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Implementation Status of the Federal Technology  
Transfer Act of 1986

Statement of  
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Before the  
Subcommittee on Science, Research, and  
Technology  
Committee on Science, Space, and Technology  
House of Representatives



Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss our just released report on the Implementation Status of the Federal Technology Transfer Act of 1986. This report was prepared at the request of the Chairman and Ranking Minority Member of the Committee on Science, Space, and Technology. As requested, it provides information on the progress that 12 federal agencies and 25 of their laboratories have made in implementing the act. The agencies and laboratories included in our study are listed in attachment I.

I would like to summarize the key aspects of the act that we examined. Federal agencies have taken numerous actions to implement the Federal Technology Transfer Act of 1986. Ten of the agencies we contacted had delegated authority to their laboratories to enter into cooperative research and development agreements. As of February 1989, the agencies contacted had entered into a total of 172 agreements under the specific authority of the 1986 act, in addition to agreements some agencies continued to enter into under their respective authorizing acts. As required by the act, each of the agencies either had distributed or planned to distribute to federal inventors at least 15 percent of the royalties collected; and one agency had established a new cash awards program focused solely on technology transfer. The Department of Commerce has drafted its first biennial report on the extent to which federal agencies have implemented the 1986 act. The agencies have submitted all other reports required by the act to date.

GAO believes it is too early to determine the impact the act has had on technology transfer. Further, although agencies reported undertaking numerous technology transfer activities, the reported activities are defined differently and, consequently, uniform statistical information has not been available to make a comprehensive evaluation. To resolve this problem and facilitate evaluating the impact of the act on technology transfer, we are conducting a separate review to develop criteria for reporting

technology transfer activities. The status of this work is presented in attachment II.

### KEY ASPECTS OF THE FEDERAL TECHNOLOGY TRANSFER ACT OF 1986

Before discussing the details of our work I would like to present some background on the act.

As you know, the Federal Technology Transfer Act amended the Stevenson-Wydler Technology Innovation Act of 1980 to permit federal agencies to delegate authority to government-operated laboratories to enter into cooperative research and development agreements with entities in both the public and private sector.<sup>1</sup> Under such an agreement, one or more federal agencies, through their laboratories, collaborate with one or more nonfederal parties in conducting specified research and development efforts that are consistent with the laboratories' missions. The act sought to make entering into such agreements as easy as possible, while protecting the legitimate concerns of the government.

To provide incentives for federal employees to promote technology transfer, the act also established royalty sharing for federal inventions and directed agencies to provide cash awards focused on technology transfer. In addition, the act contains a number of reporting requirements, including a biennial report from the Secretary of Commerce on the agencies' implementation of technology transfer legislation. The act requires the Federal Laboratory Consortium for Technology Transfer, which it formally established to help federal laboratories transfer technologies, to annually report its activities and expenditures to the Congress.

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<sup>1</sup>The 1986 act made agency delegation of authority to laboratory directors permissive. Executive Order 12591, April 10, 1987, as amended, states that agencies shall, within overall funding allocations and as permissible by law, delegate authority to their laboratories to enter into cooperative research and development agreements.

Further, the Secretary of Commerce had to submit a one-time report to the President and the Congress on various computer software issues, such as copyrights of federal software. Finally, each agency was required to include in its annual budget submission to the Congress a report on its technology transfer activities.

DELEGATION OF AUTHORITY TO ENTER  
INTO COOPERATIVE AGREEMENTS

Ten of the 12 agencies we contacted had delegated authority to their laboratories to enter into cooperative agreements. In making the delegations, however, some agencies defined laboratories to be headquarters offices at higher organizational levels than field laboratories or research centers. In this regard, the 1986 act defines laboratories broadly, and thus allows agencies a lot of latitude in how they define a laboratory. For example, the Department of Agriculture considered its Agricultural Research Service as a laboratory, but did not consider as laboratories the Service's approximately 120 research laboratories and facilities. Agriculture officials said that most of these laboratories and research facilities are small and do not have the expertise or resources needed to enter into cooperative agreements.

NASA and the Navy were the only agencies that did not delegate authority to their laboratories. NASA historically has worked with industry using agreements entered into under the Space Act of 1958. As allowed by the 1986 act, NASA opted to continue its technology transfer activities under its Space Act authority and therefore has taken little action under the authority of the 1986 act. Navy officials said it has not delegated authority to enter into cooperative agreements because its laboratories do not have the expertise to address liability issues that might arise. Without established procedures, the Navy officials said that the laboratories lack the legal capabilities to ensure that the government's interests are protected. These officials added that

after the laboratories have more experience with cooperative research and development agreements, the Navy might delegate such authority to its laboratories.

Of the 25 laboratories included in our study 15 had been delegated authority to enter into cooperative agreements, while 10 laboratories were either not considered to be laboratories or their respective agencies had not delegated such authority to the laboratory level.

COOPERATIVE RESEARCH  
AND DEVELOPMENT AGREEMENTS

The 12 agencies we contacted reported, as part of their fiscal year 1989 budget submissions to the Office of Management and Budget and their appropriation subcommittees, that they had entered into a total of over 1,200 agreements in each of fiscal years 1987 and 1988. However, the 1986 act provides agencies flexibility in defining what a cooperative agreement is, and we found that the agencies were reporting different types of agreements. For example, some agencies included cooperative agreements entered into under the authority of their respective authorizing acts, while other agencies included only those agreements entered into under the 1986 act. As of February 1989, the 12 agencies contacted reported entering into a total of 172 agreements under the 1986 act. (See attachment III.) The agencies with the most agreements were the Department of Agriculture, the National Institutes of Health, and the National Institute of Standards and Technology. I should note that these agencies had experience in using similar types of cooperative agreements with industry before the 1986 act was passed.

## INCENTIVES TO FEDERAL EMPLOYEES

The agencies contacted had taken some actions to implement the act's incentive provisions. The act, as amended, requires that agencies distribute at least 15 percent of royalties and other income, such as licensing fees, up to a maximum of \$100,000 a year per person, to federal inventors and others that assign rights to inventions or intellectual property to the federal government. From October 1986 through September 1988, nine agencies collected about \$4.6 million from royalties and licensing fees. (See attachment IV.) These agencies had distributed or planned to distribute to the federal inventor at least 15 percent of the royalties collected. The three agencies that had not yet collected any royalties each planned to distribute at least 15 percent to federal inventors once royalties are collected.

The National Institutes of Health collected the most royalties, about \$3.9 million. This amount was for agreements made prior to the 1986 act; primarily for the National Cancer Institute's AIDS-related inventions. No royalties had been collected to date for inventions made as part of the 1986 act agreements because, according to a National Institutes of Health official, it generally takes at least 2 to 3 years for inventions to be made and to reach the commercial marketplace.

The Agricultural Research Service has established a new cash awards program focused on technology transfer. The Service established the program in September 1988 and plans to make its initial awards sometime this month. Other agencies are relying on their existing cash awards program to reward their employees for promoting technology transfer. Agencies disseminate information on these programs, as well as the possibility of royalties, through formal and informal mechanisms such as internal directives, memoranda, newsletters, and scientific meetings.

## STATUS OF MANDATED REPORTS

Agencies have submitted to the Congress all but one of the reports mandated by the 1986 act. The only exception is Commerce's first biennial report to the President and the Congress on the act's implementation. Commerce has prepared a draft report, which is presently undergoing final review at the Department.<sup>2</sup> In April 1988, the Federal Laboratory Consortium for Technology Transfer issued a report to the Congress and the federal agencies that contributed funds to the consortium.<sup>3</sup> In May 1988, the Secretary of Commerce issued a report to the President and the Congress on various software issues.<sup>4</sup> These reports cite numerous examples of technology transfer activities and portray the implementation of the 1986 act in a positive light.

The agencies reported their activities performed in carrying out the act's technology transfer provisions in their fiscal year 1989 budget materials submitted to the Office of Management and Budget and their appropriation subcommittees. However, as I mentioned with respect to cooperative agreements, the reports do not provide uniform statistical information that can be aggregated to show the impact of the act on technology transfer activities.

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<sup>2</sup>Commerce's draft report is entitled The Federal Technology Transfer Act: The First Two Years.

<sup>3</sup>Activities of the Federal Laboratory Consortium for Technology Transfer, Federal Laboratory Consortium for Technology Transfer, April 25, 1988.

<sup>4</sup>Barriers to the Commercialization of Federal Computer Software and Feasibility and Cost of Compiling an Inventory of Federally Funded Training Software, Department of Commerce, May 1988.

Mr. Chairman, this concludes my statement. We would be pleased to respond to any questions you or Members of the Subcommittee may have.



AGENCIES AND LABORATORIES INCLUDED IN THIS STUDY

<u>Agency/Laboratory</u>	<u>Location</u>
Agricultural Research Service Agricultural Research Service <sup>a</sup>	Beltsville, MD
Western Regional Research Center <sup>b</sup>	Berkeley, CA
National Institute of Standards and Technology Office of Research and Technology Assistance <sup>a</sup>	Gaithersburg, MD
National Oceanic and Atmospheric Administration Satellite Applications Laboratory <sup>b</sup>	Camp Springs, MD
Environmental Protection Agency Air and Energy Engineering Research Laboratory	Triangle Park, NC
Health Effects Research Laboratory	Triangle Park, NC
Energy Morgantown Energy Technology Center	Morgantown, WV
Pittsburgh Energy Technology Center	Pittsburgh, PA
National Institutes of Health National Cancer Institute	Silver Spring, MD
National Institute for Aging	Bethesda, MD
Air Force Air Force Wright Aeronautical Laboratories	Dayton, OH
Army Harry Diamond Laboratories	Adelphi, MD
Army Engineer Topographic Laboratories	Ft. Belvoir, VA
Army Ballistic Research Laboratory	Aberdeen, MD
Letterman Army Institute of Research	San Francisco, CA
Navy Naval Research Laboratory	Washington, DC
Naval Ocean Systems Center	San Diego, CA
Naval Air Test Center <sup>b</sup>	Patuxent River, MD
Naval Surface Weapons Center	Silver Spring, MD
Naval Underwater Systems Center	New London, CT
Bureau of Mines Bureau of Mines <sup>a</sup>	Washington, DC
Pittsburgh Research Center <sup>b</sup>	Pittsburgh, PA
U.S. Geological Survey USGS National Center <sup>a</sup>	Reston, VA
USGS Western Region <sup>b</sup>	Menlo Park, CA
National Aeronautics and Space Administration Lewis Research Center	Cleveland, OH

<sup>a</sup>For purposes of the Federal Technology Transfer Act of 1986, these headquarters offices are considered by their respective agencies to be laboratories.

<sup>b</sup>For purposes of the act, agencies did not consider these research facilities to be laboratories.

DEVELOPMENT OF TECHNOLOGY TRANSFER REPORTING CRITERIA

In a September 1988 letter, the House Committee on Science, Space, and Technology asked us to develop criteria for reporting on technology transfer activities. The Committee made this separate request to help resolve reporting problems that we uncovered during the early phases of our review of the implementation of the Federal Technology Transfer Act of 1986. Currently, federal agencies that operate or direct one or more federal laboratories are required by the 1986 act to report on their activities implementing the act's technology transfer provisions. For the past 2 fiscal years, agencies have submitted these reports to the Office of Management and Budget.

Problems surfaced in the interpretation of the data contained in these reports largely for two reasons (1) some officials responsible for responding to the Office of Management and Budget's request for information on technology transfer activities found the terms used in the request are ambiguous, and (2) reporting instructions regarding exactly what data to include in agencies' calculations have not been made clear. For example, some officials responsible for preparing these reports were uncertain about what technology transfer activities to include when calculating funds devoted to technology transfer or estimating the value of cooperative research and development agreements (CRDAs). An Office of Management and Budget official indicated that the agency did not expect good or complete data from the first year's reports and that it would take at least 2 years for the data to stabilize. However, reporting problems are not likely to disappear unless an effort is made to dispel ambiguities in the guidance for report preparation.

In April 1988, the Congress requested agencies and selected laboratories to provide detailed information on the steps they had taken to implement the technology transfer legislation.<sup>1</sup> As with the reports to the Office of Management and Budget, the written responses from the agencies and selected laboratories proved, overall, to be difficult to interpret.

To respond to the Committee's request for criteria for laboratory reporting, it was necessary to develop comparable, valid, reliable, and reportable measures of the impact of recent legislation on laboratory technology transfer activities. Therefore, we reviewed technology transfer literature and analyzed the major technology transfer legislation since 1980.<sup>2</sup> We also analyzed the responses prepared by departments and laboratories to the set of questions from the Congress, and fiscal year 1989 Office of Management and Budget reports. In addition, we conducted

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<sup>1</sup>This information was requested by the Chairman, Senate Committee on Commerce, Science and Transportation and the Chairman, House Subcommittee on Science, Research and Technology.

<sup>2</sup>Specifically, we analyzed the Stevenson-Wydler Technology Innovation Act of 1980 (P.L. 96-480); the Federal Technology Transfer Act of 1986 (P.L. 99-502); Executive Order 12591, "Facilitating Access to Science and Technology"; the Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-418); the Bayh-Dole Act (P.L. 96-517); and various conference reports associated with legislation.

interviews with department or agency technology transfer officials.<sup>3</sup>

After analyzing the data collected in the activities discussed above, and accounting as much as possible for differences across laboratories, we structured the criteria as a questionnaire for laboratory directors. The questionnaire was submitted for comment to approximately 70 reviewers outside GAO, including department, agency, and laboratory technology transfer officials and university technology transfer experts. It was then further modified on the basis of comments received from reviewers and pretested during April and May 1989 to develop additional information necessary to ready the questionnaire for implementation.<sup>4</sup>

The questionnaire we have developed has several characteristics. First, it includes precise definitions of terms that may affect the type of data reported. These definitions should allow department and laboratory officials to provide valid, reliable, and comparable data. Second, it is divided into two parts: a 5-section laboratory-level questionnaire, targeted to

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<sup>3</sup>We interviewed officials at the following Departments: Agriculture (specifically the Agricultural Research Service), Defense, the Army, the Air Force, the Navy, Transportation, Interior (specifically the Bureau of Mines and USGS), Commerce, Energy, Veteran's Affairs, and Health and Human Services (specifically NIH); and at EPA and NASA. We also interviewed officials at the Office of Management and Budget, the National Science Foundation, and the FLC. We conducted these interviews to obtain their views and suggestions for developing criteria and to determine what information they need on technology transfer activities.

<sup>4</sup>As agreed to with the Committee, the questionnaire is expected to be implemented at the beginning of the next fiscal year to enable collection of complete fiscal year 1989 data.

respondents in various laboratory units, and an agency-level questionnaire, to be answered by agencies or departments. In this way, we should obtain the information needed from the respondents best able to provide it. Third, it includes questions not asked by the Office of Management and Budget or Commerce for their reports, but that help develop a more complete picture of the impact of legislation on technology transfer activities. As such, it should produce more comprehensive information than has been available to date.

The GAO-developed questionnaire is designed to provide comprehensive and uniform data to (1) aid congressional oversight of laboratory and department technology transfer activities and programs and (2) enhance the ability of departments and laboratories to manage and evaluate their technology transfer programs.

NUMBER OF CRDAS, BY AGENCY, AS OF FEBRUARY 1989

<u>Agency</u>	<u>Number of CRDAs</u>
Agricultural Research Service	59
NIST	37
NOAA	0 <sup>a</sup>
Air Force	8
Army	12
Navy	1
Energy	0 <sup>b</sup>
EPA	1
Bureau of Mines	1 <sup>c</sup>
USGS	5 <sup>d</sup>
NASA	0 <sup>e</sup>
NIH	48

<sup>a</sup>According to a NOAA official, NOAA had not entered cooperative agreements with the private sector prior to the 1986 act and is proceeding cautiously. As of April 1989, NOAA was developing procedures for pursuing CRDAs and had one potential CRDA in process.

<sup>b</sup>Since 1986 the Department of Energy's energy technology centers have entered into 12 cooperative agreements, but these were not negotiated under the authority of the Federal Technology Transfer Act.

<sup>c</sup>The Bureau of Mines entered into about 180 other cooperative agreements under its authorizing legislation.

<sup>d</sup>USGS entered into about 900 other cooperative agreements under its authorizing legislation.

<sup>e</sup>From October 1986 to February 1989, NASA entered into about 108 agreements under the Space Act.

ROYALTIES COLLECTED AND DISTRIBUTEDTable IV.1: Royalties Collected by Agencies, October 1986 to September 1988

<u>Agency</u>	<u>Amount collected</u>
Agricultural Research Service	\$ 213,416
NIST	104,312
NOAA	11,492
Air Force	57,244
Army	28,535
Navy	20,048
Energy/Fossil Energy <sup>a</sup>	0
EPA	0
Bureau of Mines <sup>b</sup>	54,000
USGS	0
NASA <sup>c</sup>	181,760
NIH	<u>3,946,263</u>
Total	<u>\$4,617,070</u>

<sup>a</sup>The zero is for the Department of Energy's Office of Fossil Energy, which is responsible for the government-operated energy technology centers. Other entities within the Department of Energy collected royalties totaling about \$881,000 for this period, but this amount was not subject to distribution under the 1986 act because the inventions were made by contractors.

<sup>b</sup>Bureau of Mines estimate.

<sup>c</sup>The amount shown for NASA is for the period October 1986 through December 1988.

Source: Prepared by GAO from data provided by the agencies.

Table IV.2 shows the royalties distributed by percent from October 1986 through September 1988 by the agencies we examined.



Table IV.2: Distribution of Royalties, October 1986 to September 1988

<u>Agency</u>	<u>Percent distributed</u>			
	<u>Inventors</u>	<u>Offset expenses</u>	<u>Laboratories</u>	<u>Treasury</u>
Agricultural Research Service	15	85	0	0
NIST	15	52	33	0
NOAA	15	85	0	0
Air Force <sup>a</sup>	0	0	0	0
Army <sup>a</sup>	0	0	0	0
Navy <sup>b</sup>	48	0	52	0
Energy/Fossil Energy <sup>c</sup>	0	0	0	0
EPA <sup>d</sup>	0	0	0	0
Bureau of Mines	15	35	50	0
USGS <sup>e</sup>	0	0	0	0
NASA <sup>f</sup>	65	0	24	11
NIH <sup>g</sup>	17	29	54	0

<sup>a</sup>The Air Force and the Army had not distributed any royalties collected as of February 1989. Each of these military services held the funds in an escrow account and planned to distribute to inventors the greater of the first \$1,000 or 20 percent of the royalties collected annually for each invention.

<sup>b</sup>The Navy distributes to each inventor the greater of the first \$1,000 or 20 percent of the royalties collected annually for each invention.

<sup>c</sup>The Department of Energy's Office of Fossil Energy had not collected any royalties during the period, but it planned to distribute to the inventors 15 percent of any future royalties collected.

<sup>d</sup>EPA had not collected any royalties during the period, but it had established a royalty program providing for inventors to receive about 35 percent of any future royalties collected.

<sup>e</sup>USGS had not collected any royalties during the period, but it planned to distribute to the inventors 15 percent of any future royalties collected.

<sup>f</sup>Percentages shown for NASA are for calendar years 1987-88. NASA provides its inventors the first \$2,000 of royalties collected and 20 percent of the royalties in excess of the first \$2,000. Remaining royalties are generally distributed to the field installations where the invention was made. However, if the amount to the field installation exceeds 5 percent of its budget, 25 percent of the excess is distributed to the field installations and 75 percent of the excess is paid to the Treasury.

<sup>g</sup>Fiscal year 1988 royalty data provided by NIH showed amounts distributed to inventors, but did not show other distributions. Percentages shown are for fiscal year 1987 distributions.

Source: Prepared by GAO from data provided by the agencies.