanical Department
Amtrak
Mike Mates
Consultant
Washington, D.C.

Arrego Mongini
Deputy Associate Administrator
Northeast Corridor Improvement
Project
Federal Railroad Administration
Gordon Peters
Senior Rail Transportation Specialist
Rail Division
New York State Department of
Transportation
Lenore Sek
Transportation Analyst
Economics Division
Congressional Research Service
Library of Congress
Richard Sklar
President
Entertainment Express Corp.
Saul Sokolsky
Senior Engineer
Aerospace Corp.
Lou Thompson
Acting Associate Administrator
Passenger and Freight Services
Northeast Corridor
Federal Railroad Administration

Appendix B

OTA Act

Public Law 92-484
92nd Congress, H. R. 10243
October 13, 1972

An Act

86 STAT. 797

To establish an Office of Technology Assessment for the Congress as an aid in the identification and consideration of existing and probable impacts of technological application; to amend the National Science Foundation Act of 1950; and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Technology Assessment Act of 1972".

Technology
Assessment Act
of 1972.

FINDINGS AND DECLARATION OF PURPOSE

SEC. 2. The Congress hereby finds and declares that:

(a) As technology continues to change and expand rapidly, its applications are-

(1) large and growing in scale; and

(2) increasingly extensive, pervasive, and critical in their impact, beneficial and adverse, on the natural and social environment.

(b) Therefore, it is essential that, to the fullest extent possible, the consequences of technological Replications be anticipated, understood, and considered in determination of public policy on existing and emerging national problems.

(c) The Congress further finds that :

(1) the Federal agencies presently responsible directly to the Congress are not designed to provide the legislative branch with adequate and timely information, independently developed, relating to the potential impact of technological applications, and

(2) the present mechanisms of the Congress do not and are not designed to provide the legislative branch with such information.

(d) Accordingly, it is necessary for the Congress to-

(1) equip itself with new and effective means for securing competent, unbiased information concerning the physical, biological, economic, social, and political effects of such applications; and

(2) utilize this information, whenever appropriate, as one factor in the legislative assessment of matters pending before the Congress, particularly in those instances where the Federal Government may be called upon to consider support for, or management or regulation of technological applications.

ESTABLISHMENT OF THE OFFICE OF TECHNOLOGY ASSESSMENT

Sec. 3. (a) In accordance with the findings and declaration of purpose in section 2, there is hereby created the Office of Technology Assessment (hereinafter referred to as the "Office") which shall be within and responsible to the legislative branch of the Government.

(b) The Office shall consist of a Technology Assessment Board (hereinafter referred to as the "Board") which shall formulate and promulgate the policies of the (Office, and a Director who shall carry out such policies and administer the operations of the Office.

Technology
Assessment
Board.

(c) The basic function of the Office shall be to provide early indications of the probable beneficial and adverse impacts of the applications of technology and to develop other coordinate information which may assist the Congress. In carrying out such function, the Office shall :

Duties.

(1) identify existing or probable impacts of technology or technological programs;

- (2) where possible, ascertain cause-and-effect relationships;
- (3) identify alternative technological methods of implementing specific programs;
- (4) identify alternative programs for achieving requisite goals;
- (5) make estimates and comparisons of the impacts of alternative methods and programs;
- (6) present findings of completed analyses to the appropriate legislative authorities;
- (7) identify areas where additional research or data collection is required to provide adequate support for the assessments and estimates described in paragraph (1) through (5) of this subsection; and

(8) undertake such additional associated activities as the appropriate authorities specified under subsection (d) may direct.

(d) Assessment activities undertaken by the Office may be initiated upon the request of

- (1) the chairman of any standing, special, or select committee of either House of the Congress, or of any joint committee of the Congress, acting for himself or at the request of the ranking minority member or a majority of the committee members;
- (2) the Board; or
- (3) the Director, in consultation with the Board.

Information, availability.

(e) Assessments made by the Office, including information, surveys, studies, reports, and findings related thereto, shall be made available to the initiating committee or other appropriate committees of the Congress. In addition, an such information, surveys, studies, reports, and findings produced by the Office may be made available to the public except where-

- (1) to do so would violate security statutes; or
- (2) the Board considers it necessary or advisable to withhold such information in accordance with one or more of the numbered paragraphs in section 552(b) of title 5, United States Code.

81 Stat. 54.

TECHNOLOGY ASSESSMENT BOARD

Membership.

SEC. 4. (a) The Board shall consist of thirteen members as follows:

- (1) six Members of the Senate, appointed by the President pro tempore of the Senate, three from the majority party and three from the minority party;
- (2) six Members of the House of Representatives appointed by the speaker of the House of Representatives, three from the majority party and three from the minority party; and
- (3) the Director, who shall not be a voting member.

Vacancies,

(b) Vacancies in the membership of the Board shall not affect the power of the remaining members to execute the functions of the Board and shall be filled in the same manner as in the case of the original Appointment.

Chairman and vice chairman.

(c) The Board shall select a chairman and a vice chairman from among its members at the beginning of each Congress. The vice chairman shall act in the place and stead of the chairman in the absence of the chairman. The chairmanship and the vice chairmanship shall alternate between the Senate and the House of Representatives with each Congress. The chairman during each even-numbered Congress shall be selected by the Members of the House of Representatives on the Board from among their number. The vice chairman during each

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Congress shall be chosen in the same manner from that House of Congress other than the House of Congress of which the chairman is a Member.

(d) The Board is authorized to sit and act at such plain and times during the sessions, recesses, and adjourned periods of Congress and upon a vote of a majority of its members, to require by subpoena or otherwise the attendance of such witnesses and the production of such books, papers, and documents, to administer such oaths and affirmations, to take such testimony, to procure such printing and binding, and to make such expenditures, as it deems advisable. The Board may make such rules respecting its organization and procedures as it deems necessary, except that no recommendation shall be reported from the Board unless a majority of the Board assent. Subpenas may be issued over the signature of the chairman of the Board or of any voting member designated by him or by the Board, and may be served by such person or persons as may be designated by such chairman or member. The chairman of the Board or any voting member thereof may administer oaths or affirmations to witnesses.

Meetings.

Subpena.

DIRECTOR AND DEPUTY DIRECTOR

SEC. 3. (a) The Director of the Office of Technology Assessment shall be appointed by the Board and shall serve for a term of six years unless sooner removed by the Board. He shall receive basic pay at the rate provided for level III of the Executive Schedule under section 5314 of title 5, United States Code.

Appointment.

Compensation.

83 Stat. 863.

(b) In addition to the powers and duties vested in him by this Act, the Director shall exercise such powers and duties as may be delegated to him by the Board.

(c) The Director may appoint with the approval of the Board, a Deputy Director who shall perform such functions as the Director may prescribe and who shall be Acting Director during the absence or incapacity of the Director or in the event of a vacancy in the office of Director. The Deputy Director shall receive basic pay at the rate provided for level IV of the Executive Schedule under section 5315 of title 5, United States Code.

(d) Neither the Director nor the Deputy Director shall engage in any other business, vocation, or employment than that of serving as such Director or Deputy Director, as the case may be; nor shall the Director or Deputy Director, except with the approval of the Board, hold any office in, or act in any capacity for, any organization, agency, or institution with which the Office makes any contract or other arrangement under this Act.

Employment restriction.

AUTHORITY OF THE OFFICE

SEC. 6. (a) The Office shall have the authority, within the limits of available appropriations, to do all things necessary to carry out the provisions of this Act, including, but without being limited to the authority to--

(1) make full use of competent personnel and organizations outside the Office, public or private, and form special ad hoc task forces or make other arrangements when appropriate;

(2) enter into contracts or other arrangements as may be necessary for the conduct of the work of the Office with any agency or instrumentality of the United States, with any State, territory,

Contracts.

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|---|---|
| 86 STAT. 800 | or possession or any political subdivision thereof, or with any person, firm, association, corporation or educational institution, with or without reimbursement, without performance or other bonds, and without regard to section 3709 of the Revised Statutes (41 U.S.C. 5) ; |
| 80 Stat. 499; 93 <i>sid.</i> 190. | (8) make advance, progress, and other payments which relate to technology assessment without regard to the provisions of section 3648 of the Revised Statutes (31 U.S.C. 529); 4 accept and utilize the services of voluntary and uncompensated personnel necessary for the conduct of the work of the Office and provide transportation and subsistence as authorized by section 5703 of title 5, United States Code, for persons serving without compensation; (5) acquire by purchase, lease, loan, or gift, and hold and dispose of by sale, lease, or loan, real and personal property of all kinds necessary for or resulting from the exercise of authority granted by this Act; and (6) prescribe such rules and regulations as it deems necessary governing the operation and organization of the Office. |
| Recordkeeping. | (b) Contractors and other parties entering into contracts and other arrangements under this section which involve costs to the Government shall maintain such books and related records as will facilitate an effective audit in such detail and in such manner as shall be prescribed by the Office, and such books and records (and related documents and papers shall be available to the Office and the Comptroller General of the United States, or any of their duly authorized representatives, for the purpose of audit and examination. (c) The Office in carrying out the revisions of this Act shall not, itself, operate any laboratories, pilot plants or test facilities. |
| Agency cooperation | (d) The Office is authorized to secure directly from any executive department or agency information, suggestions, estimates, statistics, and technical assistance for the purpose of carrying out its functions under this Act. Each such executive department or agency shall furnish the information, suggestions, estimates, statistics, and technical assistance directly to the Office upon its request. |
| Personnel detail. | (e) On request of the Office, the head of any executive department or agency may detail, with or without reimbursement any of its personnel to assist the Office in carrying out its functions under this Act. (f) The Director shall, in accordance with such policies as the Board shall prescribe, appoint and fix the compensation of such personnel as may be necessary to carry out the provisions of this Act. |
| ESTABLISHMENT OF THE TECHNOLOGY ASSESSMENT ADVISORY COUNCIL | |
| Membership. | SEC. 7. (a) The Office shall establish a Technology Assessment Advisory Council (hereinafter referred to as the "Council"). The Council shall be composed of the following twelve members: (1) ten members from the public, to be appointed by the Board, who shall be persons eminent in one or more fields of the physical, biological, or social sciences or engineering or experienced in the administration of technological activities, or who may be judged qualified on the basis of contributions made to educational or public activities; (2) the Comptroller General; and (3) the Director of the Congressional Research Service of the Library of Congress. |

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86 STAT. 801

- (b) The Council, upon request by the Board, shall—
- (1) review and make recommendation to the Board *on* activities undertaken by the Office or on the initiation thereof in accordance with section 3(d);
- (2) review and make recommendations to the Board on the findings of any assessment made by or for the Office; and
- (3) undertake such additional related tasks as the Board may direct.
- (c) The Council by majority vote, shall elect from its members appointed under subsection (a) (1) of this section a Chairman and a Vice Chairman, who shall serve for such time and under such conditions as the Council may prescribe. In the absence of the Chairman in the event of his incapacity, the Vice Chairman shall act as Chairman.
- (d) The term of office of each member of the Council appointed under subsection (a) (1) shall be four years except that any such member appointed to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed shall be appointed for the remainder of such term. No person shall be appointed a member of the Council under subsection (a) (1) more than twice. Terms of the members appointed under subsection (a)(1) shall be staggered so as to establish a rotating membership according to such method as the Board may devise.
- (e) (1) The members of the Council other than those appointed under subsection (a) (1) shall receive no pay for their services as members of the Council, but shall be allowed necessary travel expenses (or, in the alternative, mileage for use of privately owned vehicles and a per diem in lieu of subsistence at not to exceed the rate prescribed in sections 5702 and 5704 of title 5, United States Code), and other necessary expenses incurred by them in the performance of duties vested in the Council, without regard to the provisions of subchapter 1 of chapter 57 and section 5731 of title 5, United States Code, and regulations promulgated thereunder.
- (2) The members of the Council appointed under subsection (a) (1) shall receive compensation for each day engaged in the actual performance of duties vested in the Council at rates of pay not in excess of the daily equivalent of the highest rate of basic pay set forth in the General Schedule of section 5332(a) of title 5, United States Code, and in addition shall be reimbursed for travel, subsistence, and other necessary expenses in the manner provided for other members of the Council under paragraph (1) of this subsection.

Duties.

Chairman and Vice Chairman.

Term of office.

Travel expenses.

80 Stat. 498;
83 Stat. 190.
5 USC 5701.

Compensation.

UTILIZATION OF THE LIBRARY OF CONGRESS

SEC. 8. (a) To carry out the objective of this Act, the Librarian of Congress is authorized to make available to the Office such services and assistance of the Congressional Research Service as may be appropriate and feasible.

(b) Such services and assistance made available to the Office shall include, but not be limited to, all of the services and assistance which the Congressional Research Service is otherwise authorized to provide to the Congress.

(c) Nothing in this section shall alter or modify any services or responsibilities other than those performed for the Office, which the Congressional Research Service under law performs for or on behalf

of the Congress. The Librarian is, however, authorized to establish within the Congressional Research Service such additional divisions, groups, or other organizational entities as may be necessary to carry out the purpose of this Act.

(d) Services and assistance made available to the Office by the Congressional Research Service in accordance with this section may be provided with or without reimbursement from funds of the Office, as agreed upon by the Board and the Librarian of Congress.

UTILIZATION OF THE GENERAL ACCOUNTING OFFICE

Sec. 9. (a) Financial and administrative services (including those related to budgeting, accounting, financial reporting, personnel, and procurement) and such other services as may be appropriate shall be provided the Office by the General Accounting Office.

(b) Such services and assistance to the Office shall include, but not be limited to, all of the services and assistance which the General Accounting Office is otherwise authorized to provide to the Congress.

(c) Nothing in this section shall alter or modify any services or responsibilities, other than those performed for the Office, which the General Accounting Office under law performs for or on behalf of the Congress.

(d) Services and assistance made available to the Office by the General Accounting Office in accordance with this section may be provided with or without reimbursement from funds of the Office, as agreed upon by the Board and the Comptroller General.

COOPERATION WITH THE NATIONAL SCIENCE FOUNDATION

SEC. 10. (a) The Office shall maintain a continuing liaison with the National Science Foundation with respect to-

(1) grants and contracts formulated or activated by the Foundation which are for purposes of technology assessment; and

(2) the promotion of coordination in areas of technology assessment, and the avoidance of unnecessary duplication or overlapping of research activities in the development of technology assessment techniques and programs.

Scientific
programs,
financing,
92 Stat. 360.

(b) Section 3(b) of the National Science Foundation Act of 1950, as amended (42 U.S.C. 1862(b)), is amended to read as follows:

64 Stat. 156;
32 Stat. 365,
42 USC 1873.

"(b) The Foundation is authorized to initiate and support specific scientific activities in connection with matters relating to international cooperation, national security, and the effects of scientific applications upon society by making contracts or other arrangements (including grants, loans, and other forms of assistance) for the conduct of such activities. When initiated or supported pursuant to requests made by any other Federal department or agency, including the office of Technology Assessment, such activities shall be financed whenever feasible from funds transferred to the Foundation by the requesting official as provided in section 14(g), and any such activities shall be unclassified and shall be identified by the Foundation as being undertaken at the request of the appropriate official."

ANNUAL REPORT

SEC. 11. The Office shall submit to the Congress an annual report which shall include, but not be limited to, an evaluation of technology assessment techniques and identification, insofar as may be feasible, of technological areas and programs requiring future analysis. Such report shall be submitted not later than March 15 of each year.

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86 STAT. 803

APPROPRIATION

Sac. 12. (a) To enable the Office to carry out its powers and duties, there is hereby authorized to be appropriated to the Office out of any money in the Treasury not otherwise appropriated, not to exceed \$5,000,000 in the aggregate for the two fiscal years ending June 30, 1973, and June 30, 1974, and thereafter such sums as may be necessary.

(b) Appropriations made pursuant to the authority provided in subsection (a) shall remain available for obligation for expenditure, or for obligation and expenditure for such period or periods as may be specified in the Act making such appropriations.

Approved October 13, 1972.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 92-469 (Comm. on Science and Astronautics) and

No. 92-1436 (Comm. of Conference).

SENATE REPORT No. 92-1123 (Comm. on Rules and Administration).

CONGRESSIONAL RECORD, Vol. 118 (1972):

Feb. 6, considered and passed House.

Sept. 14, considered and passed Senate, unended.

Sept. 22, Senate agreed to conference report.

Oct. 4, House agreed to conference report.