6. Major Programs

ASSISTANT SECRETARY FOR
SCIENCE AND TECHNOLOGY

ISRAEL-U.S. BINATIONAL INDUSTRIAL RESEARCH AND DEVELOPMENT FOUNDATION

Background

A cooperative industrial R&D program with Israel is one of several international activities in which this Office is involved. The Israel activity is of particular interest to the Department because it is the first bilateral program to focus specifically on industrial R&D, and as such it could serve as a prototype for future programs with developing countries.

The program is being conducted under the aegis of the Joint U.S.-Israel Committee for Investment and Trade. This Committee was formed in July 1974, and is cochaired by the U.S. Secretary of Treasury and Israel's Minister of Finance. The Deputy Assistant Secretary for Science and Technology of the Department of Commerce has served as the Chairman of the Industrial R&D Subcommittee.

The private sector and several government agencies (NSF, USDA, HEW, ERDA, NBS, in addition to Treasury and State) have expressed interest in this industrial R&D cooperation. This interest resulted in February, 1975, in the formation of a Binational Industrial R&D Council, with the U.S. membership consisting presently of 14 company vice presidents and chief scientists from the private sector. In addition, in May, 1975, the Joint Committee decided to emphasize the industrial R&D cooperation and agreed to consider means of funding the activity. This led to an Agreement to establish a Binational Industrial Research and Development Foundation with a $60 million endowment fund. The Agreement was signed on March 3, 1976, but will not enter into force until Congress appropriates the funds for the $30 million U.S. contribution to the fund. This U.S. share will be provided in the form of U.S.-owned Israeli pounds derived from Israeli prepayment of a portion of its PL 480 local currency debt.

Mutual Benefits

The objective of the Binational Industrial R&D Foundation will be to encourage and facilitate mutually beneficial technological innovation activities between the United States and Israel. The Foundation will operate primarily by supporting joint projects which will lead to economic benefits for both countries. These

projects are to be proposed by Israeli or American companies, who will also share in their support. In addition, there will be a small budget to promote information exchange, consultant services and similar support and development functions.

The United States will benefit from this cooperative industrial R&D activity. It serves our foreign policy, being another indication of our continuing friendship with Israel. Because of Israel's scientific excellence, the possibility exists for truly synergistic R&D. Since 30 percent of the cost of recent Israeli high technology products is due to the purchase of components, the United States stands to gain through component sales to Israel. Many of the products arising out of the cooperation will have to be produced in the United States since the production capacity of Israel is limited by its small size. In the marketing area, on the one hand U.S. companies can benefit by providing the marketing services which Israel lacks; and on the other hand U.S. subsidiaries in Israel can take advantage of Israel's reduced duty relationships with the EEC.

Department of Commerce Responsibilities

The Foundation will be governed by a Board consisting of three American and three Israeli Government officials, the American members to be the Asst. Sec. for Science and Technology, Dept. of Commerce; the Asst. Sec. for Oceans and International Environmental and Scientific Affairs, Dept. of State; and the Asst. Sec. for International Affairs, Dept. of Treasury; or their designees. The Board will be responsible for appointing an Executive Director and for approving the annual budget and programs of the Foundation.

Besides serving on the Board, the Asst. Sec. for Science and Technology, Dept. of Commerce, will have the added responsibility of evaluating the proposals on behalf of the U.S. Government. It is planned that this will take place in two phases: In the first phase, proposal abstracts will be reviewed, and only companies that submit the most promising abstracts will be invited to prepare detailed proposals for the second phase evaluation. Present plans call for the Director of International Relations at the National Bureau of Standards to manage the review process for the Asst. Sec., drawing on in-house expertise of the Bureau and other Government agencies, and on reviewers in the private sector.

In addition to the above, there exists several other programs which are handled by the immediate office. These include the Commerce Technical Advisory Board (CTAB), the Commerce Science and Technology Fellowship Program (ComSci), and the (FCCSET) Committee on Intellectual Property and Information.

a. Commerce Technical Advisory Board

The Commerce Technical Advisory Board studies and evaluates the technical activities of the Department of Commerce and recommends measures to increase their value to the business community. Activities include: (a) assessing the future and continuing role of the Department's scientific and technical agencies in terms of the changing requirements of industry and commerce; (b) providing liaison to inform industry of the technical services available from DOC and to inform the Department of the technical requirements of industry; (c) identifying and evaluating interaction of economic and business matters with research and development; (d) suggesting ways of stimulating research and development by private industry for private industry and of helping industry get the maximum benefit from Federally-sponsored research and development; and (e) advising on specific technical problems of major material significance as they arise.

b. Commerce Science and Technology Fellowship Program

The Department of Commerce Science and Technology Fellowship Program is designed to give selected scientists, engineers and technologists an opportunity to participate in the study of national and international issues related to the development and application of science and technology. The ComSci Program endeavors to build a clearer understanding of the following:

- o the criteria for choice among scientific and technical programs;
- o the economics of fiscal policy and the budget for science in Government;
- o technological innovation as an element in the Nation's economic growth;
- o scientific manpower as a concern of national policy;

o the role of higher management in decisions on technical programs;

o science and technology in world affairs; and

o the organization of scientific activities in the Federal Government.

Each year, fifteen to eighteen candidates are selected through agency recommendation procedures, on the basis of their potential to participate in the management of technical programs. By combining an intensive educational and orientation program with actual work assignments, carefully selected to provide exposure to policy-making and program management at the highest executive level, the ComSci program fosters greater awareness of the on-going activities of other agencies of the Government.

This program started in 1964; to date, 177 men and women have participated.

c. Committee on Intellectual Property and Information

The Federal Coordinating Council for Science, Engineering and Technology (FCCSET) embraces six problem-oriented and four policy-oriented committees. In the latter category is the Committee on Intellectual Property and Information (CIPI). This committee is chaired by the Assistant Secretary of Commerce for Science and Technology. It is comprised of two subcommittees having subject matter jurisdiction as indicated.

1. Patents and Data Subcommittee

- To examine and coordinate the planning and administration of agency intellectual property policies:

  o trade secrets
  o protection of technology
  o patent licensing
  o employee invention rights
  o patent, copyright, and data procurement regulations

2. Scientific and Technical Information Subcommittee

- to examine and coordinate the planning and administration of agency programs pertaining to scientific and technical information:

- page charges and other subsidies
- copyright and patent information
- networking and other dissemination methods
- pricing
- data banks
- computer programs
- international exchange
- standards and protocols
- intra-governmental (state, local, Federal) coordination
- public/private sector interfaces
- research and development

MAJOR PROGRAMS

The Office of Environmental Affairs provides the Department with scientific and technological evaluation and coordination for a wide range of environmental activities related to air pollution, water pollution, land use, solid waste disposal, recycling, noise, pesticides, toxic substances, and energy conservation. It conducts objective independent reviews and evaluations of proposed environmental protection regulations as to the scientific validity of their underlying assumptions, and the technological feasibility of the proposed corrective actions. These reviews and evaluations serve as a basis for the promulgation of Departmental positions and policies with regard to major environmental regulatory issues. The reviews also are of value to the Environmental Protection Agency, (EPA), in developing more effective, environmental regulations, as well as to the business community, by providing objective, independent evaluations of technological capability, measured against legislated requirements.

Environmental Impact Statements (EIS's)

During Fiscal 1976, the Office received, arranged for comments on, and/or prepared comments on 839 draft EIS's prepared by other departments and agencies. It supervised the preparation of 24 EIS's on Department programs, and disseminated them to the Council on Environmental Quality, other Government agencies, environmental groups, and the general public. It also reviewed and commented on approximately 266 other documents involving proposed environmental legislation, regulations, and policies. In addition, OEA, with the cooperation of the Council on Environmental Quality and other Federal agencies, initiated a study designed to facilitate the preparation of environmental assessments by the private sector and local governments.

Water Pollution Evaluations

In water pollution control, the Office continues to review the guidelines for the limitation of effluent discharges for a wide variety of industries. Other regulations which are being

evaluated include those for industrial wastewater pretreatment requirements, secondary wastewater treatment, toxic and hazardous pollutants, disposal of dredge and fill material, and discharge permits. The Office also was active in reviewing the report to the Congress prepared by the National Commission on Water Quality, and submitted to the Congress in March 1976.

Air Pollution Evaluations

The Clean Air Act requires the development of very stringent regulations relating to mobile and stationary sources of air pollution. During the year, the Office prepared evaluations and comments on regulations stemming from the Act and proposed by the Environmental Protection Agency. In addition, the Office reviewed and commented on a number of Congressional air pollution control bills. Members of this Office, as part of the team from EPA, CEQ, Department of Commerce, National Bureau of Standards, and Department of Commerce, Office of Environmental Affairs, were instrumental in developing a new air quality measurement index to be applied nation-wide. OEA involvement in this project demonstrates that OEA expertise is solicited and well regarded among other Federal agencies.

Other Environmental Evaluations

The Office reviewed pesticide regulations focusing on issues of registration, certification of pesticide applicators, and issuance of experimental permits. It has been conducting scientific and technical evaluations of proposed bills and regulations dealing with toxic substances, resource recovery, land use, and strip mining. OEA will provide the scientific and technical support of the Department's representative to the interagency committee for the Toxic Substances Control Act.

Energy/Environmental Evaluations

In October 1974, the Secretary of Commerce noted that the President's request to industry for voluntary energy conservation programs might be negated, at least in part, by additional energy requirements for increasingly stringent pollution control. Thus, OEA was directed to develop and supervise contract studies to determine the direct and indirect energy costs of the total pollution control requirements within several major energy-intensive industries. Previous studies had focused on only the

direct requirements for a single medium (e.g., only energy requirements for scrubbers for air pollution control), and did not include the indirect energy requirements (e.g., energy requirements for processing and transporting the required lime for scrubbers, and energy requirements for the subsequent disposal of the sludge). Further, previous studies have dealt with only one level of regulation (e.g., Federal) in one medium, such as water or air. Thus, to provide an overall energy/environmental analysis, studies were needed which would consider Federal, state and local regulations on all media - air, water, and solid wastes.

International Programs

International activities continued with active participation on the Interagency Committee on International Environmental Affairs of the Department of State, United Nations Environment Program, the Environmental Committee of the Organization for Economic Cooperation and Development, and other governmental and private organizations concerned with the development and coordination of multi-national environmental improvement programs. Major responsibilities under the US - USSR Environmental Agreement also continues, and were highlighted by the Office's leadership of delegations to the USSR in December 1975 and October 1976 for a Joint Working Committee on the Harmonization of Air and Water Pollution Standards. A comprehensive plan for cooperative environmental projects for the two nations was adopted. For example, a jointly sponsored symposium on environmental economics had been scheduled for April 1977 in Yerevan, USSR. This will be the first project of its kind.

Office of Product Standards

MAJOR PROGRAMS

(a) The facilitation of effective participation by the Federal Government in domestic and international standards activities and promotion of uniform policies among agencies participating in these activities. In 1975 the Secretary reconstituted the Interagency Committee on Standards Policy (ICSP) for this purpose. It is chaired by the Director of the Office of Product Standards and its members consist of representatives of 22 Federal departments and agencies. The ICSP recently completed development of a set of policy principles which when implemented will establish a uniform policy to be followed by Federal agencies in working with non-Federal standards-setting bodies. The coordinative implementation of that policy currently is being planned by OPS in cooperation with the members of the ICSP.

(b) A new National Voluntary Laboratory Accreditation Program has been instituted and applications for accreditation of laboratories in over 12 product areas currently are in the stage of presubmission preparation. In the next several years this program should lead to the accreditation of thousands of private and public testing laboratories that serve regulatory and nonregulatory product and certification needs. The result should be that, in addition to upgrading the technical competence of such laboratories and making it possible for users of such laboratory services to select laboratories whose competence can be relied upon, there will be a minimization of anticompetitive effects caused by government and private users directing their business to the relatively few laboratories which have acquired national recognition.

(c) Establishment of a National Voluntary Consumer Product Labeling Information Program to assist consumers in making decisions at the point of purchase. The labeling program is designed to apply technological information, including references to standards where appropriate, so as to enable manufacturers to supply meaningful information which will help consumers make useful comparisons and selections of goods in the marketplace.

(d) Ensuring that the U.S. participates effectively in activities of international standards organizations in order to protect and promote U.S. trading interests. The Office is exploring methods to strengthen U.S. participation in such activities, and is participating in U.S. Government and international discussions on the proposed GATT Standards Code.

(e) The Office also is concerned with the preparation of a comprehensive plan by which the proposed GATT Standards Code could be implemented in the United States with respect to private sector standards activities.

(f) Establishing mechanisms to collect, evaluate, and transmit to U.S. business technical information on important foreign standards and other technical requirements. The Office also functions as a "control point" in a Commerce system to identify possible nontariff barrier aspects of the standards directives of the European Economic Community.

6. MAJOR PROGRAMS

A. By Sector Served

Since 1901, NBS has been the reference laboratory for the United States measurement system, often serving as the central research laboratory for the Federal Government. It develops, maintains, and delivers measurements, standards, and data which undergird the Nation's commerce, industry, Government, and science.

In commerce, NBS provides the reference standards required for equity in trade. These include the physical quantities such as length, mass, and volume which it distributes through the State weights and measures services. The Bureau also develops methods to measure product performance and safety so that criteria are available to help consumers make informed product selections as, for example, on the basis of efficient use of energy.

In industry, NBS provides services needed in mass production, interchangeability of parts and application of advanced technologies. Examples are reference data on physical quantities, and properties and performance of materials, including the Standard Reference Materials (SRMs) which are used in the quality control of the Nation's products. It provides technical evaluation of domestic and international standardizing systems of importance to United States industry. On the domestic side, NBS holds about 1,400 committee memberships; internationally, it is responsible for United States participation called for in the Treaty of the Meter and in the International Organization of Legal Metrology, further it coordinates U. S. representation to several other international standardizing bodies.

In Government, NBS provides the measurement basis for fair regulation and effective enforcement. Examples include methods for accurate monitoring of air, water, and noise pollution, measurement techniques for the safe use of radiation sources, and the technical basis required to protect individual privacy as affected by computer systems. In its role as a central reference laboratory for the Federal Government, NBS often serves as a technical arm for other agencies--providing technical understanding and services required for decisionmaking and mission implementation. The Experimental Technology Incentives Program (ETIP) contributes innovative approaches to improving Government efficiency and effectiveness.

In science and technology, the standards for the physical units of measurement provided by NBS serve as a universal measurement language. These, together with refined values of the fundamental constants, serve to guarantee the comparability of scientific findings and further the advance of human knowledge.

National objectives and programs change to meet evolving social and economic needs. This necessitates continual evolution and adaption of NBS programs. Today, NBS is placing particular emphasis on providing the infrastructure services for such vital areas of national concern as energy, materials conservation, pollution abatement, fire safety, individual privacy, and radiation safety.

B. NBS Program Structure

° Provide a national system for physical measurement

- Units and standards of physical quantities

  --time and frequency
  --mechanical quantities
  --thermal quantities
  --electrical quantities
  --optical quantities
  --electromagnetic quantities
  --ionizing radiation
  --nuclear safeguards
  --sound and applied acoustics

- Reference measurements for physical quantities

  --physical properties of matter
  --standard reference data

° Provide services to improve use of materials

- Properties and performance of materials

  --metallurgical materials
  --polymeric materials
  --inorganic materials
  --chemical processes and materials
  --compositional analysis
  --reactor operations and applications
  --nondestructive evaluation

- Reference materials

- Environmental pollution measurements

° Provide services to improve the application of technology

- State weights and measures

- Voluntary engineering standards

  --standards policy and coordination
  --international standards committee participation
  --Department of Commerce voluntary standards
  --testing laboratory evaluation
  --standards information services

- Building Science and Technology

  --building research
  --conservation of energy
  --building technology applications

- Electronic Technology

- Product Technology

  --product performance
  --product energy conservation

° Experimental Technology Incentives Program

° Improve the Application of Computer Technology

- improve the application of computer technology

  --computer security
  --computer utilization
  --computer networking and performance measurement
  --functional applications of computer technology
  --mathematical supporting services

C. Highlights of Current Program Developments

° Energy - NBS programs produce standards, data, and advisory services on conservation, generation, and transmission of energy.

--This is the largest technical program in the Nation and end-use energy conservation. The conservation program improves energy end-use in buildings, industry, and total energy systems for residential communities, develops efficiency labeling of household appliances and provides performance criteria for solar heating and cooling as required by the Solar Demonstration Act of 1974.

--Energy generation work includes improvements in materials reliability and durability for magnetohydrodynamic (MHD) generators and coal gasification, hydrogen fuel, neutron standards for fission power reactors, and atomic and nuclear data for fusion.

--Energy transmission programs include high voltage measurements for electric power delivery; and cryogenic technology relevant to storage and transfer of liquefied natural gas.

--NBS evaluates energy-related inventions for ERDA, under the Federal Nonnuclear Energy Research and Development Act of 1974.

--Increases in the Nation's energy producing capacity impose new requirements for environmental protection. The NBS measurement programs to assure environmental quality supplement the energy program with thrusts in air and water quality and radioactive pollution.

° Material Conservation and Utilization - Material degradation by corrosion causes economic losses in excess of $10 billion annually and is a major barrier to nuclear power development. Mechanical failure of structures and products is similarly a serious drain on materials resources. The Bureau's corrosion programs serve industry and Government with the measurement base for corrosion prevention, and promote dissemination of preventive technology. A second NBS materials thrust is nondestructive evaluation of materials and structures for nuclear plants, turbine engines, and other energy generating facilities.

--The NBS Standard Reference Materials (SRM) Program issues over 900 standards to calibrate measurement instruments for quality control in the manufacture of high performance materials and products; to check the accuracy of ore analyses; and for other applications, such as improving the quality of clinical laboratory tests and monitoring environmental pollution.

° Recycled Oil - Section 383 of the Energy Policy and Conservation Act of 1975 (P.L. 94-163) assigned to the National Bureau Standards (NBS) the responsibility to develop test procedures for the determination of substantial equivalency of re-refined oil with new oil for a particular end use.

C. Highlights of Current Program Developments

° Energy - NBS programs produce standards, data, and advisory services on conservation, generation, and transmission of energy.

--This is the largest technical program in the Nation and end-use energy conservation. The conservation program improves energy end-use in buildings, industry, and total energy systems for residential communities, develops efficiency labeling of household appliances and provides performance criteria for solar heating and cooling as required by the Solar Demonstration Act of 1974.

--Energy generation work includes improvements in materials reliability and durability for magnetohydrodynamic (MHD) generators and coal gasification, hydrogen fuel, neutron standards for fission power reactors, and atomic and nuclear data for fusion.

--Energy transmission programs include high voltage measurements for electric power delivery; and cryogenic technology relevant to storage and transfer of liquefied natural gas.

--NBS evaluates energy-related inventions for ERDA, under the Federal Nonnuclear Energy Research and Development Act of 1974.

--Increases in the Nation's energy producing capacity impose new requirements for environmental protection. The NBS measurement programs to assure environmental quality supplement the energy program with thrusts in air and water quality and radioactive pollution.

° Material Conservation and Utilization - Material degradation by corrosion causes economic losses in excess of $10 billion annually and is a major barrier to nuclear power development. Mechanical failure of structures and products is similarly a serious drain on materials resources. The Bureau's corrosion programs serve industry and Government with the measurement base for corrosion prevention, and promote dissemination of preventive technology. A second NBS materials thrust is nondestructive evaluation of materials and structures for nuclear plants, turbine engines, and other energy generating facilities.

--The NBS Standard Reference Materials (SRM) Program issues over 900 standards to calibrate measurement instruments for quality control in the manufacture of high performance materials and products; to check the accuracy of ore analyses; and for other applications, such as improving the quality of clinical laboratory tests and monitoring environmental pollution.

° Recycled Oil - Section 383 of the Energy Policy and Conservation Act of 1975 (P.L. 94-163) assigned to the National Bureau Standards (NBS) the responsibility to develop test procedures for the determination of substantial equivalency of re-refined oil with new oil for a particular end use.

These procedures are to be transmitted to the Federal Trade Commission to provide the basis for modified labeling standards and Federal procurement guidelines. The goals of this legislation expressed by the Congress are to stimulate the re-refined oil industry and to promote the use of re-refined oil, to lessen the environmental damage caused by the improper disposal of waste oil, and to reduce virgin crude oil consumption. The test procedures are to be developed as soon as practicable.

° Technical Support to Implement the Privacy Act of 1975 - NBS is responsible under the Brooks Act for advisory services and technical support to assure efficient utilization of the Federal Government's automatic data processing facilities. A current area of high priority is the production of technical standards and guidelines to support implementation of the Privacy Act of 1974. NBS also provides to the Domestic Council Committee on the Right of Privacy technical assistance in formulating relevant legislative and executive policies. NBS work in computer privacy is coordinated with OMB which has overall responsibility in this area.

° Measurements and Standards for Nuclear Materials Safeguards - This program is an opportunity for the Department to help assure that, as nuclear reactors provide an increasing fraction of the United States energy, there are adequate safeguards to prevent diversion of fissionable products to illicit use such as bombs. The program has been developed jointly with the NRC and ERDA (in consultation with the Atomic Industrial Forum) and has been supported by them, together with the Office of Budget and Program Analysis, to the Office of Management and Budget. The objective of the program is to provide for measurement services that are required for accurate and reliable accounting of nuclear materials so as to improve the measurement procedures used to detect and deter illegal diversion of plutonium and uranium. Development of these measurement services will be substantially completed for the current light water reactor fuel cycle 8-9 years after program start-up. During the calendar year following initiation, the program will complete resolution of discrepancies in measurements of nuclear fuel burnup and issue improved statistical design for mass measurement.

° Experimental Technology Incentives Program - ETIP conducts experiments to investigate the effects on private sector innovation of Federal policies in procurement, regulation, civilian R&D and assistance to small technology dependent firms. During FY 1973-1976, ETIP will obligate the $14 million originally appropriated. Projects have been started which hold great potential for increasing Government efficiency through use of new technology. As an example, life-cycle costing introduced at GSA is now becoming widespread there.

NATIONAL TECHNICAL INFORMATION SERVICE

William T. Knox, Director

Major Programs and Activities:

Through agreements with most Federal agencies and a few private organizations, NTIS annually collects over 70,000 research, development and engineering reports and other analyses prepared by Federal agencies, their contractors or grantees, and private organizations. Abstract bulletins, indexes and weekly newsletters are produced to announce the availability of the new information to subscribers. Computer searches of the entire information collection are also available. Report copies are sold in paper copy and microfiche form. Data files and computer software are similarly collected, cataloged and sold. NTIS ships 19,000 information products daily.

The sale of products and services currently recovers 96% of routine operating costs and is expected to be fully self-sustaining by FY 1977.

NTIS operates an extensive marketing program, utilizing primarily direct mail promotion techniques, to promote the use of its products and services. Promotion costs are recovered directly as a part of product prices.

NTIS seeks to promote wider use of Government inventions by publishing announcements of inventions available for licensing, securing foreign patent protection on the most promising inventions and promoting selected inventions directly to prospective licenses.

NTIS also operates, under contract to U. S. AID and USIS, a far-flung program to assist developing countries to utilize U. S. technology for social and economic development through the growth of effective technological information organizations in these countries.

OFFICE OF TELECOMMUNICATIONS

MAJOR PROGRAMS

A. TECHNOLOGY PROGRAM

The objectives of this program are to increase the availability of usable spectrum space by engineering methods and to increase the opportunity of satisfactory application and performance of telecommunications systems by analysis of relevant engineering factors. In order to accomplish these objectives, the overall program is divided into three elements:

1. Electromagnetic Wave Transmission and Services

This element provides basic engineering knowledge about environmental limitations to systems performance. The knowledge about transmission characteristics that results from this work provides inputs essential to meeting the objectives of the other two subelements of the program.

2. Engineering and Evaluation of Systems

This element develops performance criteria and performance measurement techniques necessary for planning, specification, and reliable and efficient operation of telecommunication systems by various Federal agencies.

3. Efficient Use of the Spectrum

This element prescribes methods and techniques to allow increased use of the presently available spectrum space where most government and civilian systems operate. This is realized principally through developing information that can be used for efficient design of systems and networks for operation in the presence of interference, rather than noise, as a fundamental limit to performance.

B. SPECTRUM MANAGEMENT SUPPORT PROGRAM

The objective of this program is to support the Office of Telecommunications Policy as required by Executive Order 11556, by providing and evaluating information necessary for decisions on effective management and use of the electromagnetic spectrum resource. OT, through this process, also supports other Federal departments and organizations in the day-to-day management and long-range planning of Federal use of the electromagnetic spectrum.

More specifically, the following subobjectives apply to the program:

1. To provide administrative and technical services to OTP, IRAC and its subcommittees, and to various ad hoc groups; to review and process applications from Federal agencies for frequency assignments; and to review new Federal telecommunication systems so that appropriate spectrum support will be available when the systems become operational.

2. To improve the Federal government utilization of the frequency spectrum to ensure availability of spectrum space to support new and existing systems; and to identify problems and recommend improved frequency management procedures.

3. To provide the data base files necessary to the frequency management function.

4. To measure spectrum occupancy in various geographic areas, improve existing measurement capability, and specify requirements for additional capability.

5. To develop systems-performance models and frequency-distance models in support of electromagnetic compatibility (EMC) analysis requirements.

In order to accomplish the above subobjectives, the overall program is organized into three elements:

1. Spectrum Management and Information

This element provides the day-to-day review of assignments, the administrative support to IRAC and its subcommittees, the data base files, and the associated computer software and hardware support to the overall program.

2. Spectrum Analysis

This element provides the EMC analysis necessary to assess resource utilization, solve operational compatibility problems, and accomplish thorough studies of new systems in their preoperational stages for compatibility.

3. Spectrum Engineering Development

This element provides the techniques required to support EMC analysis and the measurement capability for the overall program.

C. POLICY SUPPORT PROGRAM

The objective of this program is to support the Office of Telecommunications Policy as required by Executive Order 11556 by providing research and analysis directed toward strengthening Executive Branch capability to procure and operate the Federal government's own communications efficiently and effectively; improving Executive Branch participation in national telecommunications policy dialogue with the FCC, the Congress, industry and the public; and by conducting indepth studies of particular problems and policy issues to enhance the process of informed policy-making.

In order to accomplish this objective, the program is divided into three elements:

1. International Policy Research and Analysis

Work in this area is performed to assist OTP in determining the likely effects of various policy options available to the U.S. in international telecommunications. In the past the Policy Support Program has accumulated and analyzed information about the implications of U.S. policy on international facilities, traffic demand, operations, services, regulatory processes, industry structure, and satellite systems. Also included in this element is a continuing survey of international telecommunication conferences, a competitive assessment of international telecommunication trade, and a collection of documents setting forth international telecommunication agreements, both present and historical.

2. Domestic Policy Research

This element identifies areas in the overall communications industry where competition is feasible and economical and defines the appropriate relationships among the facility, services, and distribution segments of the industry. Where potential competitive areas are found, a regulatory stance must be established that allows for transition to the desired industry state with minimum disruption to existing services.

It develops regulatory techniques and institutional incentives to encourage service innovation, efficient performance, and the flexibility necessary to meet the constantly changing public and private communication needs.

This element also assesses the potential policy requirements implicit in new technological developments, and to estimate the potential economic and industry impact of these services.

It also maintains cognizance of the basic economic, institutional, market, social, and technological factors of important near-term issues and assesses developing factors which will impact previous policy positions.

3. Federal Policy Research

This element assists OTP in formulating sound policies to achieve coordinated government telecommunications systems and to identify where potential economies are achievable. Effective Federal government telecommunications contributes to functional efficiency and the realization of overall economies in government operations. The complexity of the problem is magnified by the size of the Federal government, the number of systems and services required, the necessity to coordinate large volumes of diversified data, and the continual reassessment that is required because of the rapid growth in new services, technology and systems being offered by industry.

D. OTHER AGENCY PROGRAM

OT work for other agencies is intended to meet a need for a within-government resource for analysis; systems planning; spectrum utilization and compatibility studies; and research, consulting, and advisory services in telecommunications; it can also foster, as needed, standards of practice and testing and evaluation of government telecommunication systems and services. Technology transfer, i.e., wider application of advances resulting from defense, space, and transportation programs is also a byproduct of this program.

The Office of Telecommunications, in keeping with statutory responsibilities of the Secretary of Commerce, provides unique research and analysis services in telecommunications, and makes available its technical competence for the benefit of other agencies. In doing so, OT has the following goals;

a. To assist in insuring the most effective introduction and application of telecommunications technology and services in support of national goals, such as public safety, health and education, transportation, urban development, natural resources, and defense.

b. To assist in achieving maximum efficiency of government operational telecommunications systems which many varied government agencies need to fulfill their missions.

c. To strengthen the capabilities of OT by work on the wide ranges of communications problems of current importance in Federal agencies; this implies a high degree of integration and coherence between the direct and other agency programs. The OT direct program is formulated to develop important basic knowledge and techniques needed to solve current or imminent communications problems for Federal agencies, where this knowledge is not available elsewhere.

To meet the goals of the other agency program, OT has the following long range objectives:

a. To keep abreast of, and be responsive to, the changing character of other agency requirements. Increasing attention will be given to: (1) applications and analyses rather than only specialized advanced technical requirements and (2) new and emerging telecommunications requirements in Federal programs rather than only upgrading and expanding conventional services and systems. All telecommunications, including wire line, cable, and optical systems will be embraced, not just radio systems. Economic factors will be included. Applications studies will be fostered, especially concerning public safety, education, transportation, law enforcement, and defense.

b. To maintain a significant portion of the OT program on the frontiers of communication science and technology, i.e., research services and advanced applications. Such fundamental work, with publication of results in technical journals, remains essential to maintaining the caliber and credibility of OT in this highly technical field.

Short-term objectives are necessarily set in relationship to the specific tasks and character of current work being done in OT under other agency sponsorship.

Patent and Trademark Office

MAJOR PROGRAMS

Examination of Patent Applications

Applications are examined to determine whether or not the inventor is entitled to a patent for the claimed invention. Examination of patent applications also includes the performance of quasi-judicial functions in appeal and interference proceedings.

The time between filing of a patent application and issuance of a patent, which was 37 months in 1965 and is now about 19 months, is close to the goal of 18 months. Expedited handling is given applications relating to energy or the environment.

Programs have been underway aimed at improving the quality of examination, including:

- A quality review program; and
- An experimental voluntary protest program, in which members of the public may oppose the grant of patents.

Examination of Trademark Applications

Applications are examined to determine whether the statutory criteria for the Federal registration of the trademark or service mark have been met. Examination of trademark applications also includes inter partes proceedings involving oppositions, cancellations and interferences.

The goal to lower the average pendency of trademark applications to three months, from receipt to first action, has been reached.

Collection, Assembly and Dissemination of Technical and Legal Patent and Trademark Information

Specifications and drawings of issued patents and registered trademarks are published weekly. This program also includes updating and maintenance of the search files,

MAJOR PROGRAMS (continued)

preparation and issuance of patent grants, furnishing copies of records, maintenance of public search room and scientific library facilities, and recording instruments conveying ownership of patent and trademark rights.

In the area of search file updating and maintenance, emphasis is being placed upon:

- The reclassification of documents in active technological fields; and
- Efforts to introduce computerized searching.

SUMMARY OF
SCIENCE & TECHNOLOGY RESOURCES

($ in Millions 1/; Permanent Employment 2/)

	FY 1976		FY 1977		FY 1978	
	$	Employ.	$	Employ.	$	Employ.
NBS	$117.1	3,094	$126.0	3,084	$130.0	3,137
NTIS	14.3	363	16.3	409	17.9	425
OT	14.0	247	13.6	264	18.1	268
P&TO	85.5	2,725	86.6	2,694	87.1	2,770
OEA	0.8	21	0.8	21	1.5	23
OPS	0.1	3	0.1	4	0.2	4
Office of A/S S&T	0.2	8	0.3	8	0.3	8
S&T TOTALS	$232.0	6,461	$243.7	6,484	$255.1	6,635

1/ Total funds available from both direct appropriations and reimbursements, per 1978 budget request.

2/ Employment of full-time permanent employees as of end of Fiscal Year.

Prep. 11/23/76
OAS (S&T)

OFFICE OF ENVIRONMENTAL AFFAIRS

RESOURCES

FY 1976		FY 1977		FY 1978	
Permanent Positions	Dollars	Permanent Positions	Dollars	Permanent Positions	Dollars
21	825,700	21	844,000	23	1,489,000

Office of Product Standards

RESOURCES

The Office of Product Standards is funded by the National Bureau of Standards. The following amounts were requested and/or authorized:

FY 1976	$140,700
TQ	$ 30,800
FY 1977	$142,000
FY 1978	$180,000

7. RESOURCES

Resources of the National Bureau of Standards[1]

Overall

	FY 1976[2]	FY 1977[2]	FY 1978[2]
Dollars (in thousands)	$66,262	$67,392	$71,889
Permanent Positions	1,896	1,896	1,911

By Subcategory

	$ (in thousands)			Permanent Positions		
	FY 1976	FY 1977	FY 1978	FY 1976	FY 1977	FY 1978
a) Provide a National System for Physical Measurement	$27,235	$28,366	$28,008	807	807	801
b) ovide Services to Improve e of Materials	17,992	18,740	18,600	556	556	552
c) Provide Services to Improve the Application of Technology	8,633	8,994	11,371	318	318	341
d) Experimental Technology Incentives Program	4,455	3,110	3,124	17	17	17
e) Improve the Application of Computer Technology	5,662	5,897	6,484	194	194	196
f) Facilities	2,285	2,285	4,302	4	4	4
TOTAL	66,262	67,392	71,889	1,896	1,896	1,911

1) Source of data is the FY 1978 OMB Budget.

2) In addition to these directly provided resources, NBS is reimbursed for goods and services provided to other Federal agencies and the public. In FY 1976 such contracting and reimbursements amounted to about $50 million. Positions associated with these efforts number about 1,310 for other agency contracts, and 185 for reimbursable work.

November 19, 1976

OFFICE OF TELECOMMUNICATIONS

FINANCIAL RESOURCES BY PROGRAM
(Dollar Amounts in Thousands)

PROGRAM	FY-1976 ACTUAL AMOUNT	FY-1976 EMPLOYMENT FTP	FY-1976 EMPLOYMENT OTHER	FY-1977 EST. AMOUNT	FY-1977 EMPLOYMENT FTP	FY-1977 EMPLOYMENT OTHER	FY-1977 SUPPLEMENTAL EST. AMOUNT	FY-1977 SUPPLEMENTAL EMPLOYMENT FTP	FY-1977 SUPPLEMENTAL EMPLOYMENT OTHER	FY-1978 EST. AMOUNT	FY-1978 EMPLOYMENT FTP	FY-1978 EMPLOYMENT OTHER
Telecommunications Technology	$ 1,016	23	6	$ 1,162	27	6	--	--	--	$ 1,258	29	8
Telecommunications Application	334	5	--	246	5	--	--	--	--	400	7	3
TOTAL APPROPRIATED FUNDS	1,350	28	6	1,408	32	6	--	--	--	1,658	36	11
Other Agency Support (OTP)	5,318	110	44	4,962	113	44	--	+38	--	8,755	151	5
Other Agency Support (Other than OTP)	7,316	79	20	7,152	70	20	--	+11	--	7,623	81	25
TOTAL OTHER AGENCY SUPPORT	$12,634	189	64	$12,114	183	64	--	+49	--	$16,378	232	30
GRAND TOTAL	$13,984	217	70	$13,522	215	70	--	+49	--	$18,036	268	41

DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

RESOURCES FOR MAJOR PROGRAMS
CATEGORY VI - Technology
(In thousands of dollars)

Subcategory and Entity Program	1976 Actual		1977 Estimate		1978 Estimate	
Grant and Issuance of Patents and Registration of Trademarks	Perm. Pos.	Amount	Perm. Pos.	Amount	Perm. Pos.	Amount
Examination of Patent Applications.....	1,916	$48,903	1,834	$49,266	1,858	$51,090
Examination of Trademark Applications.....	193	3,935	193	4,087	193	4,162
Collection, assembly, and dissemination of technical and legal patent and trademark information.....	905	32,512	905	33,047	907	31,805
Total.....	3,014	85,350	2,932	86,400	2,958	87,057

11-11-76

SCIENCE AND TECHNOLOGY

- o Resource Assurance: Skilled S&T Manpower Development.
- o Resource Assurance: Adequate and Stable Basic R&D Support.
- o Government Loans and Grants for Industrial Research and Development
- o Federal Support of Industrial R&D: Tax Measures
- o Educational Publications
- o Credibility of Scientific Information
- o Innovation Information for State and Local Governments
- o Consumer Technology Information Services
- o Standards Generation
- o Funding of Commercialization of Selected Government Inventions
- o Stimulation of Innovations Through Federal Procurement Policy
- o Federal Patent Policy
- o Modifications of Antitrust Laws to Permit Cooperative R&D
- o Modification of Regulatory Inhibitions of Innovation

- o Treasury Initiatives for New Technical Enterprises
- o International Standards
- o Improved Export Control of Design and Manufacturing Technology
- o Technological Support of Less-developed Countries

Office of Environmental Affairs

- o Environmental Energy Conservation in Industry
- o Improvement of Environment Impact Procedures for Industry Projects
- o Impact of Environmental Law and Regulation

Office of Product Standards

- o Implementation by Department of Commerce and other members of the Interagency Committee of Standards Policy (ICSP) of the policy principles developed by ICSP to be followed uniformly by all Federal agencies in working with non-Federal standards-setting bodies.
- o The National Voluntary Laboratory Accreditation Program
- o Institution of the National Voluntary Consumer Product Information Labeling Program

National Bureau of Standards

- o DOC Responsibility for Governmentwide ADP Planning System and PL 89-306
- o Recycled Oil - Congressional Pressures and Measurement Realities
- o Department of Commerce Response to S. 3555 "The National Voluntary Standards and Certification Act of 1976."

Office of Telecommunications

- o Rewriting the Communications Act of 1934
- o Consumer Communications Reform Act
- o Formulation of a National Telecommunications Agenda
- o Telecommunications Organization and Roles

Patent and Trademark Office

- Patent Reform Legislation
- Patent Examination Quality
- Improved Paper Handling
- Trademark Registration Treaty

RESOURCE ASSURANCE: SKILLED S&T MANPOWER DEVELOPMENT

Issue: Skilled manpower development for S&T is too often out of phase and focus with demand.

Background and Analysis: Federal employment, subsidies to manpower and education (some $10.6 billion in 1975), and procurement have a major impact on S&T manpower demand. No innovation can be produced and brought to market without some participation of scientists and engineers.

After a rapid growth of manpower in engineering and science in the postwar years - in large measure the product of the GI Bill - sharp declines occurred in these labor markets in the late sixties and early seventies. Federal expenditures declined in engineering-sensitive activities in relative and absolute (real) terms, and these brought about a sharp fall in starting salaries as well as in the number of students entering this field. At the same time, the alternate conditions of over and under supply have led to substantial increases in costs of R&D scientists and engineers.

It is suggested that the space program distorted the labor market for R&D and other scientists and engineers more than any other Federal action in the funding of R&D in the history of the country.

There is also evidence that the United States has fallen behind in comparability of employment of civilian R&D scientists and engineers against other industrially developed nations. Western Europe and Japan were 30 percent ahead of the United States in the percentage of GNP spent on civilian R&D during the 1960's. The number of scientists and engineers engaged in R&D per 10,000 population has increased between 1963 and 1973 in all major countries (USSR, Japan, West Germany, France) but not in the United States since 1969.

Possible Action: The AS/S&T should work with OSTP to develop coordinated Government policies which are required to assure a long-term supply of skilled S&T manpower, including blue collar craftsmen, with an appropriate occupational and skill mix.

A long-term skilled manpower supply was provided satisfactorily by market forces in the past. The post-Sputnik emergence of Federal advanced technology efforts upset the supply-demand balance; first draining S&T talent away from the civilian

economy, later causing a massive shift of S&T professionals to other jobs. Also there is evidence that the mix of specific skills needed by our advanced technology economy is not matched by the current output of professional and paraprofessional schools. It has been reported, for example, that in 1974 our engineering schools produced fewer mining engineers than was the demand of one company in the mining industry. The demand of the mining industry in that year was quite atypical, but the fact that the number of graduates was not sufficient to meet the demand of one company illustrates the point.

On the other hand, political pressures in the Government may not be inducive to wise management of technical manpower. In addition, formulation of optimal policy in an environment of dynamic technologies, hundreds of agencies and thousands of educational institutions, might be very difficult if not impossible, and such a program could be considered another Government "intrusion" in the historically free market process of supply and demand.

RESOURCE ASSURANCE: ADEQUATE AND STABLE BASIC R&D SUPPORT

Issue: Federal R&D programs are erratic and unpredictable, leading to feast-or-famine situations in the market, and appear to adversely affect our international competitiveness.

Background and Analysis: Disquieting trends in U.S. science and technology performance may be due in part to the fluctuating and relatively low level of Federal support of basic R&D. Federal Government's expenditures on basic R&D amounted to 0.26 percent of GNP in 1965, the same percent in 1969, 0.25 percent in 1970, 0.22 percent in 1971 and 1972, and 0.20 percent in 1973-75. This slide, coupled with mounting inflation has had a negative impact on the conduct of basic R&D. Many universities, the government's prime contractors for basic R&D, have been brought near bankruptcy in this period. Companies are finding it difficult in a climate of inflation, recession, and small profit margins to spend much on long-range research. In addition, many in the private sector have complained that the Mansfield Amendment, which requires that funds provided by the Defense Department to companies for independent, long-term R&D must be spent on mission-related work, has curtailed the amount of long-range research that can be done in that sector. The recent decrease in the number of radical innovations, usually the result of basic R&D, may reflect a suboptimal degree of Federal funding for basic R&D.

Possible Actions:

(a) Under OSTP leadership, the AS/S&T should work with other agencies to determine an appropriate level of basic R&D, consistent with the economy's long-term need and its ability to support R&D, and to make this level reasonably stable over time.

Basic R&D is a sine qua non of sustained technological innovation, especially of "radical" or "pivotal" types of innovation. Stability in support will allow better planned, more efficient R&D. On the other hand, it will be difficult to find objective criteria for determining an appropriate level of basic R&D support. Perhaps present support levels could lead to more results if more industry-university cooperation were promoted.

(b) The Administration should conduct a study of the impact of the Mansfield Amendment on basic R&D and if found detrimental to the country's interest, propose that the Mansfield Amendment be repealed.

The emphasis of the Mansfield Amendment on relevant, targeted DoD research may be detrimental to the conduct of the basic

research which is necessary for sustained technological development of the country. Since DoD provides a substantial proportion of the Federal funds for basic R&D, a change of policy in DoD research dollars could have a large impact.

**GOVERNMENT LOANS AND GRANTS FOR INDUSTRIAL R&D

Issue: Much industrial research of a generic and "overhead" nature needs to be performed, but because the benefits cannot be captured by an individual firm, the research is not funded.

Background and Analysis: The U.S. Government has funded specific applied research and engineering in a number of technical fields, in response to its responsibility for

- providing society or assuring its provision with public goods, most notably national defense, public safety, education, health care, certain types of transportation, and communication;
- ensuring that the quality of the physical environment is preserved and improved;
- conducting its own operations, especially those which collect, process, communicate, and preserve large masses of information;
- aiding industry that is fragmented into units too small to carry out effective technology development, such as in farming and food processing, minerals utilization, and fishery technology; and
- exploiting technological opportunities of clearly national impact or avoiding national loss of prestige when risks and costs are too high to be undertaken solely by private interests; examples are the exploration of space, and the development of nuclear and solar energy technologies.

The Morrill Act of 1863, an expression of U-S. Government support for general technological innovation in the private sector, enabled the establishment, by direct grant of Federal land and money of state-operated colleges to promote the agricultural and mechanical arts and to train their practioners. Much of the development of U.S. agriculture as well as the pre-World War II U.S. manufacturing industry relied heavily on the applied research and engineering performed in the "Aggie" colleges and by their graduates.

Today, however, there is no similar, broadly based Federal program for promoting general technology development in the private sector. Rather, each Federal agency promotes the creation and development of new technology related to its subject mission. In general, the guiding beliefs behind Federal activities affecting the development, diffusion and exploitation of technology in manufacturing have been that commercially applicable manufacturing technology is only developed by the private sector, and that the self-interest of each firm acting in the market place will ensure optimum diffusion of the technology to other firms and its exploitation by them.

The lack of Federal applied research support in this field is notably in contrast to Federal policies in two other technology-intensive fields: agriculture and health care. In both these fields there are planned, coordinated, and well-funded Federal programs to provide the stimulus needed for rapid technology diffusion and exploitation. Two years ago, a new technology for combatting corn blight was rapidly developed and diffused by the USDA. The most recent example is President Ford's request for $135M to innoculate all U.S. citizens in just a few months with the swine flue vaccine.

Possible actions:

(a) Establish a DoC Industrial R&D Support Program.

Direct support of industrial R&D, based on the success of some foreign nations, has been frequently recommended for U.S. Government adoption. Such a program is not without risk, both of failure and of criticism. The U.S. Government has successfully supported much applied research in solid-state electronics, but its support of alternative automotive power systems has been unsuccessful.

An experimental DoC industrial R&D program focused on problems generic to a large number of firms is a possible action. These funds would be used to support R&D of high potential and general interest to an entire industrial sector, e.g., catalytic processes, combustion technology, programmable production techniques, industrial enzymes, ultra-precision machining, etc. Most of the projects would arise from unsolicited proposals, to allow maximum private sector initiative and participation in the choice of projects. These funds would supplement mission agency (such as DoD, ERDA, and EPA) funds which often do not carry research to the point of successful commercialization or which focus on more specific projects.

The suggested DoC program would be a small analog of the DoD programs for supporting (1) the development of technology relevant to DoD-purchased items, and (2) diffusing technological innovation in manufacturing processes employed to produce DoD material. The payoff is large; on some 60 manufacturing innovations studied, the payoff is 15:1 on investment. Much of this technological innovation will only slowly, if ever, reach the attention of the majority of U.S. manufacturing firms in the absence of a concerted DoC program.

(b) Alternatively, request DoC participation in NSF's RANN Program.

The National Science Foundation operates a limited applied research and engineering grants program -- Research Applied to National Needs (RANN). A possible action would be for DoC to participate in the management of the RANN program in order to emphasize applied research and engineering which would benefit the manufacturing and services sectors.

The advantage of this action would be the avoidance of the "new program" image.

The major disadvantages would be the lack of truly effective DoC influence on the level of R&D funding; the academic orientation of NSF management, including its grants and contracts office; and the competing demands from non-industrial applied research.

(c) Establish a Federal Institute for Industrial R&D (FIIRD).

This would disburse Congress-appropriated funds in the form of grants, or through cost-sharing arrangements, for generic, "bottle-neck" or some other R&D which would be in the long-term interest of society but not be undertaken by private sector in response to other options either because of a too great uncertainty, too great cost of the project, or too great fragmentation of the industry which would be the primary beneficiary of the project. Examples of R&D projects that might be carried out under this program include research on prevention of corrosion, combustion efficiency, computer-aided quality control of products, industrial robots, programmable automation of manufactured processes, recycling of materials, automation and other technological improvements in processes applicable in service industries, etc.

The program would assure the availability of funds for meritorious projects which otherwise would not be undertaken given the kind of socio-economic philosophy we have; it is a way for the society to make timely use of major technological opportunities as they become available. In cooperative R&D arrangements, the ratio of the net increase of private outlays on R&D to the expenditures of public funds might be quite high. Most, if not all, governments of other industrialized countries support such R&D as a matter of course.

In some cases, however, the program could undertake projects which eventually private industry might do itself and, therefore, there might be some substitution of public funds for private funds. The program would generate some proprietary issues unless the Federal patent policy is simplified. Moreover, Government bureaucracy might not have a good feel for which projects should be funded.

*FEDERAL SUPPORT OF INDUSTRIAL R&D: TAX MEASURES

Issue: Should additional tax incentives be given to stimulate innovation in business firms?

Background and Analysis: A variety of tax incentives now exists to stimulate capital investment, mineral exploration and to achieve other objectives. None of these are intended specifically to encourage technological innovation. R&D expense is now tax deductible as ordinary business expense. To the extent that firms expect returns on R&D expenditures to exceed returns from alternative investments, if they consider them on par with all other investments, a tax incentive for R&D now exists. However, few businessmen consider them that today (because of risk) and most if not all other market economies treat private expenditures on R&D the same way.

Existing tax laws may delay technological innovation. Accelerated depreciation and investment tax credits may tend to speed up investment in current state-of-the-art capital goods and thus attract capital away from investment in technology in the future. Also, tax laws are generally broadly applicable to all firms; this "shotgun" approach gives tax breaks to those who do not make investments in R&D. At least at the theoretical level it is generally accepted that if public benefits resulting from private investments in R&D exceed the returns on this investment, and this is the case with most private R&D yielding economy-wide productivity increases and/or improvements in the external value of the dollar, tax credits to private investors are warranted.

Possible actions:

(a) Request ETIP in cooperation with the Treasury Department to conduct experiments and studies in which tax breaks are examined for their effect on innovation (Congressional approval may be needed).

This incremental approach would yield valuable information at modest cost.

(b) Recommend that the Congress consider the likely effect of tax changes on technological innovation.

This would require advance studies by OTA, CBO, Library of Congress, Joint Economic Committee, or others. In view of the chaotic state of tax laws and pressures for special favors, this issue may be ignored in tax reform.

The tax changes to be considered in the studies of (a) and (b) would include the following possibilities:

(1) Substantially increase the tax investment credit for R&D plant from the present 10 percent to, e.g., 25 percent.

The program would be economy-wide. There would be some net increase in R&D, and it would be easy to administer. There would be no interference in private decision-making by bureaucrats, nor would there be any proprietary issues.

On the other hand, the net increase in R&D would probably be relatively small even though costly to the Treasury, because the credits would have to be available not only to those performers who would not do the R&D unless such increased credits were available, but also to those who would do it anyway. Hence, the ratio of the net increase in private outlays on R&D to the expenditures of public funds would be low. Moreover, the policy would provide an opportunity for fraud because of frequent indistinguishability of R&D plant from production plant. At the present time the climate is against tax credits.

(2) Increase tax depreciation allowances for R&D plant.

The program would be economy-wide, might result in some increase in R&D, and would be easy to administer. There would be no interference in private decision-making by bureaucrats, nor would there be any proprietary issues.

However, depreciation represents only a small fraction of total cost of R&D, and an increase in depreciation would only mean a temporary postponement of tax payment, rather than forgiveness of the tax. Thus, the net increase in private outlays on R&D could be very small, if not nil, because of the small marginal incentive.

(3) Provide new special tax credits or equivalent cash payments (to those having no tax burden) to industrial R&D performers, with R&D defined in accordance with the Financial Accounting Standards Board concept or some other standard specifically designed for the purpose.

The program would be economy-wide. There would be some increase in R&D, the size of which would depend on the size of the tax credit or equivalent cash payment. It would be easy to administer and there would be little or no growth of bureaucracy (unless the R&D eligible for the incentive were not well defined).

Furthermore, there would be little or no interference in private decision-making by bureaucrats; nor would there be proprietary issues.

On the other hand, the kind of incentives that would substantially increase industrial R&D throughout the economy would subsidize not only incremental R&D but also ongoing projects, and the latter would be tantamount to substitution of public funds for private funds. Hence, the ratio of the net increase in private outlays on R&D to the net expenditures of public funds would be very low, if not nil. Moreover, the policy would be conducive to fraud, as is probably the case with all broad policies. At the present time the climate is against tax credits, especially new tax credits.

(4) Trade the present tax credit for investment in plant and equipment (10 percent) for tax credit or equivalent cash payments for expenditures on industrial R&D.

The basic rationale for the present tax credit for investment in plant and equipment is promotion of modernization and productivity growth. Some careful recent studies have come to the conclusion, however, that investments in plant and equipment are largely a function of pressure of demand on industries' capacity and not of these tax incentives. Consequently, from the overall social policy point of view, the tax credit for investment in plant and equipment might be considered as a tool of income redistribution and not a tool for promoting productivity growth, and hence, growth of income. From this it follows that to the extent the trade of tax credit for R&D expenditures for tax credit on plant and equipment would generate more R&D and, hence, growth in productivity, etc., the trade-off would be beneficial to society. Moreover, the trade-off would not require additional tax expenditures for the purpose.

However, in an inflationary economy, tax credit for expenditures on plant and equipment helps to counteract antiquated rates of depreciation and, therefore, the policy might socially be equitable even though formally it might look as if it were a tool of income redistribution. Thus considered, both sets of tax incentives might be necessary. However, as things are now, it seems rather ridiculous to use the excuse of social desire to improve productivity to essentially offset the adverse impact of inflation. The trade-off would most probably be also opposed by the business community, especially non-technology-intensive industries; macroeconomists; and, perhaps, even quite a few people in the Government.

(5) Provide new tax credits or equivalent cash payments (to those having no tax burden) for incremental (e.g., above the level of the most recent 3-year average) industrial R&D.

The policy would be economy-wide, and would undoubtedly increase the private outlays on R&D (the size of which would depend on the size of the tax credit or equivalent cash payment); there would be little or no substitution of public funds for private funds; and the ratio of the net increase in the private outlays to the expenditures of public funds would most likely be relatively high. Moreover, the program would be relatively easy to administer and there would be little or no growth of bureaucracy and little or no interference in private decision-making. Nor would there be any proprietary issues.

On the other hand, the policy would appear to penalize companies presently doing appreciable R&D. (However, if a 3-year moving average were accepted as a base for a given year's credit, the discrimination favoring firms which had not done much R&D in the past would disappear over time.) Moreover, the policy would be conducive to usual types of fraud. Again, at the present time the climate is against tax credits, especially new tax credit.

(6) Provide new tax credits or equivalent cash payments (to those having no tax burden) for incremental R&D in chemicals and capital goods industries.

This policy would increase the private outlays on R&D (the size would depend on the size of the incentive) in the industries whose output has traditionally been most conducive to domestic productivity growth and favorable foreign trade performance for the economy at large; there would be little or no substitution of public funds for private funds; and the ratio of the net increase in the private outlays to the expenditures of public funds would most probably be high. The program would be relatively easy to administer and there would be little or no growth of bureaucracy. Moreover, there would be little or no interference in private decision-making, nor would there be proprietary issues.

On the other hand, the policy would appear to penalize companies presently doing appreciable R&D. (However, if a 3-year moving average were accepted as a base for a given year's credit, the discrimination favoring firms which had not done much R&D in the past would disappear over time.) In addition, the policy would be conducive to usual types of fraud, and at the present time the climate is against tax credits, especially new tax credit.

Notwithstanding all cons and problems, either option (4) -- trade the present tax credit for investment in plant and equipment for credit for industrial R&D, or option (5) -- provide new tax credits or equivalent cash payments for incremental industrial R&D, merit serious consideration.

EDUCATIONAL PUBLICATIONS

Issue: There is lacking a systematic effort to generate and distribute publications to inform the general public about the consequences of major technological developments and decisions.

Background and Analysis:

An informed and sophisticated electorate is essential to the best use of technology in a technology-intensive society. The responsibility of the Government to inform the public about anticipated consequences of governmental actions is well established. It has been argued that the Government has a responsibility to inform the public about consequences of any anticipated changes, whether due to Government action, technology, natural forces, or any other factor. Almost every U.S. department and agency has now in effect public information policies and operations which seek to inform the public. Some of the outputs have been outstandingly effective, and warmly welcomed. Recent NBS educational publications on energy conservation are one example. Many USDA consumer pamphlets are also effective. Under a more formal approach, the whole NBS standards program, including physical standards and "paper" standards, is a means for advancing public understanding of technology.

These efforts involve comparatively unambiguous issues. For many other technological changes the issues are complex and many-valued and a suitable educational program would be most difficult to present. The other side of the coin is that a significant fraction of the public is both unwilling and unable to comprehend the whole picture.

There is no question of the need to take -- and continue -- action along these lines.

Possible actions:

(a) Continue present system under which individual Federal agencies prepare and distribute educational publications whenever they see a need to inform individuals about technological changes.

Some examples show that the present approach can be effective. Moreover, no new organizational structure would be required, and there would be no additional demand on budgets.

On the other hand, many present publications are ineffective. Technological problems are too complex to present in a haphazard fashion, with the outputs of some agencies contradicting the

outputs of others. At present, many technological changes are not properly handled, and effective use is not made of TV and other media.

(b) Increase agency efforts for education and provide a central coordinating office.

A coordinated approach could have a greater educational impact, with fewer important issues being inadvertently neglected. This would, however, require budget increases, and coordinating offices without management and budgetary authority are seldom effective.

(c) Reduce Government effort, and assume the task would be taken over by private publishers who are better at promoting sales of publications.

This approach utilizes the skills of the private sector, and reduces Government manpower and budget requirements.

However, it is likely that only "best seller" issues would receive attention and coverage would be very haphazard. It would be easy for partisan viewpoints to prevail.

CREDIBILITY OF SCIENTIFIC INFORMATION

Issue: How should procedures be improved by which scientific information and (often disputed) interpretations, relevant to controversial governmental decisions, are placed before policy makers and the general public.

Background and Analysis: Many policy decisions of national (and international) importance rely in considerable part on sophisticated scientific data and their interpretation. Neither decision makers nor the interested public can readily judge the reliability and objectivity of such information, especially when scientists disagree over the validity and significance of the available data. Recent instances include the issues of: safety of nuclear power; effectiveness of proposed ABM defense systems; possible threats to the "atmospheric shield" by SST's and aerosol sprays; and a host of other complex problems.

Such information and interpretations are made available today mainly through (a) publication and discussion in scientific journals, (b) reports by advisory panels or task forces of technical experts, and (c) presentations in public forums, such as Congressional hearings and meetings of the National Academies and professional societies. Significant shortcomings have been widely noted: rhetoric and emotionalism displace scientific objectivity; opposing experts fail to confront each others' arguments; implicit assumptions and "mind-sets" go unexplicated. Informed decision-making is impeded. Eloquent descriptions of the deficiencies, and tentative prescriptions of remedies, have come from industry, academia, and government itself. To cite Senator Jackson: "One often wishes that advisers with different points of view would confront each other directly and in public so that hidden or unstated assumptions could be revealed and the different modes of analysis explored."

Possible actions:

(a) Continue working with OSTP to institute a "science court," in which impartial experts would examine data and direct adversary argumentation, yielding an assessment of the credibility of scientific information (separated from value judgments) bearing on major national issues.

This approach would provide an inexpensive and efficient means to clarify the scientific facts and uncertainties, clearing the way for more rapid adoption of valuable technological innovations and rejection of harmful ones.

On the other hand, it could not compensate for gaps in relevant data, might unduly expand the influence of Science's "senior elite," and could find troublesome the identification and

extraction of "the scientific component" of heated public issues.

(b) Adopt (a) on an experimental time-limited basis.

A science court experiment would permit a flexible exploratory approach to the evolvement of a new institution with a most difficult role.

However, a "likely to be transient" Court might not command the same commitment and dedication from participants.

(c) Work through existing institutions (professional societies, universities) to better sensitize and train scientists concerning maintenance of objectivity and integrity as "expert witnesses" on controversial issues.

This approach would avoid the radical step of introducing a Science Court.

Its necessarily slow pace and its continuing reliance on ability to maintain objectivity under stress mark it as a worthwhile supplement to (a) or (b) rather than a substitute.

**INNOVATION INFORMATION FOR STATE AND LOCAL GOVERNMENTS

Issue: There is need for an innovation information system serving state and local governments.

Background and Analysis:

Serving the technological and other innovation needs of state and local governments is seriously hampered by the lack of an effective information system serving that sector. The sheer number of state and local governments - 38,000 receive revenue sharing funds - makes an information delivery system difficult. Employment in this sector increased 165 percent from 1950 to 1973, and productivity has not significantly improved.

Since productivity increases in state and local governments will be closely related to capital goods, purchases and investments (e.g., computers, telecommunication devices, trucks), U.S. industry has a large stake. There is yet, however, no coordinated governmental program to bring the full Federal, state and local governmental resources to bear on the needs of state and local governments.

The situation is analogous to the pre-1965 situation in U.S. education. There were large Federal educational laboratories spending hundreds of millions on applied research and 20,000 school districts untouched by the research results, but receiving several billions of dollars for support of traditional practices. There was no mechanism for rapidly bridging the gap between research and practice; education was a non-technology sector.

A solution in education was the establishment by the Office of Education of an educational innovation information system (ERIC). This system is like other Federal mission-oriented information systems; it collects, organizes, and supplies copies of publications relevant to educational innovation.

Other branches of state and local governments have also suddenly been thrust into a situation in which innovation is necessary, but they lack an integrated information system serving their needs. They also have a great need for applied research focused on their problems, and the President has repeatedly stressed the need to integrate this requirement into Federal R&D programs. An integrated information system would assist in collecting and organizing research needs of state and local governments.

Presently, the Federal Government has several scattered small pilot programs in these areas. A Federal Laboratories Consortium with 70 member laboratories operates in a semi-official way to assist state and local governments to become more capable of utilizing technology, and to have their needs for technology better

addressed by the Federal R&D program. NSF/RANN's Intergovernmental Science program has supported, through Public Technology, Inc., demonstration projects in 27 cities; the Council of State Governments and National Conference of State Legislators also have supported demonstration projects.

Possible actions:

(a) Create an information clearinghouse to collect, organize, and disseminate technological innovation information for state and local governments.

Although this action would be a positive response to the policy statements listed above, it would require a small additional staff to manage the program, and considerable (ca. $1/2 million) money to develop the nationwide collection apparatus, to pay for the organization and promotion of the information, and to underwrite the initial use of the clearinghouse by state and local governments.

(b) Consolidate the existing field demonstration Federal programs into a single continuing Federal program.

This possible action would recognize the continuing need for referral, interpretive, stimulative, and demonstration services in order to obtain the desired innovation in state and local governments. This sector is similar to agriculture (especially in earlier times) and education in its fragmentation, sensitivity to influences (sometimes capricious) beyond its control, and general unawareness of the possibilities offered by technological innovation. It will probably require a continuing Federal program for 10 to 20 years or more to incubate the essential re-orientation of state and local governments.

(c) Propose establishing a policy-making responsibility for effective transfer of Federally developed technology to state and local governments within the new Office of Science and Technology Policy.

This Office should work with the private sector, state and local governments and Federal Government organizations in identifying the most effective transfer mechanisms and with Federal policy-making bodies such as the Office of Management and Budget and the Civil Service Commission in planning for and implementing the funding and staffing requirements of an effective program.

A broad policy plus resources to implement this policy will be required to make significant impact in a reasonable time. Involvement of the state and local as well as private sector in the planning will assure the support of reasonable transfer mechanisms.

On the other hand, OSTP is not an operating agency; to date policy level action has not been followed up by problem solving.

(d) Provide categorical grants to the States to aid them in developing internal means to express their technological needs and work toward meeting them, drawing on any resources available.

Since problems often involve much more than the technological component in their solution, individuals close to the need will be most effective in providing an affordable solution.

However, lack of understanding of the Federal system and specialized interests of state and local employees will make it difficult to maintain a broad network of technology transfer agents.

Options (a)-(d) could all benefit from broad Federal support for technology transfer provided, e.g., by mandating that each agency creating significant technological output should place at least a fixed fraction of their manpower in the dissemination activities serving state and local governments; and by supporting the establishment of training opportunities for technology transfer agents in Federal organizations.

**CONSUMER TECHNOLOGY INFORMATION SERVICES

Issue: Insufficient information on consumer products and services results in extensive economic loss.

Background and Analysis: Consumer problems with products and product servicing are costly -- products are discarded prematurely, materials are wasted, much time and resources are devoted to resolving consumer complaints, sales are lost, and consumers are unable to make the rational choices necessary to maximize satisfaction from limited incomes.

A recent study has indicated that Americans find something wrong with 28 percent of their purchases of goods and services; of these they complain about 33 percent; of the latter only 57 percent result eventually in consumer satisfaction.

Possible Actions:

(a) Expand the Departmental effort to provide consumer information services on product performance and product servicing, and to increase the Department's consumer technical education focus.

Such an expanded effort would consist of three interrelated technical facets -- provision of product performance information, provision of product servicing information (such as for automotive and TV repair), and an increased education focus for consumers, retailers, servicing personnel, and manufacturers in order to promote more efficient consumer purchasing decisions based on sound technology. Much technical expertise to conduct this effort exists in the Department, especially in the Office of Product Standards and the National Bureau of Standards.

This comprehensive and coordinated national consumer services effort should reduce consumer financial loss and dissatisfaction, facilitate product and servicing investment decisions, stimulate competition and sales based on quality and price, reduce manufacturer liability insurance costs, and reduce State and local expenditures now required to process consumer complaints.

There are, however, technological and other limitations to such an effort. For example, some products may have so many

significant performance characteristics that selection for labeling purposes may result in uneconomic allocation of productive resources. Additional resources would also be required for effective implementation. In addition, the cooperation needed from the private sector cannot be taken for granted. Cooperation by other agencies should also be sought.

On the other hand, resolution of the consumer information problem is unlikely to occur in the absence of a comprehensive, coordinated attack. The Federal Government is in the unique position of being able to serve the interests of all Americans; that is, all those who are impacted by the problem -- consumers, manufacturers, distributors and retailers, even State and local government. The fact that the benefits of the program will be disaggregated extensively among consumers and business also calls for a Federally coordinated effort.

(b) Proceed with existing efforts supplemented by the proposed National Voluntary Consumer Product Information Labeling Program.

In this case, no special DoC effort would be made to develop an effective program to provide information on product servicing or provide the extensive education focus found in (a) above. This more restricted approach would probably have a lower benefit-cost ratio because unlike in (a) there would be a lower tendency for individual, yet related projects, to reinforce each other, and a smaller opportunity to eliminate wasteful conflicts and overlapping. It would, however, not require as much resource expenditure as in (a) above.

STANDARDS GENERATION

Issue: Lack of a clear cut, national standards policy inhibits economic growth and the public interest.

Background and Analysis: The first problem identified in the 1974 report on Voluntary Industrial Standards in the United States by the House Committee on Science and Astronautics was "the lack of a national policy for domestic and international standardization."

The proposed Voluntary Standards and Certification Act of 1976 (S.3555) contained the following findings, inter alia:

> Section 3(9) "The procedures for promulgating standards, for accepting products for testing, inspection, and certification, and for insuring aggrieved parties due process are inadequate and vary from organization or organization."
>
> Section 3(12) "Built-in safeguards to protect consumers and to eliminate restraint of trade problems inherent in the standardization process are lacking."
>
> Section 3(13) "The lack of a uniform policy with respect to domestic standardization policies has impeded the effectiveness of the U.S. participation in international standardization activities, which may have far-reaching consequences on balance of trade and balance of payments."

In a recent draft of a proposed study on this subject, ANSI (American National Standards Institute) states that: "we have no national policy with regard to standards and certification, no official government policy or position and only limited means of developing a cooperative government-private program to work effectively on behalf of U.S. international (and national) trade and commercial interests," and further that "while there has been a government presence, organizational mechanisms and procedures are seldom adequate to accommodate a vastly increased and influential role for government."

Included within the general problem and as a manifestation of it is the lack of a clear commitment to develop and use performance-type standards whenever these may appropriately

be substituted for certain standards of design, materials, or methods of manufacture which impede technological innovation.

Possible Actions:

(a) Support the purpose of Title I (National Standardization) of the Voluntary Standardization and Certification Act (S.3555), but with certain modifications.

It is likely that S. 3555 will be reintroduced next year with some modifications. Title I provides for the development of a uniform national standardization system for all standards and certification activities undertaken by the private sector. In hearings on this Bill on June 21, 1976 the Department of Commerce indicated support for the overall purpose of Title I -- to assure that the public interest will be protected and due process observed in the voluntary standards activities carried out by the private sector. However, the Department expressed its concern about the rigorous regulatory framework of the Bill and its awkward procedures. In addition, the Interagency Committee on Standards Policy (chaired by Commerce) has prepared guidelines for the participation by Federal agencies in private sector standards activities. It is anticipated that OMB will publish these guidelines in an OMB Circular, shortly. While these guidelines are not a substitute for Title I of S.3555, they are consistent with its objectives. Available information indicates that the private sector standards community is strongly opposed to S.3555.

(b) Support the American National Standards Institute (ANSI) in applying for a Federal Charter.

The granting of a Federal charter would symbolically establish ANSI as the U.S. standards body for domestic coordination of voluntary private sector standards development, for interaction with the Federal Government on standards policy matters, and for U.S. representation in non-treaty international standards-making organizations. This should result in significant benefits -- a strengthened and more responsive U.S. standards system due to coordination of national private sector efforts, improved potential for ANSI to attract increased financial support from the private and governmental sectors, and increased ANSI influence in international, non-treaty standards organizations.

ANSI attempted earlier to obtain a Federal charter but failed because, it is reported, the House Judiciary Committee had ceased issuing charters pending the development of criteria for qualification. Such criteria have since been published (1969) but only a very few charters have been issued since then. A possible drawback to this course of action is that since charters are issued through the legislative process and because of possible opposition from consumer and antitrust groups, the charter application could become the focal point of legislative efforts to impose rigorous regulatory requirements on the voluntary consensus standards-setting system such as certain objectionable provisions in S.3555.

(c) Prepare new legislation to establish a national policy for maximizing effectiveness of the American standards effort, particularly that of the voluntary standards-setting community.

This approach contains at least three advantages over the charter approach in (b) above, namely the: (1) greater opportunity for appropriate Federal funding of priority standards projects, (2) greater opportunity to strengthen the national standards system by providing a solid basis for closer cooperation between the public and private sector and for the government to supply appropriate guidance as this system develops, and (3) opportunity to cover related standards matters, such as the assurance of due process.

In preparing such legislation the Department would work with key private sector standards interests in order to arrive at a mutually satisfactory resolution of important issues, and thereby maximize the efforts of the private sector in the public interest. The Commerce Bill could be proposed as an alternative to S.3555, or constitute the basis for suggested modifications to such a bill.

(d) Continue through the Interagency Committee on Standards Policy (ICSP) to promote interagency cooperation and coordination with the private sector.

Substantial progress on this front has been made since this Committee was reestablished about a year and a half ago. This Committee provides the only active Federal Government forum to exchange information on U.S. standards policy and make government-wide policy recommendations. No significant disadvantages

have been identified for this Committee's continuance. It could also prove especially useful should S.3555 be reintroduced; in fact, Section 209(a) of this Bill provides for the establishment of an interagency committee on international standardization policy to assist the Secretary of Commerce in his responsibilities under Title II (International Standardization).

(e) Plan jointly with the private sector standards community (possibly through the ICSP) to identify present needs and their possible resolution.

Such an approach has the obvious advantages and disadvantages of any joint private sector/government undertaking. The principal advantage would be the possibility of arriving at mutually agreed solutions and recommendations; the principal disadvantage may be that the recommended solutions lack authority or are too weak. The standards community would probably be favorable to the approach at this time. An earlier effort of this nature produced a useful report -- the so-called LaQue Report of 1965 (technically, the report of the ad hoc Panel on Engineering and Commodity Standards).

FUNDING OF COMMERICALIZATION OF SELECTED GOVERNMENT INVENTIONS

Issue: Most government inventions are not commercialized, and much government R&D is not exploited for patentable inventions.

Background and Analysis: Although the U.S. Government funded roughly $10 billion of R&D in 1975 which might have resulted in Government-owned inventions, only 1600 patents actually issued. This contrasts with the 35,000 patents issued to U.S. industry for an R&D expenditure of $15.3 billion. The conclusion can be drawn that inventions--the tangible expression of an innovative idea--are not a high priority in U.S. Government R&D.

Furthermore, other than in U.S. Government procurement, there are relatively few commercial uses made of Government inventions. A partial reason for the lack of commercialization is simple lack of awareness on the part of potential users of the invention; a year-old NTIS newsletter, seminar, and exhibits program has multiplied several-fold the awareness level, and will continue. Another reason is the presumed complexity and uncertainty of getting a license to exploit the invention; the Government Patent Policy Committee is sponsoring a new patent bill which will alleviate the problem.

Perhaps the major reason so few patents issue from U.S. Government funded R&D is that Government inventions are usually not developed sufficiently to allow a reasonable assessment of commercial potential. Most inventions thus remain in the idea or bench-scale stage. Even those inventions which are fully developed for one purpose (e.g., a new missile guidance system) are usually left undeveloped for other possible applications (e.g., vehicle traffic control). Yet the history of technology has many instances where an invention first applied in one field reaches its maximum potential in another field, frequently after considerable time has elapsed (e.g., although the same technology is used for ice-making and space cooling, ice-making had far less impact on U.S. economic development than has airconditioning).

Possible Actions:

(a) Continue present NTIS program alerting potential users to existence of USA inventions.

This program is now nearly self-sustaining, except for the costs of collecting and organizing the information about U.S. Government inventions. Federal R&D agencies report a marked upsurge in their patent licensing activity as a result.

The program does require 8 people, however, and has a limited potential because of the undeveloped state of most U.S. Government inventions.

(b) Fund the commercialization of U.S. Government inventions.

This action would embrace two somewhat different functions: developing the invention to a prototype stage, where commercial potential could be assessed with reasonable risks; and further promoting its commercialization by sharing start-up costs with the commercial exploiter.

Major disadvantages to this action, other than the money and staff to administer it are:

- the deep-rooted suspicious and "you go your way; I'll go mine" attitudes between Government and industry;

- The dogma that inventions resulting from U.S. Government R&D should be public property, regardless of whether this actually results in non-use; and

- the administrative requirements in managing such a program, which would be similar in size and scope to the largest of private U.S. R&D enterprises.

However, the DoC has been directed by the President to develop plans for more aggressive exploitation of U.S. Government inventions, and actions similar to this proposal are becoming routine governmental functions in other nations.

A Government-sponsored invention development and licensing function is performed in every other industrialized nation, and in many of the semi-industrialized nations (e.g., Mexico). The organization performing this function usually obtains proprietary rights to inventions arising out of Government-funded laboratories and frequently assists in the development of privately

sponsored inventions, with a sharing of rights. These nations have set up independent corporations for this purpose because R&D performers usually give this function little or no attention, and the need for management flexibility in a commercial sense.

A variety of financing arrangements are used to support the development of inventions; including grants, loans, grants convertible to loans in the event of successful projects, and loans convertible to grants in the event of unsuccessful projects.

Such organizations have been successful. Some of them have been very successful, such as ANVAR of France, and its counterpart in Australia. ANVAR consummated nearly as many royalty bearing licenses in 1975 (many in the U.S.) as all U.S. Government agencies did without royalty, and was completely self-sustaining. The Research Development Corp. of Japan, a newer organization, was 2/3 self-sustaining on a budget of $10 million. The first of all these agencies, the NRDC (UK) continues to have a record of success

*STIMULATION OF INNOVATION THROUGH FEDERAL PROCUREMENT POLICY

Issue: Federal procurement policy in its present form does not stimulate technological innovation.

Background and Analysis: Present procurement policy, as outlined in the Federal procurement regulations, favors procurements made with maximum competition, using Federal specifications, and the awarding of contracts to the low acquisition price bidder. While these principles are designed to insure that Federal procurements will be made in an open, fair, and honest manner, they tend to result in the purchasing of products with the lowest common denominator with respect to technology. On the other hand, use of procurement incentives such as life cycle costing and performance specifications, while departing from the normal policies of procurement, can at the same time satisfy the requirements of fair, open and honest procurement and provide incentives to suppliers to bring technological innovation to Government and commercial markets.

Possible Actions:

(a) Rely on ETIP experimentation with Federal procurement policy to foster policies favorable for innovation.

The procurement experiments of ETIP have demonstrated the possibility of cost-effective modifications in the procurement activities of specifications, and life cycle costing, and it is planned that future experiments should be in the area of value incentive provisions. The ETIP experimentation mode of working closely with various agencies is an effective means of introducing new procurement concepts to the agencies.

On the other hand, the experiments are limited in size and scope and may not be the fastest means of implementing innovation-stimulating procurement practices throughout the Government.

(b) Make creation and diffusion of innovations a more prominent objective to all Federal procurement policy.

Over the long run, this policy might have a high social benefit/cost ratio.

It would probably meet with opposition from beneficiaries of the present policy. Before mandating a Government-wide policy, it would be wise to determine through experimentation the best procedures to follow.

FEDERAL PATENT POLICY

Issue: The great variety of existing Federal patent policies with their emphasis on Government ownership of inventions is a hindrance to the development and transfer of technology developed with Government funds.

Background and Analysis: Presently, there are more than a score of statutory policies for handling the proprietary rights on inventions arising from Government-funded R&D. Most of these policies mandate Federal ownership of the inventions. The great variety of policies is confusing to would-be contractors, and the emphasis on Government ownership dissuades some well qualified companies from taking Government contracts.

A bill has been drafted which would establish for the first time a uniform Federal policy on patentable technology and other intellectual property resulting from Federally-sponsored research and development. The draft bill establishes policies for (1) the allocation of rights to all inventions (contractor and Federal employee) which result from Federal R&D programs, (2) protection of these invention rights through domestic and foreign patenting, and (3) licensing and commercialization of the patented and related technology. The bill provides for contractors to retain ownership of inventions resulting from Federally-sponsored research where they have sufficient interest to seek patent protection and declare an intent to commercialize the invention. The public interest is protected by reserving strong march-in rights to the Government. Enactment of the draft bill would repeal, amend, or abolish the numerous existing differing legislative and Presidential Federal patent policies, and permit maximum utilization of the technology resulting from current Federal R&D annual expenditures of approximately $20 billion.

The draft bill, prepared by the Government Patent Policy Committee of the Federal Council on Science and Technology, has been circulated by OMB to the Executive Departments and Agencies for official comment. Upon receipt of the comments, they have and will be accommodated, as appropriate.

Possible Actions:

(a) Introduce the draft bill during the first session of the 95th Congress.

The overwhelming majority of policy level officials, both Presidential-appointees and career, now agree with the proposed bill. It is especially noteworthy that the Department of Justice had indicated no objections to the bill, overturning a longstanding policy position set forth in the 1947 Report of the Attorney General, at the GPPC level but did do so at the OMB clearance.

(b) Take no action.

The chances are increasing that the House Committee on Science and Technology, which held hearings on this subject during the closing days of the last session, will itself sponsor legislation in this area, thereby reducing the Executive Branch's influence on the content of patent policy.

MODIFICATION OF ANTITRUST LAWS TO PERMIT COOPERATIVE R&D

Issue: Would cooperative R&D leading to socially useful technological innovation occur if antitrust laws were modified?

Background and Analysis: High risks and large investments are involved in the development of many new energy, materials, environmental control and other sophisticated civilian technologies. This has lead to the desirability of industry-government and multi-company cooperative research and development programs. However, companies are reluctant to engage in these cooperative efforts because of their perception of the Government's antitrust posture. U.S. companies are placed at a disadvantage in both the domestic and international markets with respect to foreign companies whose governments encourage and participate in joint R&D undertakings.

Present antitrust opinion frowns on cooperative R&D among competing firms because it is construed as a form of collusive behavior tending to restrain competition. Antitrust action tends to modify the structure of industry (i.e., reduce economic concentration through vertical or horizontal mergers). Studies by Kamien and Schwarts have shown a generally weak relationship between market concentration in an industry and the rate of innovation.

Studies by Nelson, Freeman, and Scherer indicate that firms gain from cooperative R&D in trade associations which do basic or exploratory research. Research leading to specific products is avoided both because of fear of antitrust action and because of a desire to compete with differentiated products.

Possible Actions:

(a) Request ETIP in cooperation with the Justice Department to conduct experiments and studies which demonstrate the effect of antitrust law relaxation on cooperative R&D leading to socially desired innovation.

ETIP now has a related project (not involving antitrust law relaxation) to demonstrate the effectiveness of group action in R&D to develop flame retardant treatment for fabrics. The

experiments and studies could address the problem of how best to relax antitrust laws so as to encourage additional R&D while preserving the stimulus of competition.

(b) Introduce legislation to relax antitrust restrictions on R&D cooperation by small firms but not large firms.

It is appropriate to focus on small firms since they cannot individually devote the necessary resources to carry out high risk, high cost projects. Problems here include the monitoring of firms to insure that qualified firms are not engaged in anti-competitive R&D.

*MODIFICATION OF REGULATORY INHIBITIONS ON INNOVATION

Issue: Can one determine how to modify existing regulations in a way that will provide incentives for technological innovation:

Background and Analysis: Very little attention is being devoted, either legislatively or administratively, to modifying the existing regulatory structure in a way which would improve the climate for beneficial technological change. There is a need to develop predictive methodologies which would permit the determination of adverse consequences in advance of the promulgation of regulations. The data base on regulatory impact has not been sufficient to provide clear directions to regulatory reformers. Recent studies indicate that some reform ideas may not be well founded, and also that some conventional wisdom may be more myth than fact. (See, for example, the forthcoming report for ETIP, Analysis of the Dynamics Underlying Regulatory Chages having a Significant Effect on Innovation, Charles River Associates). Fortunately, both the Administration and the leading Congressional reform bills call for a timetable specifying data gathering leading to regulatory changes by 1980. Hence, it is critical that more objective information be gathered and analyzed as soon as possible. To some extent, knowledge about the process of regulatory modification and the resulting impact can only come through experimentation with careful evaluation.

Possible Actions:

(a) Under OSTP leadership, recommend modifications to those regulations and existing Policies of regulatory agencies which inhibit innovation.

Specifically:

1. Encourage further selected, intensive studies on regulatory impact such as the Council on Wage and Price Stability, Productivity Commission sponsored work on the steel industry.

2. Conduct comprehensive study reviews of general regulatory impact, at least to ascertain the extent to which current literature is accurate.

3. Design and implement regulatory policy experiments through ETIP and other sources in as many regulatory areas as are feasible, keeping in mind the need to fashion a general change model.

4. Integrate and coordinate current government and private sector regulatory reform efforts.

These actions could provide large benefits to society at large at little cost. Studies and experiments are called for since it is not known conclusively whether regulations on the whole have had a net positive or negative effect on innovation. It would be instructive to identify the characteristics of regulations and the regulatory process which have been found to be beneficial, to serve as a guide for future action. OSTP could draw on the resources of several agencies, and would be in a position to bring the recommendations to the attention of high-level policy-makers.

On the other hand, there would probably be opposition by affected interest groups. Most regulatory policy changes would require Congressional approval. Some would claim that enough is known about the shortcomings of regulations and the regulatory process now that remedial actions could be taken without the need for additional studies.

**TREASURY INITIATIVES FOR NEW TECHNICAL ENTERPRISES

INDIRECT FINANCIAL AID

Issue: The number of innovative technology-based companies that have started recently is much less than a few years ago.

Background and Analysis: In 1972, there were over 400 small-company public issues of which approximately a quarter were for small technical companies. New small-technical-company issues (for companies with net worth of less than $5 million) amounted to $349 million in 1969, $6 million in 1974, $10 million in 1975, and -- with the improvement in the stock market -- $15 million in the first two months of 1976. Some of the decrease may be due to the two recessions since 1969; the reduced procurement by DoD and NASA for products embodying advanced technology; and the fundamental problems of inflation and capital shortages. Whatever the reasons for the decrease, it must be of uppermost concern because small technical enterprises have traditionally been the source of innovative and competitive vigor of the economy on both the domestic and international fronts. Rise of small and successful technical enterprises is also a very important part of the "American opportunity image" which is of great socio-political value to our system.

Several possible options exist for stimulating the formation of new technology enterprises.

Possible action: The Department through ETIP should conduct studies with the Department of Treasury and the Securities and Exchange Commission, and make recommendations to the President one year after initiation of the studies on the following possible measures:

(a) The Federal Government provides guarantees for up to 50 percent of loans granted by SBIC's or other financial institutions to new technology-based enterprises.

This type of policy is in wide use abroad, especially in Japan. Though a recent study for NBS/ETIP by the Charles River Associates argues that our small, technology-based firms currently depend almost entirely on equity as a source of funds, there is no reason to believe that they would not change their pattern of financing if the availability of loan funds were improved.

(b) Provide more generous capital gains tax treatment to new technical enterprises.

Preferential tax treatment can be justified if it can be

determined that structural changes in investment conditions have caused a relatively greater increase in the levels of risk associated with investments in small technology-based firms. The Morse Report for DoC/CTAB makes this assertion. The question is, however, whether this policy would generate sufficiently large funds to make the difference or some other policy, such as reduction of the enterprises taxes, would do this better. The Charles River study for NBS/ETIP, estimated through a sensitivity analysis that a 10 percent reduction in the capital gains tax would, at most, increase the flow of venture capital by 10 percent. This could mean additional financing for only about 25 additional firms per year.

(c) Allow Small Business Investment Corporations to be incorporated under Subchapter S or to be organized as partnerships so losses can be taken at the individual level.

This measure would undoubtedly promote SBIC investment in new technical enterprises, but also lead to some speculative excesses.

(d) Provide for greater liquidity of small technical enterprises by (1) broadening SEC Rule 144 or 237 to allow a larger fraction of securities held to be sold in each six-month period, (2) SEC allowing the marketing of unregistered stock on a less restrictive basis, and (3) IRS allowing "good will" to be written off in merger accounting before tax rather than after tax.

Reduced liquidity prevents the venture capitalist from turning over his portfolio of small firms at an optimum rate, whether the objective is to maximize a profit or minimize a loss. The constraint on the liquidity of an equity investment (the only type of investment which is relevant for small technology-based firms) results from SEC Rule 144. This rule was instituted to protect investors from unstable "new issues" markets. It is ironic that reduced liquidity can itself be a destabilizing force.

It is not clear that this action would permit increased liquidity and at the same time maintain protection of investors. Indeed, the policy might be conducive to a large incidence of issuance of fraudulent securities and/or artificial inflation of net worth of speculative enterprises -- exactly the kind of phenomena which the SEC and IRS regulations in question are intended to prevent.

(e) Provide for more favorable stock option incentives to founders and key personnel of new technical enterprises by (1) increasing the qualified options time from the current five to ten years, and (2) postponing the tax on income derived from the exercise of nonqualified options until the shares have been sold rather than paying the tax at the time the option is exercised.

A serious shortage of capital has been experienced by individuals and organizations looking for seed money or "start up" capital. Due to inflation and increased regulation, start-ups require more money that was needed five to eight years ago. It is therefore even more important today than in the past to provide strong incentives for starting up new technical enterprises.

Though it is not clear that more liberal founder stock options providing longer term equity investments won't dilute the expected rate of return for other investors, especially venture capitalists, the option probably merits serious consideration.

(f) IRS to make investments in new technology-based enterprises (by individuals, institutions and corporate entities) tax deductible until the investments are sold, analogous to certain real estate transactions.

This would greatly reduce the risk of the investments and, hence, greatly increase the flow of investible funds into such ventures.

However, the policy would entirely remove "dollar control" of the quality of the enterprises to be created, since all failures would be paid for by the taxpayer.

(g) IRS to provide for a graduated corporate income tax rate structure to benefit new technology-based enterprises.

This policy would facilitate internal generation of liquid funds at the time when the attraction of outside capital needed for expansion is most difficult. Moreover, the policy would be consistent with the overall philosophy of U.S. society underlying the "progressive" income tax structure.

The foregoing analysis suggests that the most promising options for the purpose are (a), (e) and (g).

INTERNATIONAL STANDARDS

Issue: U.S. trade interests are likely to suffer unless U.S. is effective in development of international standards.

Background and Analysis: The rapid growth of technology has resulted in the proliferation of foreign national standards which may form technical barriers to international trade of U.S. products. For example, different standards for sweep and timing in TV receivers require costly modification of U.S.-made TV's before they can be sold in Europe; hence, U.S. exports of TV's to Europe are negligible.

The development of international standards to reduce the incidence of standards-related trade barriers is accelerating, yet there is a need for at least 10,000 more such standards. The increasing likelihood of national adoption of these international standards could prove troublesome for U.S. export (and import) interests if such standards are incompatible with U.S. standards and engineering practices. International standards can become referenced in foreign government regulations and government procurement specifications. The proposed GATT (General Agreement on Tariffs and Trade) Standards Code would give added impetus to national adoption of international standards. Their adoption by developing countries is especially probable. A preliminary study by the National Bureau of Standards found that 52 percent of U.S. exports are highly sensitive to product standards.

Our principle trading competitors are devoting considerable resources to ensuring the compatibility of international standards with their own engineering practices. The Japanese government provides 100 percent of the income of the Japanese member of the principal international standards-writing organization (the International Organization for Standardization); the French Government provides about 50 percent. The U.S. Government neither financially supports the U.S. member (the American National Standards Institute) nor officially recognizes it for this important responsibility.

Possible actions:

(a) Support Title II (International Standardization) of the Voluntary Standards and Certification Act of 1976 (S.3555).

Title II provides a framework to strengthen U.S. effectiveness in international standardization activities. This bill will probably be reintroduced next year. In testimony on this bill in June, the Department indicated support for the concept of Title II but indicated that its provisions should be carefully analyzed and redrafted to reflect criticisms directed at an earlier bill (S. 1761, the "International Voluntary Standards Cooperation Act of 1973") on this

subject. Continued support of the thrust of Title II, with the above reservations, is merited. However, the Department should ensure that such support does not imply agreement with other provisions of this Bill. Depending upon the eventual content of Title II, or comparable legislation, some opposition from private sector standards interests may be forthcoming.

Alternatively, if S. 3555 is not reintroduced next session, the Department could prepare and submit legislation on international standardization, taking into account past bills and testimony on the subject, including Title II of S. 3555.

(b) Propose a joint Federal/private sector study to identify U.S. needs in the international standards area, assess existing measures to meet these needs and prepare an action plan to meet unfulfilled needs.

Gaining the positive cooperation of key private sector standards interests would be important. This could prove difficult in view of limited resources in both the Federal and private sectors, and the possible fear by private sector standards interests that such an effort could become a forerunner of unwanted Federal interference in U.S. participation in non-treaty international standards organizations. In any event, the identification of specific problem areas is a necessary step in an attempt to strengthen U.S. effectiveness in international standards activities. The Secretary could call upon the Interagency Committee on Standards Policy to consider such a study and to explore its possible implementation with the private sector.

IMPROVED EXPORT CONTROL OF DESIGN AND MANUFACTURING TECHNOLOGY

Issue: There is no Government Department responsible for the assessment of foreign technology developments in non-communist countries. Consequently, present export controls inadequately protect national security and economic interests involving critical design and manufacturing technology.

Background and Analysis: Current policies related to international technology trade are based upon the dominant U.S. position at the end of World War II. Because of its significant technological lead, the U.S. was able to impose restrictions not only on U.S. exports but also those of our allies to communist countries. The export of military equipment and all commercial products capable of producing military equipment, as well as related technical data, was prohibited to communist countries.

Although the 1969 revisions of the Export Control Act required controls to be removed from products available from other foreign countries, there was no office established to assess technology developments in non-communist countries in order to determine what modifications should be made in the U.S. control lists. Consequently, policies and procedures have continued to concentrate on the restriction of technological products which are not only available from foreign countries, but which have little significant military value to the USSR.

This lack of foreign technology assessment also led to the formulation of international trade policy negotiations which did not adequately provide access to foreign markets for U.S. technological products. Along with misdirected U.S. export promotion guidance, many U.S. manufacturers had no alternative to the sale or licensing of their technology in order to gain access to these growing foreign markets. Additionally, unilateral U.S. export restrictions on shipment of technological products to communist countries have increased the pressure on U.S. manufacturers to produce outside of the U.S. to gain some share of the more rapidly growing communist markets.

The lack of control over critical design and manufacturing technology to any foreign destination has reduced the ability of the U.S. to maintain its technological superiority over the USSR. The unnecessary restrictions on U.S. exports of technological products to communist countries have reduced U.S. employment in industries which are also facing reduced military requirements.

An element in the technology export control problem is the question of whether it is in the long term interest of the United States to freely export technology, per se, as distinct from the export of products emobdying technology. It has been alleged that the export of technology, per se, to be used in foreign activities competitive with U.S. activities results in the loss of U.S. product exports, the worsening of our balance of payments, and an increase in U.S. unemployment.

Possible actions:

(a) Establish within the Office of Science and Technology a capability for the assessment of technology developments in non-communist countries based upon information available from government and industry sources.

There are presently various uncoordinated activities by U.S. military, intelligence and other government agencies related to the collection of technical information outside of the U.S. Simultaneously, all U.S. manufacturers actively engaged in exporting are continuously assessing foreign market potentials and their competitors. While some opposition might arise to this new role for the Commerce Department, such an assessment capability somewhere in the Government is required by the Export Administration Act.

(b) Recommend that the Department of Defense be required to provide a continuing technical assessment of its position vis-a-vis the USSR and to identify for the Commerce Department those areas of commercial technology which should be controlled in some manner to all foreign destinations.

Present U.S. export controls are administered by the Commerce and State Departments, both of whom consult with the Department of Defense as to possible military or other strategic implications. There is no requirement, however, for the Defense Department to provide policy guidance in advance so that Commerce and State policies and procedures for U.S. manufacturers and exporters are maintained on the basis of current and future technological trends. One of the recommendations of the recent study by the Defense Science Board was that such a continuing responsibility should be established within the Defense Department, but there has not yet been endorsement of such action by any other Department or the President.

(c) Initiate the establishment of a joint Government/Industry Task Force to undertake a 1-year review of the entire export control system, as mandated by the Export Administration Act, in order to provide guidance for future legislation and policy actions.

Various studies have been undertaken in recent years related to different phases of the technology control or transfer problem. None of them, however, have been specifically created as part of a planned policy review and implementation process by the Executive Branch of Government.

(d) Make all exports from the U.S. of technology, per se, (data and know-how related to the design and/or production of specific products or processes) subject to Government approval (license) based on the potential contribution to the U.S. balance of payments, employment opportunities, national security and the country's responsibilities for the political, strategic, and economy interests of the international community.

This action would be aimed at minimizing any loss of U.S. product exports and jobs associated with the accelerated buildup of foreign competition with U.S. technology. It would meet with opposition by U.S. multinationals, and could result in economic and political retaliation by affected foreign governments.

NOTE: An issue paper with another perspective on this question has been included under the Domestic and International Business Administration items.

INSTITUTION OF THE NATIONAL VOLUNTARY CONSUMER PRODUCT INFORMATION LABELING PROGRAM

Background:

In a Federal Register notice on May 25, 1976 (Vol. 41, No. 102, pp. 21389-21394) the Department of Commerce announced the intention to develop, in cooperation with consumers, manufacturers, producers, distributors, retailers, and other interested groups, a voluntary consumer product information labeling program, provided that substantial need and support for such a program would be demonstrated at three public hearings which later were held in Washington, Chicago, and Los Angeles. The purpose of the program is to facilitate consumer purchasing decisions by making available at the point of sale comparative information on key product performance characteristics and to provide manufacturers an opportunity to convey to the public the particular advantages of their products. The hearings and supplemental statements which were received indicated support for the program from consumers and small manufacturers. Larger manufacturers, particularly home appliance manufacturers, opposed the program; however, recently, the latter group has indicated that it may support the program provided it is given an opportunity to participate as members (along with representatives of consumer and other groups) of an advisory committee which would establish the criteria to be employed (a) in making a finding of need to establish a specification for labeling a consumer product, and (b) in developing performance information labeling specifications. It is planned to establish such a committee and to provide for a broad spectrum of interests, including the heavy appliance manufacturers, in its membership.

Issue:

At least eight European countries -- Denmark, Finland, Norway, Sweden, France, West Germany, Netherlands and Switzerland -- are operating voluntary national information labeling programs that provide consumers with the type of information discussed above. These programs have four features in common:

1. Manufacturer participation is on a voluntary basis.

2. The programs report levels of performance but do not set minimum levels.

3. The programs deal principally with measurable performance characteristics.

4. The programs utilize fixed labeling formats that present information to consumers in simplified form.

A proposed Department of Commerce program has been designed so as to have the same four features. It would be managed by the Office of Product Standards. Technical support would be furnished by the National Bureau of Standards. A schedule of fees would be established and charges made for use of the Department of Commerce Label and Mark (which is to be registered as a trademark in the U.S. Patent and Trademark Office) on each product. The fees will be paid into a revolving fund of the National Bureau of Standards, as authorized by statute, and shall be in amounts calculated to maximize the self-sufficiency of the operation of the program. An active program of communication with appropriate State and local government offices and agencies will be established and maintained so as to promote uniformity in State, local and Federal programs for the labeling of performance characteristics of consumer products.

Analysis of Issue:

Presidents Kennedy, Johnson, Nixon and Ford have affirmed that consumers have a basic right to be kept informed. In a Presidential Consumer Message in 1969, it was stated: "No matter how alert and resourceful a purchaser may be, he is relatively helpless unless he has adequate, trustworthy information about the product he is considering and knows what to make of that information. The fullest possible product description is useless if a consumer lacks the understanding or the will to utilize it." In the same vein, the National Business Council for Consumer Affairs, in a 1973 report, make the following recommendation: "Wherever appropriate, manufacturers should promote the development of mechanisms for providing consumers with performance information on consumer durables." The Council also was of the view that government agencies could help in assuring that appropriate product characteristics are chosen and measured in a manner that would be fair and equitable to manufacturers and consumers.

Schedule:

The final format of the proposed procedures to be followed is being developed at this time. Public hearings have been held and public comment received. A decision is anticipated on implementation within the next 60 days. If favorable, announcement in the Federal Register of the institution of the program is expected to be made by February 1977.

TECHNOLOGICAL SUPPORT OF LESS-DEVELOPED COUNTRIES

Issue: The less-developed countries (LDC's) of the world often called "Third World Countries," make urgent claims upon the United States and other highly industrialized countries for assistance in industrializing their economies. What actions should the Federal Government take in response?

Background and Analysis: Since World War II, the United States has contributed technical and financial assistance to the nations of the Third World. This assistance has many forms: financial grants, technical advice, training in U.S. universities, funding for multilateral agencies (such as the United Nations Development Program, the World Bank, the International Monetary Fund, the InterAmerican Bank, and others), provision of food, the Peace Corps, and research in American institutions to solve technical problems of the Third World. As the economies of the other industrialized countries improved, they too become major contributors to the worldwide assistance program. At the present, many Western European countries contribute a substantially larger share of their GNP to Third World development than does the United States. Substantial though the total assistance effort may be, the less-developed countries say it is not enough and virogously demand the creation of a "New Economic Order," in which their share of the world's goods will be larger.

A major feature of these demands is improved access to commercially important technology on terms more favorable to their industrial firms than has been customary in the past. They demand that the U.S. Government regulate the behavior of U.S. industrial firms engaged in international trade; that the U.S. Government devote a certain fraction of its R&D expenditures to solution of LDC problems; that the U.S. increase its funding for financial and technical assistance that will help develop the technological infrastructure of the LDC's; and that the U.S. Government make American technology readily available. Some of the actions requested are not within the authority of the U.S. Government, under present law, to grant. Others would require Congressional action on appropriations that are probably politically unacceptable. However, some new Federal actions could help the LDC's progress toward their technological goals, improve the international political climate and help develop mutually profitable trading partnerships between the U.S. and the LDC's.

Possible actions:

(a) Participate more actively in the international effort to develop a mutually agreeable "Code of Behavior" for multinational corporations, and to encourage multinational corporations to invest in LDC's.

Success in reaching a mutually agreeable code would reduce the acrimonious tone of many governmental and non-governmental negotiations, promote international trade, and heighten international cooperation in other fields. However, if agreement is really impossible because of irreconcilable differences in philosophy, continued discussion of the issues, particularly with the U.S. Government as an active participant, could exacerbate already difficult relationships.

(b) Work with the Department of State to organize additional U.S./LDC joint commissions for economic and technological collaboration.

Such commissions provide a framework on which an action program can be based; that is, they are a mechanism for identifying projects of joint interest and for carrying them out. Experience with the commissions established so far is not encouraging; they are slow, bound up in red tape, and not action-oriented. Before initiating any new commissions, we must learn how to make the existing ones more effective.

(c) Participate with the Department of State in organizing consortia of developed countries to participate jointly in commission-type programs for economic and social development with specific LDC's.

Such a commission would share the total effort among several countries and might produce innovative ideas for development. On the other hand, reaching agreement in a finite time among the participating developed countries on how to share costs and benefits would be nearly impossible, and such a commission would certainly be more cumbersome and slower to act than a bilateral commission.

(d) Cooperate with the Departments of State and Treasury in working through the World Bank to plan and execute the industrial development of Third World countries.

The World Bank is a highly respected, effective organization and its intervention would be well-received. However, the resources of the World Bank are already fully committed; the management of the Bank would say that they already assist economic development through their loan programs and the most urgent need is additional capital for investment; and U.S. priorities would be only one set among many that would be considered by the Bank.

(e) Work with the Department of State to expand the level of support for technological development in traditional ways.

The many existing channels for technological support, while not efficient, are in place and can be used readily. This option might also prove the least expensive for the U.S. However, support for technological development is given a low priority in the programs of the existing channels, particularly in U.S. AID, where technological development is not one of the areas specified by Congress for AID action. Further, the traditional multilateral mechanisms have not demonstrated high effectiveness in such projects.

(f) Promote mutually advantageous cooperation in industrial R&D not being pursued by U.S. private interests.

Duplication of expensive projects could be minimized, while the U.S. could get some return from possibly unique resources (climate, minerals, skills) in the LDC. On the other hand, choice of projects to satisy all conditions could be difficult; to avoid conflict with U.S. private interests, the projects chosen could be expensive or those with low probability of success.

(g) Assist technological infrastructure development in LDC's.

Relatively small U.S. resources of money and manpower are required, while the ability of LDC's to undertake many kinds of technological enterprise is substantially enhanced. At the same time establishment of broad infrastructure may divert LDC resources from practical projects with more immediate pay-off.

KEY ISSUES

Title: Environmental Energy Conservation in Industry

Background: The oil embargo of late 1973 emphasized the importance and need for energy conservation in the United States. Since the industrial sector accounts for about 40 percent of the total domestic energy consumed, the U.S. Department of Commerce, coordinating with the Federal Energy Administration, launched a voluntary energy conservation program. The two agencies initially met with representatives of the six largest energy-consuming industries, and later with representatives of other energy-intensive industries to encourage the development and adoption of energy conservation programs. During these meetings, top-level private management contended that pollution control requirements limited energy conservation efforts in two respects. First, pollution control facilities consume considerable amounts of energy; secondly, such facilities preempt capital that would otherwise be used for energy-savings investment. To investigate these assertions, the Office of Environmental Affairs initiated a series of studies to determine the amounts of energy required by each major energy-intensive industry to implement existing Federal, State, and local pollution control laws. These studies will establish the relationships among environmental quality, energy conservation, and the associated economic costs.

Issue: Industry, which utilizes more than 40% of the energy consumed in this country, has contended that substantial amounts of energy are required for environmental control purposes, and that the needed additional capital for future environmental control preempts capital that could otherwise be used for energy-savings investment.

At question is the optimum balance of several National objectives, maintenance and enhancement of our environment, the conservation of energy resources, and the promotion of a second economy, as they relate to industry.

Analysis: The first energy/environmental study addressed the iron and steel industry and was completed in 1976. This study revealed that achievement of existing environmental standards for air, water, and solid wastes would increase energy

consumption by approximately 10% of the total 1972 industry use, or 323 trillion BTU's, based on 1972 production levels. This is equivalent to 161,000 barrels per day of oil. Preliminary findings in other energy-intensive industries under study -- primary aluminum, and fossil fuel power plants -- indicate consumption percentage figures of similar magnitude. Studies of the pulp and paper industry and the petroleum refining industry are currently being undertaken.

A second phase of studies, already begun for the iron and steel industry, is designed to provide the necessary information on specific technological options for controlling pollution in the above-named energy-intensive industries. The objective of this further analysis is to assist industry and government in identifying desirable technical remedies to reduce the amount of energy used for pollution control in an environmentally, economically, and legally acceptable manner. The information developed in the entire study series will assist in a possible formulation/reformulation of Federal environmental regulations, and the establishment of industrial energy conservation program targets.

Schedule: The energy/environmental analysis of each industry listed below comprises two phases. A phase 1 study is to develop and quantify the extent of energy use associated with existing pollution control regulations and identify energy-related research needs. A phase 2 study completes the specific industry analysis by quantitatively examining the technologically feasible tradeoffs among environmental protection, energy conservation, and economic welfare while maintaining environmental quality.

Iron and Steel Industry
- Phase I Study Completed----------1st Quarter 1976
- Phase 2 Analysis Study Estimated Completion (ASEC)----------2nd Quarter 1977

Fossil Fuel, Steam Electric Generating Industry
- Phase 1 Study Estimated Completion---------4th Quarter 1976
- Phase 2 ASEC----------3rd Quarter 1978

Pulp and Paper Industry
- Phase 1 Study Estimated Completion---------1st Quarter 1977
- Phase 2 ASEC----------3rd Quarter 1978

Aluminum Industry
- Phase 1 Study Estimated Completion---------1st Quarter 1977
- Phase 2 ASEC----------3rd Quarter 1977

Petroleum Refining Industry
- Phase 1 & 2 Estimated Completion----------4th Quarter 1977