OFFICE OF TECHNOLOGY ASSESSMENT

UNITED STATES CONGRESS

Fiscal Year 1995 Justification of Estimates

Submitted to Subcommittees on
Legislative Branch Appropriations

DECEMBER 1993

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Contents

Office of Technology Assessment Fiscal Year 1995 Budget in Brief to the Subcommittees on Legislative Branch Appropriations

The funds requested represent the best estimate of the Technology Assessment Board of what is required to meet the needs for the first session of the 104th Congress.

FY 95 Budget Request:		$22,030,000
Includes:		
$ 2,000 for the Prospective Payment Assessment Commission authorized in 42 U.S.C. 1395ww		
$ 2,000 for the Physician Payment Review Commission authorized in 42 U.S.C. 1395w-1		
$10,000 for monitoring of Mandated Veterans Studies authorized in P.L. 96-151, P.L.98-160, and P.L. 99-272		
$ 2,000 for the Advisory Panel on Alzheimer's Disease authorized in P.L. 99-660 and P.L. 102-507		
$ 3,000 for Review of DoE's study of its role in support of graduate education authorized by P.L. 102-325		
FY 94 Budget Request:	$22,925,000	
FY 94 Appropriation:		$21,315,000
Estimated Increase in FY 95 Request Over FY 94 Budget Base		$ 715,000

Salaries and Expenses

For salaries and expenses necessary to carry out the provisions of the Technology Assessment Act of 1972 (*Public Law 92-484*), including official reception and representation expenses (not to exceed $5,500 from the Trust Fund), and expenses incurred in administering an employee incentive awards program (not to exceed $2,500), and rental of space in the District of Columbia [$21,315,000] **$22,030,000**: *Provided,* That none of the funds in this Act shall be available for salaries or expenses of any employee of the Office of Technology Assessment in excess of 143 staff employees: *Provided further*, That no part of this appropriation shall be available for assessments or activities not initiated and approved in accordance with section 3(d) of *Public Law 92-484*: *Provided further*, That none of the funds in this Act shall be available for salaries and expenses of employees of the Office of Technology Assessment in connection with any reimbursable study for which funds are provided from sources other than appropriations made under this Act, or shall be available for any other administrative expenses incurred by the Office of Technology Assessment in carrying out such a study.

Office of Technology Assessment Obligation Summary

Salaries and Expenses
(in thousands of dollars)

	Fiscal Year 1994 (Estimated)	Fiscal Year 1995 (Estimated)	Estimated Change
General and Administrative Fixed Costs	6,159	6,348	189
Planning	708	733	25
Testimony, Follow-on, Special Analyses	1,395	1,443	48
Prospective Payment Assessment Commission	2	2	0
Physician Payment Review Commission	2	2	0
Veterans Studies	28	10	(18)
Advisory Panel on Alzheimer's	2	2	0
Review of DOE's Study on It's Role in Support of Graduate Education	3	3	0
Regulatory and Health Assessment of Dietary Supplements	46	...	(46)
John Heinz Competitive Excellence Award Candidates Evaluation 1/	...	...	0
Formal Assessments:			
Continuation of Assessments Initiated in Prior Fiscal Years	10,185	10,605	420
New Assessments to be Initiated	2,785	2,882	97
Total Formal Assessments	12,970	13,487	517
Total	21,315	22,030	715

1/ This mandate imposes a potential annual burden of $30,000 on OTA's flexibility to initiate new work.

1. Schedules A, B, and C: Agency Request and Analysis of Change

Schedule A: Office of Technology Assessment Summary by Organization and by Object Class

CATEGORIES	FY 93 ACTUAL STAFF	FY 93 ACTUAL DOLLARS ($000)	FY 94 ESTIMATE STAFF	FY 94 ESTIMATE DOLLARS ($000)	FY 95 ESTIMATE STAFF	FY 95 ESTIMATE DOLLARS ($000)	NET CHANGE 94/95 STAFF	NET CHANGE 94/95 DOLLARS ($000)
1. Breakdown by Organization:								
Industry,Commerce, and International Security Division	60	8,215	60	8,290	60	8,576	0	286
Health, Life Sciences, and the Environment Division	50	6,732	50	6,866	50	7,106	0	240
General and Administration	33	6,055	33	6,159	33	6,348	0	189
Total	143	21,002	143	21,315	143	22,030	0	715
2. Breakdown by Object Class:								
11 Personnel Compensation		11,014		11,620		12,011		391
12 Personnel Benefits		2,323		2,628		2,738		110
13 Benefits to Former Personnel		25		2		2		0
21 Travel		245		227		250		23
22 Transportation of Things		117		121		127		6
23 Rent, Communications & Utilities		2,013		2,118		2,182		64
24 Printing and Reproduction		260		347		357		10
25 Other Services		4,254		3,552		3,651		99
26 Supplies and Materials		376		315		324		9
31 Equipment		375		385		388		3
32 Land and Structures								
42 Insurance Claims and Indemnities								
Total		21,002		21,315		22,030		715

Schedule A-a: Office of Technology Assessment Summary by Organization and by Object Class
Actual FY 1993 Under Old Organization Structure

CATEGORIES	FY 93 ACTUAL STAFF	FY 93 ACTUAL DOLLARS ($000)
1. Breakdown by Organization:		
A. Energy, Materials, and International Security Division	36	5,232
B. Health and Life Sciences Division	36	5,225
C. Science, Information, and Natural Resources Division	36	4,490
G. General and Administration	35	6,055
Total	143	21,002

	DIV. A	DIV. B	DIV. C	DIV. G	TOTAL
2. Breakdown by Object Class:					
11 Personnel Compensation	3,113	2,653	2,905	2,343	11,014
12 Personnel Benefits	688	555	578	502	2,323
13 Benefits to Former Personnel		1	8	16	25
21 Travel	87	68	64	26	245
22 Transportation of Things	11	12	9	85	117
23 Rent, Communications & Utilities	1			2,012	2,013
24 Printing and Reproduction	65	65	56	74	260
25 Other Services	1,143	1,711	773	627	4,254
26 Supplies and Materials	58	71	34	213	376
31 Equipment	66	89	63	157	375
32 Land and Structures					
42 Insurance Claims and Indemnities					
Total	5,232	5,225	4,490	6,055	21,002

Schedule B: Office of Technology Assessment Analysis of Change to Budget Base by Organization and by Object Class

CATEGORIES	MANDATORY PAY AND RELATED COSTS		PRICE LEVEL CHANGES		PROGRAM TYPE CHANGES						TOTAL CHANGES	
					LEGISLATION		WORKLOAD		EQUIPMENT, ALTERATIONS, MAINTENANCE, REPAIRS, ETC.			
	STAFF	DOLLARS ($000)	STAFF	DOLLARS ($000)	STAFF	DOLLARS ($000)	STAFF	DOLLARS ($000)	STAFF	DOLLARS ($000)	STAFF	DOLLAR ($000)
1. Breakdown By Organization:												
Industry, Commerce, and International Security Division		224		62								28
Health, Life Sciences, and the Environment Division		180		60								24
General and Administration		97		92								18
Total		501		214								71
2. Breakdown By Object Class:												
11 Personnel Compensation		391										39
12 Personnel Benefits		110										11
13 Benefits to Former Personnel												
21 Travel				23								2
22 Transportation of Things				6								
23 Rent, Communications & Utilities				64								6
24 Printing and Reproduction				10								1
25 Other Services				99								9
26 Supplies and Materials				9								
31 Equipment				3								
32 Land and Structures												
42 Insurance Claims and Indemnities												
Total		501		214								71

Schedule C: Office of Technology Assessment
Summary—Detailed Analysis of Changes

	Calculation of Base	
	Staff	Amount ($000)
Appropriation, 1994	143	21,315
Adjustments to Appropriation		
Budget Base, 1995	143	21,315
	1995 Request	
I. Adjustments to Base	Staff	Amount ($000)
A. Mandatory Pay and Related Costs	...	501
1. Excess Day		(53)
2. FTE Reduction		(149)
3. January 1995 Cost-of-Living Adjustment		260
4. Merit Increases and Promotions		419
5. Health Benefit Cost Increases		24
B. Price Level Changes	...	214
1. Travel Related Inflation of 10%		23
2. Postage Rate Increase		5
3. Miscellaneous Transportation Inflation of 2.7%		1
4. Building Lease Increases		49
5. Telephone Services Inflation of 10%		12
6. Miscellaneous Communications Inflation of 2.7%		3
7. Printing Inflation of 3%		10
8. Library of Congress Services Inflation of 5.7%		5
9. Other Services Inflation of 2.7%		94
10. Supplies and Materials Inflation of 2.7%		9
11. Equipment Inflation of 2.7%		3
C. Program Type Changes		
1. Legislation	...	...
2. Workload	...	...
3. Equipment, Alterations, Maintenance, Repairs, Etc.	...	...
II. Net Increase/Decrease Requested	...	715
III. Total Appropriation Request, 1995	143	22,030

2. Explanation of Changes Shown on Schedule C

Office of Technology Assessment
Agency Summary

A. MANDATORY PAY AND RELATED COSTS	Staff	Amount (000)
1. Excess Day, from 261 to 260 work days in FY 1995		(53)
2. FTE reduction of 3 temporary staff to meet the 4% reduction in Sec. 307 of PL 103-69		(149)
3. January 1995 2.6% Cost-of-Living Adjustment		260
4. Merit increases and promotions averaging 3% agency-wide		419
5. Annualization of January 1994 4% plus estimated January 1995 7.5% health benefit increases		24
B. PRICE LEVEL CHANGES	Staff	Amount (000)
1. Travel inflation rate of 10% applied to base		23
2. Postage rate increase of 14% effective in April 1995		5
3. Miscellaneous transportation inflation rate of 2.7% applied to base		1
4. Building lease escalation based on 30% of change in CPI-W for space, plus an estimated 3.5% increase in operating costs and 5% increase in property taxes		49
5. Telephone services inflation rate of 10% applied to base		12
6. Miscellaneous communications inflation rate of 2.7% applied to base		3
7. Printing and publications inflation rate of 3% applied to base		10
8. Interagency agreement with the Library of Congress for financial services increase of 5.7% for COLA, locality-based pay adjustment and within-grade increases		5
9. Other services inflation rate of 2.7% applied to base		94
10. Supplies and materials inflation rate of 2.7% applied to base		9
11. Equipment inflation rate of 2.7% applied non ADP equipment base		3
C. PROGRAM TYPE CHANGES	Staff	Amount (000)
1. Legislation		...
2. Workload		...
3. Equipment, Alterations, Maintenance, Repairs, Etc.		...

3. Summary of Agency Request

Schedule D: Office of Technology Assessment FY 1995 Budget Request

	Calculation of Base	
	Staff	Amount ($000)
Appropriation, 1994	143	21,315
Proposed Changes for FY 1995		
Mandatory Pay and Related Costs		501
Price Level Changes		214
Program Type Changes		
Legislation		
Workload		
Equipment, Alterations, Maintenance, Repairs, Etc.		
Total Proposed Changes	0	715
FY 1995 Budget Request	143	22,030

4. Overview of OTA's Role

The prosperity and security of the Nation depend in no small part on how the U.S. Congress and others anticipate and respond to complex issues involving science and technology. OTA has an unequalled record in providing Congress with facts, figures, and nonpartisan analyses it can rely on in dealing with critical national issues involving science and technology. As we approach the 21st century, the United States and the world are undergoing momentous political, economic, social, and technological transformations that pose both new problems and new opportunities for the nation's lawmakers. U.S. lawmakers seeking to cope with these transformations are likely to find that the guidance OTA can provide is more valuable than ever.

With the end of the Cold War, the United States is free for the first time in 50 years to focus more of its energies on domestic problems. OTA can advise Congress on the many ways in which science and technology can be marshalled to help meet pressing domestic needs.

- Getting the U.S. economy on a sound footing for the years ahead is clearly a high priority of the 104th Congress. One of the challenges will be to find productive civilian uses for the resources that were formerly devoted to the Nation's defense. OTA's assessment of U.S. Technology and the Defense Conversion, which includes *Defense Conversion; Redirecting R&D*, concentrates on new opportunities in this area. Another OTA report, *Adult Literacy and New Technologies: Tools for a Lifetime*, focuses on how information technologies can help equip U.S. citizens with the skills needed to participate fully in the workplace. *Multinationals and the National Interest* discusses how to help ensure that multinational corporations such as IBM and AT&T work to support economic growth and high standards of living in the United States.
- Health care reform increasingly is coming to dominate the domestic policy agenda, and OTA can help U.S. lawmakers sort out some of the dilemmas that arise in the debate. *An Inconsistent Picture: A Compilation of Analyses of Economic Impacts of Competing Approaches to Health Care Reform by Experts and Stakeholders*, for example, points to some of the reasons for the wide range of differences in estimated economic impacts of approaches to health care reform. OTA's report *Pharmaceutical R&D: Costs, Risks, and Rewards* can help inform the development of sound Federal policies related to payment for prescription drugs.
- Another item high on the domestic policy agenda is "reinventing government." At a time when demand is growing and budgets are tighter, Federal, State and local governments face the challenge of delivering better services faster and at less cost. OTA's report *Making Government Work: Electronic Delivery of Federal Services* provides Congress with alternative strategies for improving the performance of government by using modern computer and telecommunication technologies.
- Dealing with environmental problems will be a continuing challenge for U.S. policymakers for the foreseeable future. Many scientists believe that as a result of CO_2 emissions from cars and other factors, the Earth's climate is likely to warm by several degrees during the next few decades. OTA's report *Preparing for an Uncertain Climate* discusses how U.S. policymakers can begin to plan for the possibility of global warming in the light of considerable uncertainties about when, where, and how much change will occur. Another OTA report, *Dismantling the Bomb and Managing the Nuclear Materials*, presents options for the successful dismantlement and disposition of nuclear weapons materials. This is one of the major environmental and public health challenges the country faces.

- Decisions related to the use of nuclear power will affect economic growth, the quality of the environment, and national security for years to come. Currently, 107 operating nuclear power plants in the United States supply over 20 percent of the country's electricity. As these plants age, issues related to plant lives and decommissioning are likely to become much more visible and draw more attention. OTA's report *Aging Nuclear Power Plants: Managing Plant Life and Decommissioning* identifies Federal efforts that could contribute to more timely and better informed decisions about these plants.

The end of the Cold War and the changes that have ensued necessitate radical rethinking of America's foreign and national security policy. For the first time in half a century, the United States faces no massive military threat from another superpower. OTA can provide useful perspectives on the role of technology in this new era.

- *Energy Efficiency Technologies for Central and Eastern Europe*, part of OTA's assessment of Energy and Environmental Technology Transfer to Central and Eastern Europe, notes that transferring technology to improve the efficiency of energy use is one highly cost-effective way for the United States to encourage economic reform, democratization, and stability in the former communist countries of the Soviet bloc. Energy is used very wastefully in formerly centrally planned economies, and the waste limits economic development and contributes to local and global environmental degradation.
- The proliferation of chemical, biological, and nuclear weapons of mass destruction—especially in unstable regions of the world such as the Middle East, S. Asia, and Korea—is likely to pose a major security threat to the United States and other countries for many years to come. OTA's report *Proliferation of Weapons of Mass Destruction: Assessing the Risks* identifies a range of measures from which a coherent nonproliferation treaty might be constructed.

OTA's work in FY 1995 will continue to reflect the explicit needs of the committees of jurisdiction. The bipartisan, bicameral Technology Assessment Board (TAB) will guide OTA's work with committees and shape the agency's agenda through the assessment proposal approval process. OTA serves as a shared resource for Congress, providing nonpartisan analysis of scientific and technological issues—issues intrinsic to all important policy issues—in a cost-effective way.

5. OTA's Accomplishments During Fiscal Year 1993

During FY 1993, OTA delivered 53 publications to Congress, including 27 assessment reports, 23 background papers, and 3 administrative documents (see p. 91). As of September 30, 1993, 41 TAB-approved studies and 13 special responses were in progress. As an integral part of carrying out assessments, OTA also provided expert advice, briefings, testimony, and results of OTA assessments matched to the specific needs of the requesting committees and the congressional agenda (see p. 153).

Toward the end of January 1993, new senior management had begun to be put in place at OTA. Originally installed on an acting basis, by the end of FY 1993 an entirely new top management team was confirmed, consisting of a new Director and two new Assistant Directors. This reorganization, initiated with the departure of former Director John H. Gibbons to assume the position of President Clinton's Science Advisor, continued in response to several needs. Downsizing of the Legislative Branch required a response from OTA that reacted to the need for maintaining productivity most efficiently. The preservation of research/analytic teams was made a priority. Shrinking

management through elimination of one of OTA's three Division management groups and the operations manager as well as two general assignment senior associates generated significant personnel savings. The outline of the new organization is displayed in Schedules A and A-a and in the sections below. A planning and strategic process was also begun to fulfill further needs. Reorganized Divisions should consist of Programs which form sensible, coherent intellectual and scientific units, ones which foster increased intercommunication and efficient cooperative use of personnel resources. Continued savings should be possible through coalescing Programs and the elimination of a few Program management teams. This process is underway and should result in a leaner and more efficient organization with as little loss of productivity to downsizing as possible.

Relation of Work to Legislative Activity

OTA's role is neither to promote nor to discourage the development or the application of any particular technology or legislation, but rather to help Congress determine whether or when some form of Federal government participation may make sense. OTA identifies and clarifies options; exposes misleading, unsupportable, or incorrect information; and works to raise the level of understanding in the debate about expensive and controversial technical issues.

In each section on accomplishments in OTA's divisions, we identify some activities during fiscal year 1993 that illustrate the link between OTA's work and specific congressional activity. Please see the following pages for this information.

Mandate Avoidance

OTA works closely with members of TAB and the Appropriations Committees to maintain the authority of TAB to set the agenda of the agency and the best use of OTA's limited resources for the whole Congress. Mandates are strongly discouraged as a mechanism to obtain OTA's help, and potential mandates are often avoided when we are able to work with the interested parties prior to passage of legislation into law.

Because of the support of OTA's Board and the Appropriations Committees, no mandates occurred in the 103d Congress. OTA also successfully convinced a committee to repeal an earlier mandate. Two small mandated studies were passed at the end of the 102d Congress, *P.L. 102-571* mandating a study of the regulatory and health assessment of dietary supplements and *P.L. 102-585* mandating a study of registries of health data on Persian Gulf veterans. Both studies will be completed by January 1994.

Continuing Mandated Functions

OTA continues to monitor veterans studies: *P.L. 96-151* requires OTA to monitor and evaluate certain studies by the Department of Veterans Affairs; *P.L. 98-160* requires OTA to monitor certain Federal research activities with regard to veterans exposed to atomic radiation; *P.L. 99-272* requires OTA to monitor certain Federal research activities related to women veterans.

OTA continues to appoint the members of the Prospective Payment Assessment Commission (ProPAC) and the Physician Payment Review Commission (PPRC). ProPAC is an independent advisory committee mandated under the Social Security Amendments of 1983 *(P.L. 98-21, Section 601, 42 U.S.C. 1395ww)* that reform the Medicare program payment method. The law requires the OTA Director to select the Commission members. The first Commissioners were appointed in 1983.

PPRC is also an independent advisory committee and was mandated by the Consolidated Omnibus Budget Reconciliation Act of 1985 *(P.L. 99-272, 42 U.S.C. 1395w-1)*. PPRC's purpose is to advise Congress and the Executive Branch on possible ways of reforming physician payment under the Medicare program. The law requires the OTA Director to select the Commission members. Initial appointments to the 13-member Commission were made in 1986, for terms ranging from one to three years.

P.L. 99-960 and *P.L. 102-507* also require the Director of OTA to appoint the members of the Advisory Panel on Alzheimer's Disease, which advises the Secretary of Health and Human Services on priorities and emerging issues related to Alzheimer's disease and related dementia. The first panel was appointed by the OTA director in 1987, and the panel was reauthorized in 1992. The panel's authorization terminates in 1995.

Interagency Coordination

In carrying out OTA's mission as a shared resource of the committees of the Congress, our staff cooperate and interact extensively with congressional members and staff and with the staffs of other Federal agencies, the private sector, and institutions around the world. This extensive networking serves to avoid duplication and to increase Congress's analytical resource base as it enables OTA to utilize the most up-to-date information available. In particular, OTA and the three other congressional support agencies have adopted processes that ensure fuller utilization of each other's expertise—in administrative as well as substantive areas. Senior staff from OTA, CRS, CBO, and GAO meet regularly to discuss topics on which each agency works, such as trade, education, health care, energy, agriculture, environment, transportation, and defense, in order to eliminate duplication and ensure that resources are devoted to each facet of an issue. A few recent examples of OTA networking that resulted in notable benefits to the Federal, State, and local government include:

- OTA continues to work closely with CRS, GAO, the Health Resources and Services Administration (HRSA), and the HHS Assistant Secretary for Planning and Evaluation (ASPE) on long-term care and case management issues. In July 1993, GAO held a congressional forum on long-term care; OTA staff assisted in planning the forum and moderated the forum for GAO. OTA and CRS have shared data and findings on State case management regulations and procedures for case management; this sharing of data benefits both agencies and is particularly helpful to OTA for the agency's staff paper on cost caps in case-managed long-term care.

- OTA participated in a CRS-sponsored congressional briefing on drug pricing in April, 1993. In addition, in August 1993, GAO staff asked OTA to review a draft of a GAO study of the impact of price controls on R&D, a subject that was briefly discussed in OTA's report. OTA's staff met with GAO staff and as a result of that review, the GAO report is currently undergoing extensive revision.
- OTA conducted extensive coordination with GAO, CRS, CBO, Physician Payment Review Commission, and Prospective Payment Review Commission, regarding Assessing the *Assumptions Behind Health Reform Projections.* GAO, CRS, CBO, PPRC all have work under way in this area, and OTA is consulting with them to ensure that there is not unnecessary overlap. Further, CBO has ongoing responsibilities in this area, and OTA is continuing to solicit information from CBO on the ways in which they model health reform proposals.
- OTA and GAO have coordinated their studies on Health Professions Training, with GAO concentrating on evaluation of the effectiveness of past efforts to improve specialty mix and lessen the impact on underserved areas, and OTA concentrating on potential techniques and programs to improve the situation in the future.
- In November 1992, soon after the start of OTA's assessment, *The Continuing Challenge of Tuberculosis*, OTA staff met with GAO staff who were also beginning work on TB in response to congressional requests. The purpose of the meeting was coordination — avoiding duplication of effort and sharing of resources. The meeting indicated that the work of the two agencies complement each other well. While OTA has focused on synthesizing current scientific understanding of TB and its control and giving a broad overview of Federal involvement, GAO was asked to evaluate in some detail Federally-funded TB control programs administered by State and local governments in several hard-hit communities. Staff from the two agencies have talked with each periodically about their respective projects.The GAO research is on-going at this date.
- On the basis of a list of questions from OTA about case management for long-term care and discussions with OTA staff, the Health Resources and Services Administration (HRSA) contracted for an analysis of policy-relevant findings from its congressionally-mandated "Health Care Services in the Home Demonstration Program." The results of the contract analysis are to be presented in November 1993. Also based on a list of questions from OTA about case management for long-term care, HRSA conducted a workshop on case management for special populations, the results of which were published in February 1993.
- HHS's Assistant Secretary for Planning and Evaluation (ASPE) is currently working on criteria for determining eligibility for long-term care for persons with cognitive impairment. OTA has provided information developed in 1989 to assist the Subcommittee on Health of the House Committee on Ways and Means in its work on the "Frail Elderly Bill," legislation intended to provide home and community-based services for people with dementia. OTA continues to participate on the advisory panel for ASPE's case management study.
- The HHS Office of Inspector General requested, and used, previously unpublished data from OTA's study of home infusion therapy, in an HHS IG report published September. 1993. OTA staff provided information, consulted with IG staff, and reviewed the IG report.
- Health Care Financing Administration (HCFA) staff used the OTA *Home Drug Infusion Therapy* report to help them make decisions about uniform Medicare coverage policy decisions under the new regional carrier system being put in place by HCFA, according to the medical director of one of the new regional carriers (spring 1993).

- Many of the options included in OTA's report on *Adolescent Health* were incorporated into the President's Health Security Plan (the health care reform plan).
- OTA coordinated the *Science & Technology, Renewable Resources, and International Development* study with GAO's new project on the role of private volunteer organizations (PVO's) in development that addresses: 1) when are PVOs appropriate in development, 2) how do their overhead rates affect funding use, and 3) AID effectiveness in determining when to use grants, contracts, cooperative agreements and how well do they administer/manage them.
- OTA coordinated the *Science & Technology, Renewable Resources, and International Development* study with GAO's new project on World Bank's portfolio management, including review of World Bank actions to improve accountability, loan policy, level of U.S. financial risk because of World Bank loans.
- GAO is reviewing OTA's body of work (5 reports) on African agriculture and environment as they develop a new GAO project on the role of U.S. industry and organizations in foreign aid.
- OTA coordinated the *Science & Technology, Renewable Resources, and International Development* study with ongoing CRS work on reviews of the Foreign Assistance Act and sustainable development discussions.
- CRS staff participated in several OTA meetings during the course of the study, *Harmful Nonindigenous Species in the United States*, including the hearings at which the study was released.
- The OTA report, *Energy Efficiency in the Federal Government: Government by Good Example?*, has been used extensively by several Executive agencies. The General Services Administration (GSA), with whom OTA worked closely in the course of this assessment, adopted an agency wide practice promoting equipment retrofits outlined in the report. OTA work has also been credited with improving communication between Federal facility personnel and private sector suppliers of energy efficient goods and services. For example, one large energy management company distributed copies of OTA's report to all its field representatives to improve their understanding of Federal energy management needs and opportunities.
- The OTA report, *Building Energy Efficiency,* is being used by several Federal agencies: by the Energy Information Administration, Department of Energy in planning their data collection and analysis on building energy use; by the National Renewable Energy Laboratory (NREL) for project planning and analysis; as a basic reference by the General Services Administration (GSA); and by the GSA's New York Field Office as a guide in putting together a training course for building operators. The report is also being used by State energy offices in Colorado and Arizona.
- Since the delivery of OTA's report, *Fueling Development: Energy Technologies for Developing Countries*, the World Bank has reported changing the structure of some of it energy projects in developing countries to reflect the "energy services" approach outlined in the OTA assessment. OTA staff have been invited to brief the senior World Bank staff on the project. In addition, the World Energy Conference has adopted the interim report, *Energy in Developing Countries,* as the basic document for discussion in their subcommittee on developing countries and it continues to have considerable impact on the thinking of the subcommittee.
- OTA's 1989 background paper, *Biological Effects of Electromagnetic Fields,* continues to be widely cited as the issues addressed in that report remain in public focus. OTA staff periodically

confer with counterparts in other research agencies including EPA, DoE, and Electric Power Research Institute (EPRI) on issues related to electromagnetic fields (EMF) and electric power systems and equipment. A number of outside experts have credited the OTA report and the publicity surrounding it as an important factor in encouraging both EPA and DoE to develop broader EMF research agendas.

- The World Bank continues to rely heavily on OTA's reports *Fueling Development* and *Energy in Developing Countries* in formulating its projects on energy efficiency and environmental issues. The Environment Department also recommends the reports as guides for environmental agencies in developing countries.
- OTA staff participate periodically in meetings with CBO, CRS, GAO on defense conversion issues.
- Many Federal agencies were engaged in the course of the study, *Dismantling the Bomb and Managing the Nuclear Materials*. The Department of Energy was prominent, with meetings and briefings on specific programs and issues held both at headquarters, as well as in trips to field facilities. A cooperative symposium was held with DoE that brought Russian scientists to OTA to discuss issues of mutual concern relative to treatment and management of high-level waste. Military agencies were also consulted, including the Defense Nuclear Agency, the Office of the Assistant to the Secretary of Defense for Atomic Energy, the Defense Intelligence Agency, the U.S. Army Corps of Engineers, and the nuclear decision-making components of each service. Other Federal agencies consulted included the Nuclear Regulatory Commission, the Department of State, and the Environmental Protection Agency.
- OTA received extensive cooperation from the Executive Branch in conducting the Literacy Study, especially from the Office of Vocational and Adult Education of the Department of Education. After the study was released, staff briefed the Assistant Secretary and senior staff in the Adult Education Division of the Department of Education.
- Throughout the study, *Access to Over-the-Road Buses for Persons with Disabilities*, OTA coordinated its efforts with the Office of the Secretary of the Department of Transportation (DoT) and the federal Architectural and Transportation Barriers Compliance Board. As directed under the Americans With Disabilities Act (ADA), the OTA report has been used as the basis of DoT's regulatory analysis for the implementation of regulations informing over-the-road bus operators of their compliance obligations under the ADA.
- OTA coordinated with GAO staff on data analysis in support of the GAO study, *The Availability of Intercity Bus Service Continues to Decline*, and the OTA study, *Access to Over-the-Road Buses for Persons with Disabilities*.
- OTA staff assisted FAA in organizing the Civil Tiltrotor Development Advisory Committee. This Committee was mandated by Public Law 102-581.
- OTA staff participated in or worked with four separate Federal Advisory Committees to the Federal Aviation Administration: FAA Research, Engineering, and Development Advisory Committee; Aviation Rulemaking Advisory Committee; Aviation Capacity Advisory Committee; and the FAA-sponsored Task Force for Global Navigation Satellite System Implementation.
- OTA participated in a joint NASA/American Institute of Aeronautics and Astronautics (AIAA) workshop on interactive effects of environmental technologies programs on other aviation system technologies.

- The OTA background paper, *Accessibility and Integrity of Networked Information Collections*, was released in conjunction with a July 14, 1993, meeting at the Library of Congress on "Delivering Electronic Information in a Knowledge-Base Democracy." This meeting was chaired by Vice President Gore and the Librarian of Congress, James Billington.
- The Social Security Administration automation study is being closely coordinated with relevant GAO staff.
- The OTA report, *Making Government Work*, included GAO, CRS, and executive agency staff in the research and review process, and reached out to similar efforts by state/local governments.
- Three of OTA's intellectual property reports, *Finding A Balance* (1992), *Copyright and Home Copying* (1989), and *Intellectual Property Rights* (1986) were used in Office of Science and Technology Policy's early 1993 report to Congress concerning the National Research and Education Network (NREN).
- The OTA reports *Defending Secrets* (1987) and *Electronic Record Systems and Individual Privacy* (1986) are cited in the information technology portions of the National Performance Review (NCR.IT.10—"Develop Systems and Mechanisms to Ensure Privacy and Security").
- OTA arranged and chaired three briefings on critical technologies for the Director and Deputy Director of the Office of Technology Policy, Department of Commerce.
- OTA staff have had ongoing input to GAO's inquiries into satellites and telecommunication matters.
- OTA and GAO staff organized a joint workshop on "Federal Agency Substance Abuse Prevention Initiatives," which was held at OTA on January 14 and 15, 1993. Information obtained from the workshop was incorporated into the OTA assessment report *Technologies for Understanding the Root Causes of Substance Abuse and Addiction* and into a number of ongoing GAO projects.
- On January 21 and 22, 1993, a workshop on "The Implications of Genetics Research and Mental Illness" was hosted by OTA. The workshop was a joint effort between OTA and the National Institute of Mental Health.
- Information from *Cystic Fibrosis and DNA Tests: Implications of Carrier Screening* (1992) and its accompanying background papers, *Genetic Counseling and Cystic Fibrosis Carrier Screening: Results of a Survey* and *Genetic Tests and Health Insurance: Results of a Survey* was used in recommendations of the National Institutes of Health (NIH)/Department of Energy (DoE) Health Insurance Task Force of the NIH/DoE Joint Ethical, Legal, and Social Implications (ELSI) Working Group for the Human Genome Project.
- The FBI and U.S. Attorney's Offices continue to cite *Genetic Witness: Forensic Uses of DNA Tests* (1990) in casework, and it is also used in local and State cases.

6. Changes in OTA's Prior Plans for FY 1993

During FY 1993, OTA essentially accomplished its goals, with approved modifications, negotiated reductions in some projects, and additions to others to meet the changing needs of Congress and to accommodate the inherent uncertainty of research. Also, during the year OTA's General and Administration activities were restructured in a way that allowed a greater share of resources to flow to the analytical divisions.

The chart below shows the variations in actual obligations for the OTA divisions for FY 1993 from the planned obligations for FY 1993 provided on Schedule A in the FY 1994 budget justification. The chart on page 22 provides a summary by object class of projects and actual expenditures for FY 1993.

Changes in OTA's Prior Plans

DIVISION	FY 93 ESTIMATE ($000)	FY 93 ACTUAL ($000)	PERCENT CHANGE
Energy, Materials, and International Security	4,956	5,232	5.6
Health and Life Sciences	4,908	5,225	6.5
Science, Information, Natural Resources	4,860	4,490	-7.6
General and Administration	6,301	6,055	-3.9
Total	21,025	21,002	-0.1

7. OTA's Goals for FY 1995

OTA's basic goals remain quite similar year to year. These are:

- to meet the Legislative Branch's priorities for support agencies — currently to manage with diminishing resources so that Congress still gets the best possible value in scientific and technological advice;
- to provide services to Congress in a balanced nonpartisan way that are accurate, complete, unbiased and high quality;
- to work with congressional clients so that assessments provide information and analysis as relevant and useful for the legislative agenda as possible.

Within this overall framework each year OTA may have more topical, short term goals. For FY 1995, OTA hopes to continue and solidify agency reorganization and restructuring begun toward the end of FY 1993 in an effort to maintain productivity at lesser appropriation and staffing levels, to rationalize and think through focussing analytic capacity on likely most relevant subject matter, and to maximize intra-agency communication and cooperative, effective use of personnel resources. As is described below, OTA hopes to stay involved in salient issues such as sustainable use of energy, competitiveness, new priorities in international security, the continuing health care debate, the new information society, improving education, better care of our environment and the like. In the final analysis, the agency depends on congressional interests and will, as usual, reserve resources for response to the often unexpected and unanticipatable issues of the day.

Priorities in Program Work

OTA's agenda is driven by explicit needs of congressional committees. Therefore, we cannot predict in detail the new assessments that will be undertaken in a given year. In response to the Appropriations Committees' request, however, OTA has prepared a list of subjects that are representative of the assessments we may be asked to undertake. Such an exercise, using a wide variety of information sources, helps sharpen the discussions between OTA staff and congressional committees. It also reflects one of the charges Congress assigned to OTA: foresight about emerging technology. The most recent list (see below) was derived from a much larger group of subjects that have come to OTA's attention via its own work, requests and inquiries already received from committees, the technical literature, interactions with members and staff of Congress, and from peers in the Executive Branch and outside of the government. Because OTA works hard to be responsive to changing congressional needs, work actually begun in a given year is often significantly different from OTA's prospective list, but new work usually does contain some of the identified issues. (Brief descriptions of the candidate studies are provided in the sections on divisions' priorities on pages 43 and 67).

Candidate Areas for New Assessments in Fiscal Years 1994 and 1995

The topics given in this list have been identified by congressional committees, OTA, and its advisers as technical issues the Congress will face over the next several years. *Note: 1) This list is not given in order of priority; 2) the actual number of issues we can undertake as full assessments is not more than 1 in 3 or 4 of those listed.*

- *Energy and Materials*

  Energy Research and Development: Meeting the Nation's Needs
  Materials Flow in a Sustainable Society
  Implementation of Energy Efficient Alternatives to Private Vehicles
  Plutonium as Fuel for Commercial Power Reactors
  Multiple Resource Management of Federal Lands and Resources
  Energy Use and Urban Infrastructure

- *Industry, Technology, and Employment*

  Technology Policy
  Technology, Job Mobility, and Adjustment Policies
  Technology Transfer to the United States
  Technology and Trade with Developing Economies
  Cleaner Manufacturing Technologies and U.S. Manufacturing Competitiveness
  Industrial Cooperation and Economic Competitiveness

- *International Security and Commerce*

  International Cooperation and Competition in Space
  Multilateral Monitoring and Verification
  Multilateral Peacekeeping, Peace-making, and the U.S. Military
  Theater Missile Defense
  The Future Structure of U.S. General Purpose Forces
  Aerospace Industry Study

- *Science, Transportation, and Education*

  School to Work Transition
  Community Colleges in Today's Economy
  School Readiness and Technology
  Learning and Technology
  Transportation and the 1990 Clean Air Act Amendments
  Satellite-Based Information and the Transportation System

- *Telecommunication and Computing Technologies Program*

  Communications Technology Convergence: Its Impact on Federal and State Regulatory Policy
  Linking the Americas: Economic Strength Through Communications and Information Technology
  Telecommunication Services and Manufacturing in the Pacific Rim: Challenge to the U.S. Industry?
  Electronic Keiretsu: A Challenge to U.S. Anti-Trust Law
  Copyright and the Value of Intellectual Property in a Networked Environment
  High Definition Television: Future Role in Multi-Media Communications

- *Biological and Behavioral Sciences*

  Organ Transplants
  Follow-on to the Risk Assessment Project
  Human Genome Diversity
  Drug Treatment Programs

- *Food and Renewable Resources*

  Riverine Fisheries Restoration
  Global Land-Use Changes, Emerging Viral Diseases, and U.S. Health Concerns
  Resource Management and Research Needs in U.S. National Parks
  Ecosystem Reclamation: Rural and Urban
  Natural Disasters, Technology and the Federal Role
  Integrating Agriculture and the Environment: Educating for the Future

- *Health*

  AIDS/HIV-related Studies
  Financing Experimental Care and Related Issues in Technology Diffusion
  Methods for Narrowing the Target Audience for Clinical Preventive Services by Using Risk Factors
  Health Care Reform-related Studies
  Health Care and the Inner City
  Prescription Drugs and Health Care Reform

- *Oceans and Environment*

  Water Quality in the U.S.
  Transnational Pollution
  The Science of Ecotoxicology
  Flood Control and Flood Plain Management
  Recycling

Office of Technology Assessment Administrative Expenses *(dollars in thousands)*

	FY 93 ACTUAL	FY 94 ESTIMATE	FY 95 ESTIMATE
Calculation of Administrative Expenses:			
Object Class 20 Series	7,265	6,680	6,891
Less: Rental Expenses	(1,799)	(1,875)	(1,924)
Programmatic, Mission-Essential Expenses	(4,228)	(3,854)	(3,974)
Reimbursable Expenses			
Legally Mandated Expenses			
Administrative Expenses	1,238	951	993
Calculation of Maximum Administrative Expenses:			
Base Year (FY 93) Expenses		1,238	1,238
Adjustment for Inflation		33	66
Adjusted Base Year Expenses		1,271	1,304
Required Reduction		(38)	(78)
Maximum Administrative Expenses		1,233	1,226

Office of Technology Assessment Fiscal Year 1993 Estimate vs Actual By Object Class

CATEGORIES	FY 93 ESTIMATE DOLLARS ($000)	FY 93 ACTUAL DOLLARS ($000)	CHANGE EST VS ACT PERCENT	CHANGE EST VS ACT DOLLARS ($000)
2. Breakdown by Object Class:				
11 Personnel Compensation	11,444	11,014	(3.8)	(430)
12 Personnel Benefits	2,370	2,323	(2.0)	(47)
13 Benefits to Former Personnel	51	25	(51.0)	(26)
21 Travel	368	245	(33.4)	(123)
22 Transportation of Things	110	117	6.4	7
23 Rent, Communications & Utilities	2,252	2,013	(10.6)	(239)
24 Printing and Reproduction	541	260	(51.9)	(281)
25 Other Services	3,462	4,254	22.9	792
26 Supplies and Materials	245	376	53.5	131
31 Equipment	182	375	106.0	193
32 Land and Structures				
42 Insurance Claims and Indemnities				
Total	21,025	21,002	(0.1)	(23)

Explanation of 10% OR $100,000, Whichever is Greater, Variation by Object Class for Fiscal Year 1993

21. Travel *(decrease of 33.4% or $123,000)*

- The departure of the director and several key staff members curtailed planned travel. Travel was also reduced because a signifigant number of projects were nearing completion when less travel occurs and in some cases project priority was placed on contractual needs.

23. Rent, Communications and Utilities *(decrease of 10.6% or $239,000)*

- Projected increases related to the building lease did not occur. As a result of a court appeal, taxes on the building actually decreased. Operating cost and costs associated to ADA modifications were lower than projected.
- Savings in telephone service and equipment rental charges were realized.

24. Printing and Reproduction *(decrease of 51.9% or $281,000)*

- Utilization of GPO's contract procurement printing services has saved an average of 57% on printing.

25. Other Services *(increase of 22.9% or $792,000)*

- Savings in personal service resulting from the departure of the director and other staff and other savings allowed for the utilization of increased contracting for research support.

26. Supplies and Materials *(increase of 53.5% or $131,000)*

- The change in software technology to a Windows environment, an Agency shift to new word processing programs and an increase in the use of analytical software increased the purchase of software above original projections.

31. Equipment *(increase of 106.0% or $193,000)*

- A new Internet communications platform was required because of the increased OTA usage in various worldwide electronic communications networks as well as the Legislative Branch Capnet system.
- Publications equipment to run a sophisticated publishing system that allows for the integration of graphics and text, advanced layout and design options and the support of more word processing packages was purchased.
- The shift to a Windows personal computer operating system environment required the upgrade of many 286 based personal computers to 386 based or higher personal computers.

8. A. Agency Workload and Product Data

Projects Requested or Mandated and Approved During the Fiscal Year

Status of Projects Requested	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate
Projects Requested by Committees (1)	40	40	40
Projects Approved by TAB	14	20	20
Projects Undertaken as Special Responses or Incorporated in Ongoing Work	20	20	20
Projects Delayed to Another Fiscal Year	2	2	2
Legislative Mandates Enacted in Fiscal Year (2)	2	0	0
Legislative Mandates Active in Fiscal Year	5	6	5

(1) These numbers are representative of assessments formally requested in writing. They do not represent the total number of request letters for an assessment (which may come from several different committees) and do not include the significant number of requests that are refused or referred elsewhere before reaching the formal request stage.

(2) OTA's appropriations language states, *"That no part of this appropriation shall be available for assessments or activities not initiated and approved in accordance with section 3(d) of Public Law 92-484."* The previously mandated studies will be continued. OTA will continue to discourage new mandates with the assistance of the Technology Assessment Board and the Appropriations Committees.

8. B. Agency Workload and Product Data

Projects Ongoing, Started, or Completed During the Fiscal Year

Status of Projects	FY 1991 Actual	FY 1992 Actual	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate
Projects in Process - Beginning of Fiscal Year (1)	39	43	42	41	41
Projects Approved by TAB During the Fiscal Year	16	20	14	20	20
Reports Published During the Fiscal Year (2)	30	29	27	27	27
Projects in Process - End of Fiscal Year	43	42	41	40	40

(1) Projects in process counts all TAB-approved activities. A project may produce more than one assessment report, or may produce no reports at all, therefore, numbers are not additive. Projects in press or under TAB review are counted.

(2) Reports include full assessment reports, special reports, and excludes administrative documents.

8. C. Agency Workload and Product Data

Type and Number of Products Completed During the Fiscal Year

Products	FY 1993 Estimate	FY 1993 Actual	FY 1994 Estimate	% Change 93 - 94	FY 1995 Estimate	% Change 94 - 95
Reports (1)	29	27	27	0	27	0
Other Publications (2)	26	23	23	0	23	0
Testimony	50	24	50	108	50	0
Total Products	105	74	100	35	100	0

(1) Reports include full assessment reports, special reports, and excludes administrative documents.

(2) Other publications refers to background papers.

9. Staffing of the Agency

Schedule E: Office of Technology Assessment Summary—Direct and Indirect Employees

CLASSIFICATION	NUMBER OF EMPLOYEES			DOLLARS ($000)		
	FY 93 ACTUAL	FY 94 ESTIMATE	FY 95 ESTIMATE	FY 93 ACTUAL	FY 94 ESTIMATE	FY 95 ESTIMATE
Staff Allocation (permanent positions)	143	143	143	—	—	—
11.1 Full-Time Permanent						
Full-Time Permanent	136	138	138	8,202	8,561	8,950
Part-Time Permanent 1/	10 (6.2)	8 (5)	8 (5)	371	324	340
11.3 Other Than Full-Time Permanent						
Temporary	61	56	53	2,434	2,710	2,696
Intermittent/Consultants	22	12	12	7	25	25
25.0 Other Services (Contracts for on-site personal services) 2/	14	6	2	194	40	41

1/ Number of individuals and full-time equivalent employment in ( ).

2/ Includes individuals whose services are obtained under contract performing on-site services (in agency workspace) for six months or more during a twelve month period.

Schedule F: Office of Technology Assessment Object Class 25.0 Service Contracts *(indirect employment)*

Type of service provided under contract	NUMBER OF CONTRACTS			DOLLARS ($000)		
	FY 93 ACTUAL	FY 94 ESTIMATE	FY 95 ESTIMATE	FY 93 ACTUAL	FY 94 ESTIMATE	FY 95 ESTIMATE
In House	10	2	2	194	40	41
Panel/Work Group	741	1,391	1,391	412	794	815
Research Contracts	303	229	229	2,722	2,109	2,166
NFC Services	1	1	1	19	20	21
Library of Congress	1	1	1	80	84	89
Purchase Orders	510	500	500	827	505	519
TOTAL*	1,566	2,124	2,124	4,254	3,552	3,651

* This includes the total number of contracts and the total dollars under object class 25.

Industry, Commerce, and International Security

10. Division A: Industry, Commerce, and International Security

1. Schedules A1, B1, and C1 for the Division

Schedule A1: Industry, Commerce, and International Security Division by Organization and by Object Class

CATEGORIES	FY 93 ACTUAL STAFF	FY 93 ACTUAL DOLLARS ($000)	FY 94 ESTIMATE STAFF	FY 94 ESTIMATE DOLLARS ($000)	FY 95 ESTIMATE STAFF	FY 95 ESTIMATE DOLLARS ($000)	NET CHANGE 94/95 STAFF	NET CHANGE 94/95 DOLLARS ($000)
1. Breakdown by Organization:								
Industry,Commerce, and International Security Division	60	8,215	60	8,290	60	8,576	0	286
Total	60	8,215	60	8,290	60	8,576	0	286
2. Breakdown by Object Class:								
11 Personnel Compensation		4,966		5,071		5,245		174
12 Personnel Benefits		1,079		1,177		1,227		50
13 Benefits to Former Personnel		8		1		1		0
21 Travel		129		109		120		11
22 Transportation of Things		16		23		24		1
23 Rent, Communications & Utilities		1		1		1		0
24 Printing and Reproduction		98		159		164		5
25 Other Services		1,734		1,551		1,593		42
26 Supplies and Materials		82		64		66		2
31 Equipment		102		134		135		1
32 Land and Structures								
42 Insurance Claims and Indemnities								
Total		8,215		8,290		8,576		286

Schedule B1: Industry, Commerce, and International Security Division
Analysis of Change to Budget Base by Organization and by Object Class

CATEGORIES	MANDATORY PAY AND RELATED COSTS		PRICE LEVEL CHANGES		PROGRAM TYPE CHANGES						TOTAL CHANGES	
					LEGISLATION		WORKLOAD		EQUIPMENT, ALTERATIONS, MAINTENANCE, REPAIRS, ETC.			
	STAFF	DOLLARS ($000)	STAFF	DOLLARS ($000)	STAFF	DOLLARS ($000)	STAFF	DOLLARS ($000)	STAFF	DOLLARS ($000)	STAFF	DOLLARS ($000)
1. Breakdown By Organization:												
Industry, Commerce, and International Security Division		224		62								286
Total		224		62								286
2. Breakdown By Object Class:												
11 Personnel Compensation		174										174
12 Personnel Benefits		50										50
13 Benefits to Former Personnel												
21 Travel				11								11
22 Transportation of Things				1								1
23 Rent, Communications & Utilities												
24 Printing and Reproduction				5								5
25 Other Services				42								42
26 Supplies and Materials				2								2
31 Equipment				1								1
32 Land and Structures												
42 Insurance Claims and Indemnities												
Total		224		62								286

Schedule C1: Industry, Commerce, and International Security Division
Detailed Analysis of Changes

	Calculation of Base	
	Staff	Amount ($000)
Appropriation, 1994	60	8,290
Adjustments to Appropriation		
Budget Base, 1995	60	8,290
	1995 Request	
I. Adjustments to Base	Staff	Amount ($000)
A. Mandatory Pay and Related Costs	...	224
1. Excess Day		(23)
2. FTE Reduction		(61)
3. January 1995 Cost-of-Living Adjustment		114
4. Merit Increases and Promotions		184
5. Health Benefit Cost Increases		10
B. Price Level Changes	...	62
1. Travel Related Inflation of 10%		11
2. Miscellaneous Transportation Inflation of 2.7%		1
3. Printing Inflation of 3%		5
4. Other Services Inflation of 2.7%		42
5. Supplies and Materials Inflation of 2.7%		2
6. Equipment Inflation of 2.7%		1
C. Program Type Changes		
1. Legislation	...	...
2. Workload	...	...
3. Equipment, Alterations, Maintenance, Repairs, Etc.	...	...
II. Net Increase/Decrease Requested	...	286
III. Total Appropriation Request, 1995	60	8,576

10.2 Explanation of Changes Shown on Schedule C1 for Division A

Industry, Commerce, and International Security Division

A. MANDATORY PAY AND RELATED COSTS	Staff	Amount (000)
1. Excess Day, from 261 to 260 work days in FY 1995		(23)
2. FTE reduction of 1 temporary staff to meet the 4% reduction in Sec. 307 of PL 103-69		(61)
3. January 1995 2.6% Cost-of-Living Adjustment		114
4. Merit increases and promotions averaging 3% agency-wide		184
5. Annualization of January 1994 4% plus estimated January 1995 7.5% health benefit increases		10
B. PRICE LEVEL CHANGES	Staff	Amount (000)
1. Travel inflation rate of 10% applied to base		11
2. Miscellaneous transportation inflation rate of 2.7% applied to base		1
3. Printing and publications inflation rate of 3% applied to base		5
4. Other services inflation rate of 2.7% applied to base		42
5. Supplies and materials inflation rate of 2.7% applied to base		2
6. Equipment inflation rate of 2.7% applied non ADP equipment base		1
C. PROGRAM TYPE CHANGES	Staff	Amount (000)
1. Legislation		...
2. Workload		...
3. Equipment, Alterations, Maintenance, Repairs, Etc.		...

10.3 Role of the Industry, Commerce, and International Security Division

The Industry, Commerce, and International Security Division comprises 5 research Programs: **Energy and Materials; Industry, Technology, and Employment; International Security and Commerce; Science, Education, and Transportation;** and **Telecommunications and Computing Technology.**

The **Energy and Materials Program (E&M)** is responsible for assisting the Congress in understanding the role of technology in developing energy and materials resources and the consequences of these developments for society. The Program helps the Congress progress toward rational resource development such that economic growth is maintained, undesirable side effects are kept to a minimum, and the resource base is sustained for future generations. The Program covers those technologies that concern the extraction, delivery, and the use of energy and materials. The Program also analyzes world energy and materials markets and policies, especially the implications of U.S. imports and exports of energy and materials.

The **Industry, Technology, and Employment Program (ITE)** examines how technology affects the ability of U.S. industry to contribute to a healthy national economy. This includes consideration of the competitiveness of U.S. industries in international markets; trade and economic development issues; the number and nature of employment opportunities in the U.S. economy; needs for worker education, training and retraining; and ways to ease adjustment in structural economic transitions. The ITE Program is concerned with the role of technology in examining the competitive position of both basic and new industries, with the development and dissemination of pre-competitive technologies, and with the quantity, nature, and quality of jobs in the U.S. economy.

The **International Security and Commerce Program (ISC)** deals with the role of technology in national security, exploration and commercialization of space, and international technology transfer. The Program's work in national security focuses on assessment of the likely impacts of technological considerations on national security, including international stability, terrorism, diplomacy, alliance relations, arms control, deterrence, and defense. Assessment of issues related to the nation's defense industrial and technology base is an increasing part of ISC's work. The Program's work on space involves a broad range of issues, such as space transportation, international cooperation and competition in civilian space activities, and other areas in which technological progress, civilian exploration, commercial uses of space, and national security must all be reconciled.

The **Science, Education, and Transportation Program (SET)** includes efforts focusing on the Federal government's in national transportation systems and policy; it includes a variety of efforts related to the Federal Government's role in maintaining the health of the U.S. scientific enterprise, especially allocation and decision methods available to the Congress to support and manage research and development; and, finally, the Program activities include a strong focus on the role of technology in enhancing learning in schools as well as in non-school educational systems.

The **Telecommunications and Computing Technology Program (TCT)** is concerned primarily with the changing role of telecommunications and computing technologies in the nation's industry, commerce, and government. The core responsibilities of the Program require monitoring the research and development of new information technologies and assessing the state of the art in these areas as well as the pace and direction of basic research and development. The Program also studies telecommunications regulation, information policy, and applications of information technology in the public sector.

10.4 Accomplishments of the Industry, Commerce, and International Security Division

In FY 1993, the Industry, Commerce, and International Security Division published 17 assessment reports:

- Industrial Energy Efficiency
- Access to Over-the Road Buses for Persons with Disabilities
- Defense Conversion: Redirecting R&D
- The 1992 World Administrative Radio Conference: Technology and Policy Implications
- Energy Efficiency Technologies for Central and Eastern Europe
- Who Goes There: Friend or Foe?
- Adult Literacy and New Technologies: Tools for a Lifetime
- The Future of Remote Sensing from Space: Civilian Satellite Systems and Applications
- Aging Nuclear Power Plants: Managing Plant Life and Decommissioning
- Proliferation of Weapons of Mass Destruction: Assessing the Risks
- Multinationals and the National Interest: Playing by Different Rules
- U.S. Telecommunications Services in European Markets
- Making Government Work: Electronic Delivery of Federal Services
- Protecting Privacy in Computerized Medical Information
- Energy Efficiency: Challenges and Opportunities for Electric Utilities
- Contributions of DoE Weapons Labs and NIST to Semiconductor Technology
- Pulling Together for Productivity: A Union-Management Initiative at US West, Inc.

The Division also published 10 background papers:

- U.S. Banks and International Telecommunications
- Data Format Standards for Civilian Remote Sensing Satellites
- Advanced Network Technology
- Development Assistance, Export Promotion, and Environmental Technology
- Accessibility and Integrity of Networked Information Collections
- Chemical Weapons Convention: Effects on the U.S. Chemical Industry
- Aircraft Evacuation Testing: Research and Technology Issues
- Potential Environmental Impacts of Bioenergy Crop Production
- Information Systems Related to Technology Transfer: A Report on Federal Technology Transfer in the United States
- Biopolymers: Making Materials Nature's Way

In addition, the Division testified 15 times.

Listed below are several examples of direct legislative use of the Division's work:

Energy and Materials

1. The project staff of the assessment *Green Products by Design: Choices for a Cleaner Environment* consulted extensively with staff of the House Science, Space, and Technology Committee in the preparation of legislation introduced in the 103d Congress to promote environmental technology research and development and exports. OTA staff also were consulted by the House Committee

on Energy and Commerce Subcommittee on Transportation and Hazardous Materials concerning toxic use reduction and reauthorization of the Resource Conservation and Recovery Act.

2. The OTA report, *Energy Efficiency Technologies for Central and Eastern Europe*, was released in July 1993, just before the Senate consideration of the bill on financial and technical assistance to the former Soviet Union. Senate staffers reported that it was useful background material for the portions of the bill dealing with energy matters.

3. The report, *Industrial Energy Efficiency*, was released in April 1993 at a hearing before the Subcommittee on Renewable Energy, Energy Efficiency, and Competitiveness of the Senate Committee on Energy and Natural Resources. The hearing focused on the potential for enhancing U.S. industrial competitiveness through energy efficiency and waste minimization technologies.

4. Based on the findings of the report *Energy Efficiency in the Federal Government: Government by Good Example?*, OTA interacted extensively with the Senate Committee on Governmental Affairs and staff of the House Energy and Commerce Subcommittee on Energy and Power in development of the Federal energy efficiency provisions of Public Law 102-486, the Energy Policy Act of 1992 (specifically, Title 1-Energy Efficiency, Subtitle F-Federal Agency Energy Management).

5. Many of the findings and options of OTA's report, *U.S. Oil Import Vulnerability: The Technical Replacement Capability*, were adopted in the Energy Policy Act of 1992. The Act contains extensive provisions for alternative vehicle fuels, alternative feedstocks, and improved energy efficiency. One option formed the basis of S. 1018 introduced by Sen. Bingaman and referred to Senate Energy and Natural Resources Committee to establish national energy policy goals. S. 1018 was incorporated into the Energy Policy Act of 1992 (EPACT). During legislative consideration of EPACT in the 102d Congress, the report was cited by House and Senate committees and in floor statements.

6. OTA's report, *Building Energy Efficiency* and the earlier report, *Energy Efficiency in the Federal Government: Government by Good Example?*, were used by the staff of the Subcommittee on the Environment, House Committee on Science, Space, and Technology, to assist them in preparation of comprehensive energy R&D legislation that became the R&D titles in the Energy Policy Act of 1992. Committee staff have reported that the building energy efficiency report was used during negotiations by House and Senate conferees.

7. OTA's report, *Electric Power Wheeling and Dealing: Technological Considerations for Increasing Competition*, was also cited extensively in the early legislative discussions and hearings in the House Energy and Commerce Subcommittee on Energy and Power affecting the regulation of electric utilities.

8. OTA staff were consulted by several House and Senate staff regarding legislative proposals aimed at removal of older cars from the U.S. fleet as a result of the report *Retiring Old Cars: Programs to Save Gasoline and Reduce Emissions.*

9. During the course of the OTA assessment *Renewable Energy Technology Research Development, and Commercial Prospects*, OTA project staff were consulted by congressional committee staff in connection with hearings, and draft legislation on renewable energy issues. For example, OTA provided background information on hydrogen energy systems to minority staff of the House Committee on Science, Space and Technology, Subcommittee on Energy, for use in drafting H.R. 1479, the Hydrogen Future Act of 1993.

10. During preparation of the OTA background paper, *The Environmental Impacts of Bioenergy Crop Production*, OTA project staff assisted the staff of the House Committee on Energy and Commerce, Subcommittee on Energy and Power with suggestions for potential witnesses, issues, questions and background materials for hearings on the potential role of biomass energy systems to sequester carbon or offset fossil energy carbon emissions to reduce the greenhouse effect.

11. Building on the findings of OTA work on the biological effects of electromagnetic fields completed in the course of the assessment, *Electric Power Wheeling and Dealing: Technological Considerations for Increasing Competition*, and the background paper, *Biological Effects of Electromagnetic Fields*, throughout the 102d Congress OTA staff were consulted by staff of the House Committee on Science, Space, and Technology as they drafted legislation on federal research efforts on biological effects of electric and magnetic fields (EMF) and on the appropriate level, scope, and structure of federal research efforts.

Industry, Technology, and Employment

1. Legislation from both the House and the Senate—HR. 1432 and S. 473—reflect policy options from *Defense Conversion: Redirecting R&D* dealing with modifying the initiation and management of CRADAs (cooperative research and development agreements). Further options from this assessment, addressing CRADA management and reorganization of the DoE weapons labs, were incorporated into the defense authorization bills. Specific language in the bills can be traced to the report and to staff briefings of the House Armed Services Committee, the House Science, Space and Technology Committee, and the Senate Energy Committee.

2. *After the Cold War: Living with Lower Defense Spending* was relied upon heavily in the Defense Authorization and Defense Appropriations Acts for Fiscal Years 1993 and 1994. The FY 1993 Acts included extensive provision and funding for defense conversion programs, implicitly adopting definitions and structures proposed in the report.

Congress passed the Defense Authorization and Defense Appropriations Acts for Fiscal Year 1993, which included extensive provision and funding for defense conversion programs. The bills implicitly adopted the broad definition of defense conversion presented in *After the Cold War*, which emphasized investing in technological advance and economic growth at the community, regional and national levels, rather than focusing efforts on plant-level conversion. The bills also adopted the framework for conversion programs proposed in *After the Cold War*, which included programs for transition assistance for workers and communities for the short term, and longer term programs for technology diffusion and government-industry partnerships for development of commercial technologies.

3. In preparing the FY 1994 legislative package for defense conversion, the Senate Democratic Defense Conversion Task Force asked OTA to coordinate a series of three briefings, bringing in outside speakers and conducting workshops to identify major issues. The workshops addressed base property disposal, environmental assessment and cleanup at bases, and federal community development assistance. The workshops, and a detailed memo based on them and on *After the Cold War* prepared by OTA, led Senators Pryor and Bingaman to praise OTA and its staff (by name) when they introduced the Report of the Task Force on Defense Reinvestment as "instrumental in helping the task force develop these recommendations" and providing "invaluable assistance in preparing these recommendations."

4. Based on OTA's work with the Senate Democratic Defense Conversion Task Force (see #3), Senator Pryor submitted an amendment (cosponsored by a number of other Senators) to the FY 1994 DoD Authorization bill dealing with federal policies for easing adjustment to base closures and defense industry closures. Virtually all the components of the amendment stemmed from *After the Cold War* and OTA's work with the Task Force. The provisions included: expedited interim leasing of bases, expedited environmental cleanup, moratoria on removal of certain types of base property, greater participation of affected communities in DoD policy making, and policy allowing DoD to sell bases at less than full market value.

5. Based on *After the Cold War*, OTA provided Congressman Wise, Chairman of the Subcommittee on Economic Development of the Public Works Committee, with information and guidance for a directory of economic development programs for defense conversion that the Committee intends to publish as a Committee document. OTA also wrote a short memo discussing problems communities are likely to face when dealing with defense cutbacks, particularly base closures, as background for, or as inclusion into, the Committee's report.

6. T*rade and Environment: Conflicts and Opportunities* was deemed the major centrist piece on the topic by a representative of the International Trade Commission. Groups as diverse as the Center for International Environmental Law, the Council on Foreign Relations, the National Science Foundation, the National Security Council, and the State Department Transition Team have used this background paper as core material for their meetings and work. EPA managers have also relied on the information in the report, as have officials in the states. The Office of the U.S. Trade Representative routinely recommends this report to callers who want to understand trade and environment issues.

7. *Trade and Environment* and the second background paper on international industrial competitiveness and the environment, *Development Assistance, Export Promotion, and Environmental Technology*, combined with briefings on ongoing work, provided information and ideas for congressional committees working on S. 1074, a bill to promote U.S. environmental exports, and S. 978, the National Environmental Technology Act of 1993. For example, OTA work helped the committees working on S. 1074 in defining the role of proposed regional environmental export centers.

8. Vice President Al Gore, in *From Red Tape to Results: Creating a Government that Works Better & Costs Less* (Report of the National Performance Review, September 7, 1993) quoted from *After the Cold War* in his comments on Job Training Partnership Act:

> "When Congress enacted JTPA, it sought to avoid such problems. It let local areas tailor their training programs to local needs. But Federal rules and regulations have gradually undermined the good intentions. Title III, known as the Economic Dislocation and Worker Adjustment Assistance Act (EDWAA), helps states respond immediately to plant closings and large layoffs. Yet even EDWAA's most flexible money, the 'national reserve fund,' has become so tangled in red tape that many states won't use it. As Congress's Office of Technology Assessment put it, 'the process is simply too obstacle ridden. ... many state EDWAA managers cannot handle the complexities of the grant application, and those that do know how are too busy responding to clients' urgent needs to write demanding, detailed grant proposals.'"

9. *U.S.-Mexico Trade: Pulling Together or Pulling Apart?* has become a primary source of comparisons on production costs in the two countries, notably for the automobile industry. The report's cost estimates have been extensively cited by Members of Congress, by the Administration, and in the press. The report is considered a primary resource by the Economic Policy Council (EPC) of the United Nations Association of the USA, co-chaired by Paul Allair, Chairman and CEO of Xerox, and Jack Sheinkman, President of the Amalgamated Clothing and Textile Workers. Many direct quotations and discussions based on the Mexico report have been included in Member statements, in position papers and testimony by advocacy groups (both pro-NAFTA and anti-NAFTA, and in the press. As a result, it seems fair to say that the analysis in *U.S.-Mexico Trade* helped shape the public debate on NAFTA, particularly through its focus on the need to prepare the U.S. work force for future competition. The report also influenced the U.S. negotiating position on the side agreements, which the three governments began to discuss shortly after the report was issued.

10. In drafting amendments to S.4 designed to improve State and Federal industrial extension services, the Senate Commerce Committee drew on findings from OTA's *Worker Training* and *U.S.-Mexico Trade* reports. Currently State and Federal industrial extension services focus primarily on hardware, and give little attention to how work is organized and workers are trained to use the new technology. The amendments to S.4 incorporate into the bill a major theme of *Worker Training* by specifying that industrial extension services explicitly address the organization of work.

11. In the 1993 Energy Policy Act (Sec. 2108) Congress directed DoE to prepare and submit to it a study that identifies technologies that significantly reduce waste and energy usage. Based on *Serious Waste Reduction* and on files and contacts for the ongoing assessment of American Industry and the Environment, OTA assisted DoE to scope the issues and technological opportunities.

12. Senator Moynihan, as Chairman of the Senate Finance Committee, wrote the Chairman of the International Trade Commission requesting the Commission to collect and analyze information on the competitiveness of U.S. industries producing environmental goods and services. In establishing the rationale for the request, Senator Moynihan wrote: "Recent reports prepared by the Office of Technology Assessment at the request of the Committee have highlighted the emerging market opportunities for U.S. exporters of [environmental technology] goods and services. The OTA reports have also underscored the need for better data about the extent to which U.S. competitors are involved in export promotion of their environmental goods and services." The reports referred to are *Trade and the Environment: Conflicts and Opportunities* and D*evelopment Assistance, Export Promotion and Environmental Technology*.

13. OTA participated on a review panel of DoD's Office of Economic Adjustment state planning grant program to review over 20 state proposals for defense conversion funds. The state program was created by Congress in the FY 1993 DoD Authorization Bill, in part in response to policy option in *After the Cold War* discussing the need for states to do more in the area of conversion and to be more proactive in acting before layoffs occurred.

14. The OTA Background Papers *Development Assistance, Export Promotion, and Environmental Technology* and *Trade and Environment: Conflicts and Opportunities* played a role in shaping President Clinton's export policy, and was helpful to the Trade Promotion Coordinating Committee (TPCC) in preparing its report to Congress. TPCC is an interagency advisory group, and its members say the two OTA background papers were extremely useful to their work. President Clinton asked the Commerce Department to direct another interagency group to formulate an environmental export and environmental technology strategy; members of this body have used and praised the

OTA background paper; they also met with OTA to seek input. The background papers were also used by Eximbank, AID, the Commerce Department, and the U.S.-Asia Environmental Partnership. The Environmental Business Council of the United States and the Environmental Technology Export Council, two major environmental industry associations, have used the OTA reports in their work; the president of one of the organizations cited *Development Assistance* as required reading in the field.

International Security and Commerce

1. On June 16, 1993, OTA staff briefed staff of the Senate Committee on Governmental Affairs on the contents of *Proliferation of Weapons of Mass Destruction: Assessing the Risks*, the first report of the current nonproliferation study. Particular attention was paid aspects touching upon two bills submitted by Senator Glenn and Representative Lantos on nuclear nonproliferation topics and may contribute to actions during markup of the Omnibus Nuclear Proliferation Control Act of 1993, and the Nuclear Export Reorganization Act, both offered by Senator Glenn. The definition of "nuclear explosive device" in the prospective legislation was changed to avoid capturing things such as nuclear reactors that are clearly not bombs.

2. OTA staff testified before the House Committee on Science, Space, and Technology on remote sensing on May 6, 1993, connected with the release of the OTA report, *The Future of Remote Sensing from Space: Civilian Satellite Systems and Applications*. The testimony was used as input to the drafting of H.R. 2200, which cited the OTA report. This study agreed that NASA's Earth Observing Program should include more observations from small satellites and from unpiloted air vehicles.

3. OTA staff testified before the Senate Subcommittee on Defense Technology, Acquisition, and Industrial Base of the Committee on Armed Services in May 1993 on acquisition and the defense industrial base. This testimony affected the drafting of the Defense Authorization Act of 1994.

4. On April 22, 1993, OTA staff briefed House Science, Space, and Technology Committee members and staff about OTA's report on the space station. This information was used as input in committee deliberations on H.R. 2200.

5. Also in September, OTA released its report, *The Future of Remote Sensing from Space: Civilian Satellite Systems and Applications*, at a briefing in the hearing room of the House Space Subcommittee, attended by staffers from several committees. The report language of H.R. 2200 includes reference to OTA's option in its study, which support the acquisition of data from unpiloted aircraft and other inexpensive means of data acquisition.

6. Testimony related to OTA's report, *Cooperative Aerial Surveillance in International Agreements*, was cited by Senator Pell in his speech recommending ratification of the Open Skies Treaty, which was accomplished on August 6, 1993.

7. In October 1992, OTA staff submitted a statement for the record to the Subcommittee on Technology and Competitiveness of the House Committee on Science, Space, and Technology, which substantially affected the final language of the National Aeronautical Research and Competitiveness Act.

8. On January 15, 1993, OTA staff briefed eighty officials from the Executive Branch (including such agencies as the Departments of Commerce, Defense, Treasury, and Labor) on issues related to the defense technology and industrial base. The briefing was founded on the OTA study on the

topic, *Building Future Security: Strategies for Restructuring the Defense Technology and Industrial Base*, and affected Defense Department actions in implementing relevant provisions in the Defense Authorization Act of 1993.

9. OTA staff briefed defense technology and industrial base issues to the Army Science Board Study Group on March 3, 1993. This briefing affected Defense Department policies on acquisition issues.

10. On January 21, 1993, OTA staff discussed shipbuilding strategies by the U.S. Navy with Representative Taylor and staff of the House Armed Services Committee staff. This affected the language of the Defense Authorization Act of 1994 regarding the National Shipbuilding Initiative.

11. OTA staff briefed staff of the House Science, Space, and Technology Committee on its background paper on orbital debris. OTA's work was eventually used in the drafting language for the committee's authorizing legislation (H.R. 2200) to require a report from the Administration on its progress in developing an international plan to reduce production of new orbital debris.

12. On May 26, 1993, and August 3, 1993, OTA staff met with Senator Dodd's staff on the possibility of demilitarizing Soviet submarines, using money from the Nunn-Lugar Amendment, and performing the work in the United States. Probably as a result of these discussions, the idea was abandoned.

13. Also in September, OTA released *Proliferation of Weapons of Mass Destruction: Assessing the Risks* at a press conference held by Senators Pell and Glenn. The report will affect outcomes of the Omnibus Nuclear Proliferation Control Act of 1993, the Nuclear Export Reorganization Act of 1993, the forthcoming revision of the Export Administration Act, and the ratification vote for the Chemical Weapons Convention.

Science, Education, and Transportation

1. OTA staff briefed Senator Harkin's staff about R&D support for accessibility technologies on over-the-road buses, as a preliminary to congressional rethinking of issues surrounding over-the-road bus service to rural areas.

2. *Testing in American Schools* changed the debate in Congress over educational standards and shifted the focus from mandatory to voluntary standards and assessments.

3. OTA education staff provided direct support and briefings for members working on legislation to provide greater access by schools to computer and telecommunications technology.

4. In H.R. 89, the Technology Education and Assistance Act of 1993, the legislative language draws extensively on both *Power On!* and *Linking for Learning*.

Telecommunication and Computing Technologies

1. OTA's 1988 report *Informing the Nation* was used in the debate leading up to enactment of the Government Printing Office Electronic Information Access Act of 1993, Public Law 103-40.

2. OTA's 1988 report *Informing the Nation* and 1990 report *Helping America Compete* were used as background by the Administration in preparing the National Performance Review and National Information Infrastructure reports and the revised OMB Circular A-130, Management of Federal Information Resources.

3. OTA's 1991 report *Automated Record Checks of Firearm Purchasers* was used by the congressional leadership in formulating legislative proposals for consideration by the 103rd Congress.

4. OTA's 1991 report *The FBI's Automated Fingerprint Identification Program* was used by the FBI and the Department of Justice in implementation of the automation program.

5. OTA's ongoing study of the Social Security Administration automation program was used by the SSA in developing strategic planning, electronic delivery, and reengineering initiatives.

6. S.4, calls upon NIST to respond to OTA's report Global Standards.

10.5 Changes in Prior Plans for FY 1993 for the Industry, Commerce, and International Security Division

During Fiscal Year 1993, the Industry, Commerce, and International Security Division essentially accomplished its goals, with approved modifications and additions to meet the changing needs of Congress. These changes reflect the inherent uncertainty of research and the attendant need to be able to make adjustments.

10.6 FY 1994 and FY 1995 Priorities for the Industry, Commerce, and International Security Division

A Division's work is determined by the expressed needs of congressional committees, so we cannot safely predict an agenda, but an illustrative list of subjects that are representative of the kinds of new assessments that we may be asked to undertake can be prepared. Such an exercise, using a wide variety of information sources, helps sharpen the discussions between OTA staff and congressional committees. It also reflects one of the charges Congress assigned to OTA: foresight about emerging technology. Of course each Division can undertake only a few new assessments each year, so this list should be viewed only as representative of potential subjects for the assessments that the Industry, Commerce, and International Security Division may be asked to undertake in Fiscal Years 1994 and 1995. Because OTA works hard to be responsive to changing Congressional needs, new work is often significantly different from OTA's prospective list, but it usually does contain some of the identified issues.

Energy and Materials

Energy Research and Development: Meeting the Nation's Needs

The U.S. Department of Energy spends about $5 billion annually on its energy program research and development activities. Given the diverse nature of DoE's energy R&D portfolio and of the nation's energy needs, it is a difficult task for Congress to determine which projects represent a high priority use of Federal funds. Often, the relationship between DoE's R&D activity and commercial energy needs is unclear. For example, while a rapidly changing external environment has increasingly focused the nation's energy efforts on improving energy efficiency, efficiency accounts for under 5% of the energy R&D spending in DoE's program. Similarly, while coal provides over half of the nation's electricity supply, less than 3% of DoE's energy program R&D

targets improved coal technologies. This project will examine the basis for present R&D funds allocation, evaluate alternative approaches for Congress and DoE to allocate energy R&D funds, and provide options for allocating energy R&D funds so as to help meet the nation's mid- and long-term energy needs in an economic, secure, and environmentally sound manner.

Materials Flow in a Sustainable Society

Making the transition from the consumer society of today to a more sustainable society in the future will require management of net flows of materials through the economy. Policies to achieve this are now being debated in Congress and around the world, and include specifying recycling rates for discarded materials and making manufacturers responsible for their products at the end of their useful lives. These policies have significant implications for U.S. industry at every stage of the materials life cycle, from extraction of raw materials to the management of solid waste. For example, domestic producers of virgin materials such as steel, glass, and paper are likely to face reduced demand as more materials are recycled. Recycling and waste reduction would in turn create new business opportunities and technical challenges. This study would examine the implications of such policies for materials suppliers, manufacturers, consumers, and waste management providers, and identify options Congress may wish to consider in the reauthorization of the Resource Conservation and Recovery Act or enactment of new legislation.

Implementation of Energy Efficient Alternatives to Private Vehicles

Over two-thirds of U.S. oil use is for transportation and the bulk of that is used for moving people in private automobiles and light trucks. Recently enacted laws (Clean Air Act Amendments of 1990 and Intermodal Surface Transportation Efficiency Act of 1991) promote more energy efficient alternatives to traditional private vehicles, including mass transit, demand management, and alternative fueled vehicles. Yet many technical, institutional, and other issues remain which may slow implementation of these options. Building on the work done by OTA on transportation efficiency, this study would consider longer-term demographic and structural economic issues and their effects on transportation demand and technologies. The study would also go farther than past analyses in evaluating implementation of specific options, notably transit (which has a mixed historical record of cost-effectiveness) and demand management (which lacks empirical evidence of effectiveness).

Plutonium as Fuel for Commercial Power Reactors

It is likely that some of the plutonium from dismantled nuclear weapons in the U.S. and Russia will no longer be needed to support nuclear weapon stockpile requirements. Alternatives for disposition of weapons plutonium include long-term storage, disposal as waste, and conversion for use in commercial power reactors. While the use of weapons surplus plutonium in the U.S. is unlikely in the near term because of economic, regulatory and public acceptance factors, such use may be considered in other nations, thus raising proliferation issues of concern to Congress. This study would build on the work done in the OTA report "Dismantling the Bomb and Managing the Nuclear Materials" and examine the prospects for using surplus plutonium from weapons materials in commercial power reactors outside the U.S. Technologies and facilities in France, Japan, Germany, as well as R&D being conducted in the U.S., would be examined for applicability to

commercial reactor use of weapons plutonium. The study would focus on the technical, institutional, and economic issues associated with the use of plutonium as fuel for commercial power reactors, with particular emphasis on proliferation concerns.

Multiple Resource Management of Federal Lands and Resources

More than one-third of the Nation's land and even more of its mineral wealth are publicly owned. Under Federal land management laws, many Federal lands are to be administered under principles of multiple use; for example, balancing resource development with recreation, protection of wildlife and habitat, and watershed preservation. Recurring issues of congressional interest include the efficacy of measures designed to assure resource protection and restoration, and whether the public receives a fair return for development of its resources. This study would look at the adequacy and effectiveness of natural resource land management and planning requirements, and how they are implemented by Federal land managers. It would aid congressional committees in their ongoing consideration of reforms to the General Mining Law of 1872 and authorization for the Bureau of Land Management.

Energy Use and Urban Infrastructure

The urban form strongly influences many urban issues such as energy use, pollution, and infrastructure requirements. A variety of modern technical systems, including energy distribution, transportation, and communication networks converge in cities. Federal policies play an important role in funding and shaping both form and technical systems, both through direct payments (such as grants and subsidies) and indirectly through taxes. An OTA study could address the impact of urban form and urban technologies on energy use and on related urban infrastructure issues.

Industry, Technology, and Employment

Technology Policy

Technology policy in the United States rests on a foundation laid five decades ago. It served us well when the United States was by far the dominant power in international competition. Now, however, it is clear that technology policies that improve not only research and development but technology diffusion, adaption and physical and human infrastructures have been more effective in many ways than ours.

ITE work has addressed this question before, but never head-on. This assessment would examine how we might change the foundations, principles and practice of technology policy in the United States to serve future needs. The assessment would entail some examination of what kind of nation the United States thinks it is, and wants to be. Significant fractions of the population do not meet minimum standards of literacy, and many business sectors have trouble coping with 20th century technologies, not to mention those of the 21st century. How can we use technology policy to deal with not only the Silicon Valleys, but the Monongahela Valleys, or is technology policy even an appropriate vehicle? Improvements in the practice and delivery of education and medicine could have profound impacts on standards of living and (though indirectly) on competitiveness. Yet educational technology and medical technology have never been accepted as orbiting the same sun as technology policy.

Technology, Job Mobility, and Adjustment Policies

New technologies are not only increasing productivity in both manufacturing and services, but changing the nature of tasks and jobs. Increased productivity leads not only to higher living standards overall, but to lost jobs and job opportunities. In the light of increased global competition in most manufacturing sectors, and intensifying competition domestically in such service sectors as telecommunications, firms have little choice but to apply new technologies and new forms of work organization to raise productivity and lower their costs of doing business. But there is no guarantee that the new business a firm generates by lowering costs and improving its products and services will enable it to avoid laying off workers. None of this is new. What is new is the increasingly pervasive nature of job dislocation, which now affects white and blue collar worker alike, and the highly educated as well as the uneducated. In the past, causes of dislocation could be thought of as episodic: the decline of the Rust Belt, the end of the Cold War, a recession, NAFTA. In the future, few people will be immune over a lifetime of work from periods of dislocation and/or reeducation for a transmuted job.

Drawing on past and ongoing ITE work, this assessment will test the hypothesis presented above of endemic dislocation for both manufacturing and service sectors. The assessment will explore policies to mitigate the level and types of dislocation that can be expected, including government and industry policies for education and training, portable pensions, alternate lengths of the work-week, internal labor buffers and job creation (including community service jobs.) Technology's potential role in creating a more flexible workforce would be explored—e.g., training/retraining technologies, information technologies for job search, and telecommuting as an alternative to relocation.

Technology Transfer to the United States

Some countries, such as Japan and South Korea, have pursued explicit strategies to encourage the acquisition, diffusion and improvement of technology developed abroad. These activities have contributed greatly to their economic growth. The evidence suggests that far more technology flows out of the United States than enters our country from abroad. In recent years the U.S. Government has introduced several programs to encourage study abroad and awareness of science and technology developed outside the United States. However, these programs are limited in size, scope and influence. Consequently, technology transfer into the United States is driven largely by the interests of individual firms, which may not be comprehensive enough to ensure strong technical capability across industries and their supplier bases.

This assessment will describe the mechanisms by which technology flows into and out of the United States, and will attempt to measure the flows. The assessment will examine both public and private sector technology acquisition in the U.S., the EC and Japan, and will assess the effectiveness of existing programs being conducted by the U.S. government, academia and the private sector. It will examine how the U.S. government might develop and implement a strategy and policies to ensure the rapid acquisition and diffusion of technology from abroad into the economy of the United States.

Technology and Trade with Developing Economies

With the recent decline of traditional forms of development assistance, many lesser-developed nations may find themselves falling further behind the developed economies. Advances in flexible

automation and new product design, by reducing the direct labor content in manufactured goods, reduce the competitive advantage of low-cost labor and make these countries less attractive to investment by multinational corporations (MNCs). In order to improve their prospects for industrialization, these nations will have to develop the workforce and organizational skills necessary to operate advanced production systems that will enable them to manufacture world-class products. Because development requires exporting, the U.S. market will continue to be a target for goods from developing countries, even as development opens up new and expanding markets for U.S. producers. As the NAFTA debate illustrates, the consequences include continuing protectionist pressures and recognized needs for adjustment policies for U.S. workers.

Congress is currently considering new foreign aid policies that reflect changes in the global political and economic environment. This assessment would build upon ITE's past work *U.S.-Mexico Trade: Pulling Together Or Pulling Apart?* by exploring policies to encourage productive investment by MNCs and by local sources, create human capital and institutional capabilities for technology development, and deliver turnkey packages of affordable education, transportation, health, and environmental protection amenities.

Cleaner Manufacturing Technologies and U.S. Manufacturing Competitiveness

This assessment will build on the recently completed assessment *Industry, Technology and the Environment: Competitive Challenges and Business Opportunities* to analysis in depth the effects of cleaner and more energy efficient technologies on U.S. competitiveness. The assessment will examine the extent to which new process technologies that are more energy efficient and/or environmentally beneficial such as powder coating paints, direct steel making, no clean soldering and dry process vacuum coatings can lower costs or improve quality. In addition, it will examine how the relationship between the practices related to cleaner technology, such as workforce participation and training, focus on reduced defects and better maintenance, and continuous improvement of the production process affect firm competitiveness. The assessment will analyze the extent to which demands for cleaner technologies speed up overall industry modernization.

The assessment will analyze the degree to which U.S. firms have adopted leading edge cleaner technologies, particularly as they compare to U.S. industry leaders and foreign firms. The assessment will identify barriers to faster adoption, and will examine the effectiveness of both U.S. and foreign government policies to develop and diffuse clean and energy efficient manufacturing process technologies.

Industrial Cooperation and Economic Competitiveness

Technological innovation increasingly relies on tacit and explicit cooperation, not only between industry and government but also between competing firms in the same industry. This project will assess various forms of cooperation and seek to understand the implications of cooperative strategies on innovation and the competitive strength of national economies. In terms of interfirm cooperation, there is apparently a strong geographical element to innovation, as evident in the concentration of high technology industries in regions such as Silicon Valley, Route 28, and Triangle Park. At the same time, the generation and diffusion of knowledge has become increasingly borderless as competing firms collaborate to develop, produce, and market key technologies on a global scale. What forms of cooperation are becoming more or less relevant to the US and other industrial economies?

This assessment will compare industries that exhibit different types of cooperation. For example, the tension between regional economies and international market pressures in the semiconductor industry could be compared to patterns of cooperation and innovation in other industries, such as biotechnology and various types of advanced communications technologies. A similar cross-sectoral approach will be taken to understand the implications of different forms of cooperation between industry and government, in the U.S. and in our major competitors, such as government-sponsored R&D consortia.

International Security and Commerce

International Cooperation and Competition in Space

The space programs throughout the world are under severe financial stress, which has led to renewed cries for vastly increased international cooperation. However, in the United States, interest in enhanced international cooperation is mixed with concern over the U.S. ability to compete in the global marketplace. This project will summarize developments worldwide and weigh the prospects for cooperation and the dilemmas of competition. For example, while it may be in this Nation's interest to maintain its historic lead in human space flight, it might make equal or better sense to develop an international plan for space exploration that clearly outlines the roles for all space-faring nations. For example, the United States might provide the basic manned vehicles, while ESA and Japan supply orbital and colonial habitats and the Soviets, France, and China handle surplus (unmanned) payload launches.

The project would focus especially on prospects for cooperating with the Russians. The Clinton Administration has decided to embark on cooperative efforts on a space station in order to provide an avenue for giving Russia aid and to generate closer political ties with the country. This assessment would analyze the Clinton proposal in light of the cooperative program already under way with Canada, Europe, and Japan. Among other things, it would examine the concept of closer cooperation with Russia in space, and how such cooperation is likely to affect relations with our other partners. It would look beyond the space station to cooperative ventures in remote sensing and in space transportation.

Finally, the assessment would examine the competitive position of the United States vis-a-vis other nations and suggest options for improving our cooperative arrangements while improving or maintaining our competitive position.

Multilaterial Monitoring and Verification

Multinational approaches to verifying compliance with treaties limiting nuclear, chemical, and other weapons are becoming increasingly important as arms control moves away from the narrow bilateral focus of the Cold War era. Recent examples of multilateral agreements include the CFE Treaty and the Chemical Weapons Convention; even the START treaty originally negotiated by Washington and Moscow has been multilateralized with the breakup of the Soviet Union. An uncharted regime for verification, but one likely to grow in importance, is verification of international environmental treaties. Historical precedents for multilateral monitoring and verification activities include the post-war Western European Union created to monitor German disarmament, the International Atomic Energy Agency (IAEA), and the United Nations Special Commission on Iraq (UNSCOM).

Possible future arrangements for multilateral monitoring and verification cover a variety of options, ranging from a primarily national to a fully internationalized approach. The list includes (1) sharing or exchange of national monitoring data with other countries; (2) coordination of national monitoring activities; (3) multilateral monitoring regimes under the auspices of a regional security organization; and (4) a centralized UN verification agency that would monitor several multinational treaties and might be equipped with its own satellites and other monitoring systems.

The proposed OTA study would assess the benefits and costs to the United States — political, military, and economic—of these various forms of multilateral verification. Specifically, the study might analyze the following issues: pros and cons of sharing verification tasks with other countries; reliance on national vs. multinational monitoring assets (e.g., satellites and surveillance aircraft); arrangements for multilateral surveillance and data-sharing; multilateral data interpretation and verification analysis; new technologies and procedures needed to monitor environmental treaties; dealing with problems of illegal intelligence collection in attempts at concealment, camouflage, and deception; and implications of multilateral verification for U.S. and international security.

Multilateral Peacekeeping and the U.S. Military

U.S. involvement in Somalia, and the debate over the lack of U.S. involvement in Bosnia, are the most immediate reminders of what may become a major new mission for the U.S. military: participation in international peacekeeping or peace-making operations. The explosive growth in UN peacekeeping operations around the world in recent years, together with the even more rapid growth of regional conflicts that are now underway without any attempts at international peacekeeping, point to the importance of this topic.

An OTA study of peacekeeping/peace-making would point out what changes would be required to U.S. military forces, materiel, and doctrine, as well as in the structure and operation of the United Nations (particularly its command structure for peacekeeping operations), in order for the United States to take a more effective role in such operations. It would draw the distinction between peacekeeping and peace-making, and between unilateral and multilateral operations; it would also address requirements for intelligence support and intelligence sharing.

Theater Missile Defense

The redirection of SDIO to BMDO has left missile defense a major part of defense R&D, but now oriented towards land-based, tactical ballistic missile defense. Many nations other than the five official nuclear powers have short- to intermediate range ballistic missiles (up to 2500 km). In some cases, this capability is coupled with a nuclear weapon program. The combination of missile with nuclear (or, for that matter, biological) weapons would represent a serious threat to US interests overseas in terms of regional security, threats to US allies, and, possibly, to US troops or UN peacekeeping troops deployed overseas. Further, in the near- to mid-future, more nations may acquire short- to intermediate-range cruise missiles (some, like Iran, have apparently already purchased them), which pose a different mode of threat to the US and its interests.

One means of counterproliferation is to pre-emptively strike the adversary's nuclear capability, eliminating it. Unfortunately, it may not always be possible to do so. Another means which must be explored is to provide defenses against an incipient missile-delivered nuclear weapon threat, ballistic or cruise. The problem may or may not be susceptible to solution. In the recent past, strong political feelings were attached to ballistic missile defense; fortunately, such passions have waned.

Further, little work appears to have been done in the area of cruise missile defenses. A dispassionate look at the technical aspects of the issue would now be politically practical and, moreover, extremely useful to the future development of US military R&D policy. It is relevant that BMDO work still represents a large fraction of DoD R&D.

The report would examine technologies that may be appropriate for defense against short- or intermediate-range ballistic missiles and cruise missiles. These technologies would include space-based interceptors, ground-based endo- and exo-atmospheric interceptors, and directed energy. Estimates would be provided of the likely dates for and costs of deployment of weapons based on the above technologies. Further, the robustness of each system against plausible countermeasures would be analyzed. On a policy level, the report would analyze the stabilizing or destabilizing nature of such systems and alternative options against the threat, such as pre-emption, embargoes, or other organized international sanctions against an offender.

The Future Structure of U.S. General Purpose Forces

With the collapse of the Warsaw Pact, the Nation's security environment has undergone a revolutionary change. The world is a less threatening place for the United States but the potential military challenges that remain are less predictable and more diffuse. The size and character of Soviet military power has affected virtually every U.S. force planning decision since the end of the Second World War. With the decline of the Soviet threat, the structure of U.S. forces overall and the optimal performance of individual weapons need complete review. The changed security environment and domestic financial pressures will ensure that U.S. military forces will get smaller, but what their composition and strength ought to be is not yet clear.

This assessment will examine future potential military threats to the United States by region, the potential missions for U.S. forces, and the range of possible force structures and weapons technologies needed to fulfill those missions. Fiscal realities, existing military inventories, and lessons learned from the Persian Gulf War will inform the discussion, as will the Bottom-Up Review. Rather than limiting the discussion to each military Service's role and how it might change, the assessment will consider how military objectives on the ground, on and under the sea, and in the air can be best achieved. Land forces currently emphasize heavy armor designed for great tank battles in Central Europe but used effectively in the deserts of Iraq. The design of future land forces must compare the power of heavy armor forces and the importance of rapid deployment. Air forces were used to great success in the Gulf War, but are becoming increasingly costly. Future air forces in each of the Services will face a choice between a larger number of upgraded older aircraft and fewer, state-of-the-art aircraft. The United States will continue to be a maritime nation with the need to maintain access to the sea world-wide, but the naval forces arrayed against the United States have changed. While the Russians still have enormous capability, particularly in submarines, regional navies are becoming relatively more important. Thus, for example, the United States will need to increase efforts in shallow water anti-submarine warfare, perhaps using active instead of passive sonar. At the same time that the Nation's primary threats are changing, technology races ahead in many areas important to military capability. The performance of U.S. weapons in the Persian Gulf concentrated public attention on "high-tech" weapons although much of the technology is already a couple of decades old. Many of the weapons needed for future power projection missions will require information-intensive surveillance, target tracking, navigation, and communication made easier by on-going developments in technology. The military Services are adjusting to

this new security environment, but primarily on an ad hoc basis. Priorities have not been established on where limited resources should be concentrated. The defense technology and industrial base is growing weaker as it fights for fewer procurement dollars. This assessment will offer Congress a series of alternative futures and indicate the consequences of choosing among them.

Aerospace Industry Study

The aerospace industry is important to both defense and the economy. The industry ranked sixth in total shipments from a U.S. industry in 1991, fourteenth in employment, and was the Nation's leading exporter of manufactured goods ($43 billion in 1991). It also accounted for 25% of the Nation's R&D expenditures. The sector produces weapons that have provided the United States a technological edge in both deterrence and war. The sector consumes a significant portion of the U.S. defense budget. The industry is faced with both a civilian and military recession in purchases. The United States is also being challenged in some sectors (commercial aircraft, space launch, etc.). There are questions about the ability of the country to maintain its lead in important sectors and to continue to develop and field advanced systems in the future.

Congress and the Executive Branch have shown an interest in the aerospace industry. There is interest among those in the defense committees and on other committees. There have been several studies of the aerospace industry. The Air Force is currently sponsoring a 3-year study focused on applying lean manufacturing concepts to the military aircraft industry.

The International Security and Commerce Program might conduct an assessment of the aerospace industry aimed at assisting Congress in considering future civilian and defense funding decisions, and legislation aimed at promoting the industrial sector. Issues include: R&D directions and funding, international cooperation, industry support, worker availability, military needs, global industry trends. The objectives of the assessment would be to (1) identify future global commercial market, defense needs, and global suppliers, (2) identify potential U.S. alternatives for meeting commercial and defense needs, (3) consider congressional alternatives to support U.S. initiatives. The assessment would include some force structure analysis, some commercial analysis, and some international assessments.

Science, Education, and Transportation

School to Work Transition

A major question facing Congress concerns the transition of youth from school to work. Most public investment in youth has been directed to those who are going to a 4-year college; yet, for those without a college education (about 75 percent of our youth), the prospects of finding a good job leading to a decent career have significantly declined in the past 20 years. The Administration is currently planning to submit a comprehensive piece of legislation on this topic. The OTA study would examine trends in labor market experience of youth and young adults in relation to changes occurring in the economy and policies of investment in the skill and social development of youth. The study will focus on four broad topics: 1) how the cognitive, technical, and social skills around which programs of education and training for non-college youth are organized could be broadened; 2) what the transformation of the economy from one that runs on machines to one that runs on information implies for the occupational preparation of non-college youth; 3) what incentives