

U.S. Small Business Administration



Championing America's Entrepreneurs

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SBA

SMALL BUSINESS
INNOVATION
RESEARCH PROGRAM
(SBIR)

ANNUAL REPORT ■ FY 1994



U.S. SMALL BUSINESS ADMINISTRATION
WASHINGTON, D.C. 20416

OFFICE OF THE ADMINISTRATOR

AUG 15 1996

The Honorable Christopher S. Bond
Chairman, Committee on Small Business
United States Senate
Washington, DC 20510

The Honorable Jan Meyers
Chairwoman, Committee on Small Business
House of Representatives
Washington, DC 20515

This report, prepared pursuant to Public Laws 102-564, 99-443, and 97-219, details the 12th year results of the Small Business Innovation Development Act of 1982.

Presented in this report are the progress and accomplishments of the 11 participating Federal agencies under the Small Business Innovation Research (SBIR) program and their achievement of small business goals in research and research and development acquisition. The report also includes information on small business commercialization.

During fiscal year 1994, small business concerns received nearly \$718 million in obligated funding and successfully competed for 4,030 SBIR awards from the participating Federal agencies.

We continue to depart from the traditional fiscal reporting for awards. The report includes awards of procurements initiated in fiscal year 1994, but which were made after the close of the fiscal year. This more accurately reflects the program's fiscal year 1994 activity.

Copies of this report have been provided to the Office of Federal Procurement Policy and the General Accounting Office. The review and analysis were made by the Office of Technology of this Agency.

Sincerely,

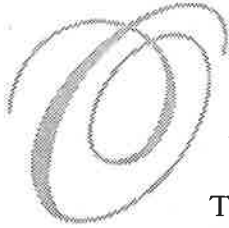
Philip Lader
Administrator

Enclosure



ontents

<i>Overview</i>	1
<i>Introduction</i>	3
<i>Program Services</i>	7
<i>Program Data</i>	10
<i>Success Stories</i>	17
<i>Distribution of Awards</i>	25
<i>Administrative Issues</i>	27



Overview

This is the 12th in a series of annual reports on the Small Business Innovation Research Program. The Small Business Administration prepared the report pursuant to the requirements of the Small Business Innovation Development Act, which created the SBIR Program in 1982. The SBA is directed by the Act to set SBIR Program policy and to monitor, evaluate and report on the program's progress. This report reflects and summarizes, along with other information, SBIR Program results and activities for FY 1994.

The Small Business Innovation Development Act was signed into law on July 22, 1982. Congress reauthorized it to continue in FY 1986 and again in FY 1993, extending the SBIR Program until October 1, 2000. The latter mandate also increased the percentage of research and development funds that the federal-agency participants must direct to small business.

When considering the legislation to extend the program to October 1, 2000, Congress concluded that technological innovation creates jobs, increases productivity and economic growth, and serves as a valuable counterforce to inflation and the nation's balance-of-payments deficit. Congress also noted that while small business is the nation's principal source of significant innovations, large businesses, universities and government laboratories histori-

cally have conducted the vast majority of federally funded research and development.

The SBIR Program has proven again in FY 1994 that with focused program support from the federal government, the nation's small high-tech enterprises can convert basic ideas and research into commercial products that enhance the nation's productivity and help maintain its competitive leadership in the international marketplace. By any measure, this partnership of government and the private sector has been a resounding success.

In its first dozen years, the SBIR Program has directed almost 33,000 awards worth over \$4 billion to thousands of small high-tech companies. These enterprising concerns have transformed their ingenuity and inventiveness into profitable commercial successes in a wide range of industries and technologies from the familiar to the exotic.

Highlights and accomplishments of the SBIR Program since it began operations in FY 1983 include the following:

- In response to 159 solicitations by the 11 participating federal agencies, 217,324 proposals have been received from small high-tech firms. These proposals have resulted in 32,971 awards worth more than \$4 billion.
- The increasing number of successes in commercial sales associated with the program have come

have come from a wide range of technologies and industries, from laser manufacture to medical research to robotics to military decision-making, to name a few.

- The new products and techniques emerging from the SBIR awards are assisting America's competitive stance worldwide and improving the lives of people here and abroad.

Despite the talent, determination and entrepreneurial spirit that exist among small high-tech businesses many enterprises could not have turned their ideas into profitable commercial products without the assistance of the SBIR Program. As the company profiles and statistics in this report illustrate, an ever-increasing number of program participants are succeeding in commercializing their new products, processes and services. Surveys by the SBA and the General Accounting Office report that a minimum of one in four SBIR participants has recorded the commercial success of its SBIR-supported product(s) within four years of receiving its Phase II award.

Another encouraging statistic involves small firms headed by minorities. Businesses in this classification are winning an increasing number of SBIR awards, testifying to their technical innovation and business talents. In FY 1993, minority/disadvantaged-owned firms received 557 awards; in FY 1994, the number increased to 621.

In administering and supervising the SBIR Program, the SBA and its Office of Technology continue to encourage more small high-tech enterprises to respond to solicitations from the agencies participating in the program. A number of participating small businesses are winning multiple awards, an understandable development that reflects their continuing spirit of innovation.

*I*ntroduction

The Rationale

The rationale for creation of the Small Business Innovation Act was to give small, innovative enterprises a greater role in federally funded research and development. The goal was to help develop the nation's base for creative technical achievement, as well as enlarge the markets for ideas generated in the laboratories and research facilities, and on the factory floors of America's small high-tech businesses.

The designers of the original statute, Public Law 97-219, realized that small businesses — especially technically oriented small businesses — were responsible for most of our new products, processes and technologies, and were particularly adept at turning research and development activity into viable commercial products. In many cases, the only ingredient these firms needed for success was financial assistance to conduct the research and development of their ideas. SBIR Program history is full of such successes, and many more are anticipated. These accomplishments have created many new jobs, expanded the nation's tax base, and bolstered America's economic viability and productivity.

Findings and Purposes of the Act

Beginning in FY 1983, each agency that has established an SBIR program has set aside a specific percentage of its extramural research or research and development budget for award to small businesses. Through a four-year phase-in process, civilian agencies were required to increase the percentage of their R&R&D set-asides, from 0.2 percent in FY 1983 to 1.25 percent in FY 1986. The Department of Defense was allowed five years to phase in their increase from 0.01 percent in FY 1983 to 1.25 percent in FY 1987.

In 1992 Congress extended the life of the SBIR Program to October 1, 2000, as part of the Small Business Research and Development Enhancement Act (Public Law 102-564). This legislation also increased by increments the percentage of annual extramural R&D funds that the participating federal agencies must direct to small high-tech firms from 1.25 percent to 2.5 percent. Additionally, the Act raised the ceiling of Phase I awards from \$50,000 to \$100,000 and Phase II awards from \$500,000 to \$750,000.

The purposes of Public Law 102-564:

- Expand and improve the SBIR Program
- Emphasize increased private-sector commercialization of technology developed through federal SBIR research and development

- Increase small business participation in federal research and development
- Improve the federal government's dissemination of information concerning the SBIR Program with regard to participation by women-owned and socially and economically disadvantaged small businesses

Federal Agency SBIR Participants

Under the terms of the 1982 Small Business Innovation Development Act, any federal agency with an extramural budget for research or research and development in excess of \$100 million for FY 1982 or any subsequent fiscal year must establish an SBIR program. The agency then sets aside a prescribed percentage of its extramural research or research-and-development contracting dollars for program use during each fiscal year.

Public Law 102-564 has set the funding percentage at not less than 1.5 of the agency's R&R&D for FY 1993 and 1994; not less than 2 percent for FY 1995 and 1996; and not less than 2.5 percent for fiscal years thereafter.

The FY 1994 federal agencies participating in the SBIR Program:

- Department of Agriculture (DOD)

- Department of Commerce (DOC)
- Department of Defense (DOD)
- Department of Education (ED)
- Department of Health and Human Services (HHS)
- Department of Transportation (DOT)
- Environmental Protection Agency (EPA)
- National Aeronautics and Space Administration (NASA)
- Department of Energy (DOE)
- National Science Foundation (NSF)
- Nuclear Regulatory Commission (NRC)

The Three-Phase SBIR Structure

- **Phase I:** Awards for up to \$100,000 are made for research projects designed to evaluate the feasibility, as well as the scientific and technical merit of an idea.
- **Phase II:** Phase I projects with the most potential are funded for further development of the proposed idea. Phase II funding is for one or two years, at a maximum of \$750,000.

- **Phase III:** No SBIR funds may be used. Private-sector investment and support bring an innovation to market. If appropriate, Phase III funds may involve follow-up production contracts with a federal agency for future use by the federal government.

The R&R&D Goaling Program

In addition to the SBIR Program, the Small Business Innovation Development Act also requires certain federal agencies to participate in the Research and Research and Development Goaling Program.

The legislation stipulates that any agency with a fiscal year budget for research or research and development in excess of \$20 million must establish goals for awarding R&R&D funding agreements to small business. An agency's annual goals cannot be lower than those achieved during the previous fiscal year. In addition to the 11 SBIR participant agencies, seven other agencies participate in the R&R&D Goaling Program:

- Department of the Interior (DOI)
- Department of Justice (DOJ)
- Department of the Treasury (TR)
- Department of Veteran Affairs (DVA)

- Agency for International Development (AID)
- Smithsonian Institution (SI)
- Tennessee Valley Authority (TVA)

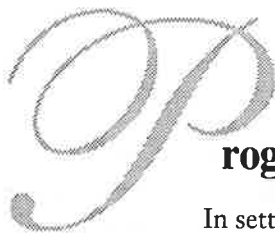
SBA Authorities and Responsibilities

- Develop, coordinate, issue and update a policy directive for the federal-governmentwide conduct of the SBIR and R&R&D goaling programs
- Develop and administer an information and outreach program for the SBIR Program
- Develop and maintain a source and information file of interested small businesses
- Develop, coordinate, publish and disseminate each SBIR Pre-Solicitation Announcement
- Survey, monitor and report on all SBIR programs
- Report at least annually to Congress on all SBIR and R&R&D goaling programs and on the SBA's monitoring activities
- Coordinate private-sector commercialization of SBIR innovations
- Obtain information on the current national critical technologies

◆◆◆◆◆

SBIR Program Authorities and Responsibilities for Each Participating Agency

- Determine the categories of projects to include in the agency's SBIR Program
 - Issue SBIR solicitations in accordance with a schedule determined cooperatively with the SBA
 - Unilaterally determine research topics within each SBIR solicitation, giving special consideration to broad research topics and to topics that further one or more National Critical Technologies
 - Receive and evaluate proposals resulting from SBIR solicitations
 - Select awardees for SBIR funding agreements
- Ensure those funding agreements under the SBIR Program include provisions setting forth the respective rights of the United States and small businesses with regard to intellectual property rights and follow-on research
 - Administer SBIR funding agreements (or delegate such administration to another agency)
 - Make payments to SBIR award recipients based on progress toward or completion of the funding agreement requirements
 - Submit annual reports on the SBIR and R&R&D Goaling programs to the SBA



rogram Services

In setting SBIR Program policy and in monitoring and evaluating the program, the SBA acts to keep contract award procedures simple and standardized, to keep paperwork to a minimum, and to encourage small companies owned by minorities and the disadvantaged to participate in the program. The SBA also conducts an ongoing national information-and-outreach campaign, and ensures that participating agencies conform with SBIR policy directives.

As required by law, the solicitation process minimizes regulatory burdens and mandates timely receipt and review of proposals, peer review, proprietary-information guidelines, selection of awardees, data-rights retention, title to government property, cost-sharing and cost principles.

Pre-Solicitation Announcements

The SBA's SBIR Pre-Solicitation Announcement to small businesses presents basic program solicitation information in a succinct and understandable manner. Each quarterly announcement provides complete information on all SBIR activity for that quarter, eliminating the need for small businesses to track the activities of each participating agency. In addition to mailings, the announcements are available from the SBA's electronic bulletin board SBA OnLine, and on the Internet. (Other SBIR

information available from the bulletin board includes SBIR award winners from the latest available fiscal year, as well as the *SBIR Proposal Preparation Handbook*. Bulletin-board information is updated on the first day of each quarter.) The announcements provide small businesses with—

- a brief statement of each research topic, listed by participating agency,
- the opening and closing dates of each solicitation,
- an estimate of the number of awards to be made under each solicitation,
- the party to contact for a copy of the agency's solicitation, and
- a master schedule of solicitation opening and closing dates for all participating agencies.

The SBA published four pre-solicitation announcements in FY 1994. During the 12 years of the program, over 2.8 million announcements have been distributed. The response from the public to these announcements has been excellent.

SBIR Outreach

During FY 1994, the SBA cooperated with numerous organizations that conducted SBIR seminars and conferences by providing information, materials and speakers. SBA field representatives, and public and private organizations play a significant role in part of the information-dissemination process.

The SBA continues to publish a special SBIR Program pamphlet, which provides program information and serves as a mechanism for developing the SBIR mailing list. SBA field offices have been furnished a supply of the pamphlets for speakers throughout the country.

Another form of outreach involves briefing officials of foreign governments. During FY 1994, foreign interest in the SBIR Program continued to grow. SBIR-type programs are in place in the United Kingdom and other European countries.

Commercialization Matching System

A major goal of the SBIR Program is to bring the results of research and development to the marketplace. The program encourages more research and development, as well as commercialization by offering the possibility of economic reward for innovations successfully marketed by SBIR firms. At each stage of a small firm's progress through the

program, there are policies and incentives to promote research work with commercial potential and to encourage the availability of the completed research in the marketplace.

Recognizing that most small firms with innovative products have difficulty finding the financing required for the final development, manufacture and marketing of their product, the SBA has developed the Commercialization Matching System. The system maintains information on all SBIR awards, including the recipient company's name and address, the name of the principal investigator, and the innovation to be commercialized. The system also includes information on the financing sources that have requested inclusion and the types of investments they are seeking.

From this data base, the Commercialization Matching System provides possible investors with technical abstracts of SBIR projects, and SBIR firms with information on sources of investment capital for their innovations. Matching selections from the data base are made on the basis of technology and industry preferences, geographic preferences and dollar thresholds.

Table 1: SBIR Program Data

FY 1994 SBIR Agency Obligations Summary (dollars in thousands)

	<i>DOA</i>	<i>DOC</i>	<i>DOD</i>	<i>DOE</i>	<i>DOT</i>	<i>ED</i>	<i>EPA</i>	<i>HHS</i>	<i>NASA</i>	<i>NRC</i>	<i>NSF</i>	<i>Total</i>
Agency Extramural Budget	\$477,784	187,010	22,291,500	3,443,134	574,534	169,667	338,989	8,652,470	7,175,923	92,885	2,250,670	45,654,560
Agency SBIR Budget	\$7,166	2,805	334,373	51,647	8,618	2,545	5,848	129,787	107,634	1,393	33,760	685,576
Dollars Obligated	\$7,166	3,718	354,189(a)	53,147	7,489	2,643	4,855	133,276(b)	115,807	1,286(c)	34,071(d)	717,647
Percent of SBIR To Extramural Budget	1.50	1.99	1.59	1.54	1.30	1.56	1.43	1.54	1.61	1.39	1.51	1.57
Deficit/Surplus	0	+913	+17,816	+1,500	-1,129	+98	-993	+3,489	+8,173	-107	+312	+32,071

FY 1994 Award Profile (dollars in thousands)

	<i>DOA</i>	<i>DOC</i>	<i>DOD</i>	<i>DOE</i>	<i>DOT</i>	<i>ED</i>	<i>EPA</i>	<i>HHS</i>	<i>NASA</i>	<i>NRC</i>	<i>NSF</i>	<i>Total</i>
Total Phase I Awards	60	39	1,371	244	33	20	35	596	383	12	309	3,102
Minority/Disadvantaged Phase I Awards	5	7	298	26	5	4	0	39	64	0	40	488
Total Phase II Awards	22	9	417	65	14	9	18	151	173	6	44	928
Minority/Disadvantaged Phase II Awards	2	2	71	10	1	3	1	13	23	1	6	133
Total Phase I Dollars Awarded (\$)	2,933	1,942	100,990	18,141	2,947	793	1,905	44,285	26,152	597	19,734	220,419
Minority/Disadvantaged Phase I Dollars Awarded (\$)	250	349	21,929	1,946	444	160	0	2,809	4,397	0	2,550	34,834
Total Phase II Dollars Awarded (\$)	4,233	1,776	231,628	35,006	4,542	1,850	2,950	87,504	89,655	679	13,777	473,600
Minority/Disadvantaged Phase II Dollars Awarded (\$)	410	399	39,526	6,000	300	744	146	7,006	11,107	189	1,579	67,406
Average Amount for Phase I Awards (\$)	49	48	74	74	89	40	54	74	68	50	64	71

FY 1994 Agency Solicitation Profile

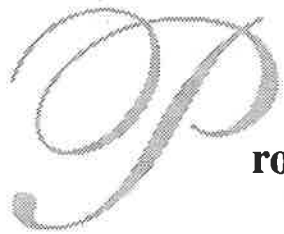
	<i>DOA</i>	<i>DOC</i>	<i>DOD</i>	<i>DOE</i>	<i>DOT</i>	<i>ED</i>	<i>EPA</i>	<i>HHS</i>	<i>NASA</i>	<i>NRC</i>	<i>NSF</i>	<i>Total</i>
Number of Solicitations Released	1	1	3	1	1	1	1	3	1	1	1	15
Number of Research Topics in Solicitations	8	17	766	43	32	11	9	231	15	9	26	1,167
Number of Copies Distributed	16,000	10,000	160,000	30,000	17,000	2,000	5,000	32,821	20,000	500	62,000	355,321
Number of Phase I Proposals Received	443	620	12,573	2,786	543	275	383	3,423	2,296	74	2,172	25,588
Number of Phase II Proposals Received	36	17	818	183	35	28	29	558	327	11	202	2,244
Number of Phase I Awards	60	39	1,371	244	33	20	35	596	383	12	309	3,102
Number of Phase II Awards	22	9	417	65	14	9	18	151	173	6	44	928

(a) \$ 21,572K in modifications to non-FY 94 awards

(b) \$ 1,487K in modifications to non-FY 94 awards

(c) \$10K in modifications to non-FY 94 awards

(d) \$560K in modifications to non-FY 94 awards



rogram Data

Reporting Requirements for SBIR and R&R&D Goaling

Each agency required by Sections 4(f) and 4(h) of Public Law 97-219 to establish an SBIR program for research and research and development is also required to report annually to the SBA on the number of grants, contracts, and cooperative agreements awarded that exceed \$10,000, and on the dollar value of all such awards. The agencies are also required to compare the number and amount of SBIR awards with awards to other than small business.

To properly monitor and report on the participating agencies' SBIR programs, the SBA has established a reporting base to compare against each agency's budget data. To determine extramural R&R&D obligations as a base for the size of each agency's SBIR Program, the Small Business Innovation Development Act provides a definition of research and development identical to that in the Office of Management and Budget Circular A-11, "Preparation and Submission of Budget Estimates."

Each year federal agencies submit to the National Science Foundation their total R&R&D obligations broken down into intramural and extramural R&R&D obligations, which are then published in "Federal Funds for Research and Development." The SBA reviews the NSF data on agencies with SBIR programs, then uses the amount determined by the agency to be its extramural budget as the extramural base for the SBIR Program. A distinction between intramural and extramural is not made for agencies participating in the R&R&D Goaling Program, since each agency's goal is based upon total R&R&D budget obligations.

A three-year budget cycle is used for establishing extramural R&R&D obligations. Within any given year, a participating agency's initial estimate can change due to congressional action on that agency's R&R&D budget. To ensure proper implementation of the program, each agency establishes an estimated budget and proceeds during the year on that budget. The SBA uses a system of deficits and credits to make the necessary adjustments during the course of the budget cycle. In this way, SBIR agencies ultimately achieve the percentages specified by law.

FY 1994 SBIR Summary

The 11 agencies participating in the SBIR Program in FY 1994 released a total of 15 Phase I solicitations. The departments of Defense and Health and Human Services each released three solicitations; the other nine agencies released one each. (See Table 1 on page 10.)

In response, the participating agencies received 25,588 Phase I proposals from small high-tech enterprises. The agencies subsequently distributed a total of 3,102 Phase I awards, which represented 12 percent of the proposals received. A total of 2,244 Phase II proposals were received, resulting in 928 new awards. These awards represented 41 percent of all Phase II proposals received. The combined number of Phase I and Phase II proposals received in FY 1994 was 27,832. There were 4,030 awards, representing 14 percent of the total.

The number of SBIR proposals received has increased steadily over the years – a trend that illustrates past award successes and the ever-growing awareness and acceptance of the SBIR Program within the small business community. (See Table 2 immediately following.)

**Table 2: Number of SBIR Awards —
FY 1983 through FY 1994**

<i>Fiscal Year</i>	<i>Phase I</i>	<i>Phase II</i>	<i>Totals</i>
83	686	—	686
84	999	338	1,337
85	1,397	407	1,804
86	1,945	564	2,509
87	2,189	768	2,957
88	2,013	711	2,724
89	2,137	749	2,886
90	2,346	837	3,183
91	2,553	788	3,341
92	2,559	916	3,475
93	2,898	1,141	4,039
94	3,102	928	4,030
<i>Total</i>	24,824	8,147	32,971

There also have been year-to-year increases in the dollar value of awards. During FY 1994, the 11 participating SBIR agencies awarded \$717.6 million through the SBIR Program, which represented a 2.7 percent increase over the approximately \$698 million obligated in FY 1993. FY 1994 Phase I awards were worth \$220 million; Phase II awards, \$473 million. The overall total included \$23 million in modifications to non-FY 1994 awards. (See Table 3 on page 12.)

In FY 1994, minority/disadvantaged-owned firms received 488 Phase I awards worth \$34.8 million and 133 Phase II awards worth \$67.4 million.

In awarding two-year funding agreements under Phase II, agencies utilize various acquisition methods of obligation and funding. For purposes of consistency, the acquisition data in this report reflect only actual obligations during FY 1994.

**Table 3: Value of SBIR Awards —
FY 1983 through FY 1994**
(in millions of dollars)

<i>Fiscal Year</i>	<i>Phase I</i>	<i>Phase II</i>	<i>Totals</i>
83	\$44.5	\$—	\$44.5
84	48.0	60.4	108.4
85	69.1	130.0	199.1
86	98.5	199.4	297.9
87	109.6	240.9	350.5
88	101.9	284.9	389.1*
89	107.7	321.7	431.9*
90	118.1	341.8	460.7*
91	127.9	335.9	483.1*
92	127.9	371.2	508.4*
93	154.0	490.7	698.0*
94	220.4	473.6	717.6*
Total	\$1,327.6	\$3,250.5	\$4,578.1*
FY 1995 EST: — \$700+			
*includes award modifications			

As in prior years, the SBA continued in FY 1994 to use a system of deficits and credits to evaluate agency SBIR budgets against actual amounts obligated.

Through its SBIR Policy Directive, the SBA requires each participating agency to list the number of Phase I awards made both within six months and beyond six months of the closing date of its solicitation announcement. Table 4, below, provides this information for FY 1994.

Table 4: FY 1994 Phase I Time Frame

<i>Agency</i>	<i>Total FY94 Phase I Awards</i>	<i>Number Within Six Months of Solicitation Close</i>	<i>Number More Than Six Months After Solicitation Close</i>
DOA	60	0	60
DOC	39	39	0
DOD	1,371	815	556
DOE	244	244	0
DOT	33	24	9
ED	20	20	0
EPA	35	35	0
HHS	596	364	232
NASA	383	311	72
NRC	12	12	0
NSF	309	0	309
Total	3,102	1,864	1,238

R&R&D Goaling Agencies

The SBA requires all annual reports for the R&R&D Goaling Program to include the following information:

- total R&R&D obligations for the previous fiscal year;
- total of the previous fiscal year's R&R&D dollars obligated to small businesses, minority and disadvantaged small businesses, and women-owned small businesses under funding agreements; and the percentage of each to the agency's total R&R&D obligations (data for women-owned small businesses are not required by law to be collected by the agencies, making the data incomplete);
- total R&R&D budget for the current fiscal year;
- total R&R&D small business goal for the current fiscal year based on the percentage of obligations made to small businesses the previous fiscal year;
- current-fiscal-year achievement of the singular small business R&R&D goal and the dollars obligated through prime funding agreements in the following categories: small business, minority and disadvantaged small business, and women-owned small business; and
- total number and dollar value of R&R&D awards to small business for contracts, grants

and cooperative agreements over \$10,000, and a comparison of such awards to awards made to non-small businesses for the same categories. (See Table 14 and Table 15.)

To evaluate each agency's R&R&D Goaling Program, the SBA uses a final budget report from OMB entitled *Conduct of R&D by Agency*. This report details each agency's total R&R&D obligations for the reported fiscal year and provides R&D budget estimates for future years. The SBA then computes each agency's total R&R&D obligations to small business, as reported to SBA, to determine the actual percentage of the R&R&D obligations awarded to small business.

In FY 1994 as in prior years, there was some difference between each agency's total R&R&D obligations as reported to the SBA and to OMB. Since the SBA uses the OMB data as the base, the percentage of an agency's awards that was given to small business may be higher or lower in this report than the percentage reported by the agency to the SBA.

In FY 1994 over \$3 billion was awarded to small business under the R&R&D Goaling Program. This represented 4.4 percent of the total R&D obligations for the 18 reporting agencies.

R&R&D awards to minority/disadvantaged-owned firms totaled \$882 million in fiscal 1994, representing 29 percent of all agency R&R&D obligations to small businesses.

Highlights of Cumulative Data

The SBIR Program continues to receive national acceptance and international recognition for quality performance. Following are highlights of accomplishments since the SBIR Program began:

- Nearly \$4 billion has been awarded to small businesses.
 - Minority/disadvantaged-owned firms have received 3,892 awards, representing 12 percent of all SBIR awards; the value of these awards has totaled \$506 million, which is 11 percent of all dollars awarded under the program.
 - The participating agencies received 197,956 Phase I proposals and 19,341 Phase II proposals in response to 159 SBIR solicitations. There has been a total of 24,842 Phase I and 8,147 Phase II awards.
 - Awards have been made to firms in all 50 states, Puerto Rico and the District of Columbia.
- Several participating agencies have allocated more for this program than required by law. In accordance with the law, each participating agency will continue to award at least 1.5 percent of its R&R&D extramural budget in fiscal years 1993 and 1994; not less than 2 percent in fiscal years 1995 and 1996, and not less than 2.5 percent thereafter.

TABLE 5: R&R&D GOALING DATA — FY 1994

(dollars in thousands)

<i>Agency</i>	<i>Agency % Goal FY 94</i>	<i>Total R&D Budget</i>	<i>\$ Goal</i>	<i>Agency Reported \$ To Small Business</i>	<i>% Awarded To Small Business</i>	<i>\$ Awarded To Minority/ Disadvantaged</i>	<i>% Awarded To Minority Disadvantaged</i>
DOA	5.7	\$1,354,655	77,215	79,000	5.8	NR	NR
DOC	1.0	370,534	4,446	8,153	2.2	3,792	1.0
DOD	4.5	37,522,872	1,690,000	1,825,000	4.9	404,000	1.1
DOE	1.6	6,033,924	97,750	86,708	1.4	3,918	0.6
DOI	0.2	699,566	1,399	1,366	0.2	42	0.1
DOT	21.0	621,400	130,494	70,815	11.4	63,924	10.3
ED	1.3	109,301	1,421	1,608	1.5	769	0.7
EPA	7.2	558,300	40,200	41,000	7.3	19,000	3.4
HHS	1.8	11,034,670	196,417	210,774	1.9	45,399	0.4
NASA	8.3	7,012,100	582,000	658,300	9.4	325,700	4.6
NSF	0.8	1,967,730	16,720	23,380	1.1	5,900	0.3
NRC	2.8	114,163	3,197	2,178	1.9	118	0.1
AID	0.8	95,500	765	92	1.0	8,700	9.1
DOJ	22.5	65,950	14,839	9,103	13.8	811	1.2
DVA	0.5	292,345	1,462	1,483	0.5	325	0.1
SI	0.1	124,000	124	10	0.8	0	0.0
TR	NR	NR	NR	NR	NR	NR	NR
TVA	NR	NR	NR	NR	NR	NR	NR
Total	—	67,977,010	2,858,479	3,018,970	4.4	882,398	1.3

NR = Not reported

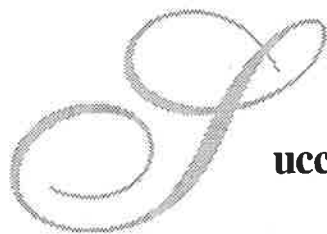
TABLE 6: R&R&D GOALING DATA — FY 1994 (CONTINUED)

(dollars in thousands)

Agency	SMALL BUSINESS						NON-SMALL BUSINESS					
	Number of Contracts Awarded	Dollar Amount Of Contracts	Number of Grants Awarded	Dollar Amount of Grants	Number of Co-op Agreements	Dollar Amount of Co-op	Number of Contracts Awarded	Dollar Amount of Contracts	Number of Grants Awarded	Dollar Amount of Grants	Number of Co-op Agreements	Dollar Amount of Co-op
DOA	0	0	83	7,292	2	79	2	175	1,595	421,883	1,464	59,301
DOC	199	10,241	3	79	25	14,705	251	20,596	544	116,793	482	214,533
DOD	21,625	2,283,000	NU	NU	NU	NU	15,589	17,001,000	NU	NU	NU	NU
DOE	76	86,708	NR	NR	NR	NR	NR	5,947,216	NR	NR	NR	NR
DOI	40	1,463	NR	NR	NR	NR	59	2,118	NR	NR	NR	NR
DOT	1,332	158,486	2	604	NR	NR	1,336	229,489	159	38,839	42	9,703
ED	62	2,692	NR	NR	NR	NR	34	9,911	774	200,919	NR	NR
EPA	162	41,900	NR	NR	NR	NR	130	82,000	NR	NR	NR	NR
HHS	1,083	161,826	1,060	150,586	38	16,500	2,769	829,403	30,622	6,982,914	3,118	1,094,679
NASA	2,330	752,700	1	100	9	21,300	2,596	5,632,400	4,897	439,700	748	165,900
NSF	100	13,610	500	41,510	NR	NR	124	103,980	18,836	2,753,700	NR	NR
NRC	22	3,761	0	0	0	0	20	5,732	18	2,154	0	0
AID	NR	NR	NR	NR	NR	NR	126	238,900	NR	NR	NR	NR
DOJ	58	2,832	26	4,281	4	310	83	29,169	135	13,608	22	4,572
DVA	9	1,461	NR	NR	NR	NR	8	1,158	NR	NR	NR	NR
SI	3	10	0	0	0	0	2	0.1	0	0	0	0
TR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
TVA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

NR = Not reported

NU = Not used by reporting agency



Success Stories

Atom Sciences, Inc.

Atom Sciences, Inc. of Oak Ridge, Tenn., provides contract research and development, analytical services and analytical instrumentation based upon laser resonance ionization mass spectrometry. This advanced analytical technique can be applied to a variety of disciplines, including the environmental and geological sciences, semiconductor research, biological imaging and DNA sequencing.

For the first time in Atom Sciences' history, 1994 revenues from commercial analyses and instrument sales surpassed revenues from research and development. The credit for this can be directly attributed to the success of a recent SBIR project from the Advanced Research Projects Agency.

The aim of the ARPA/SBIR project was to improve the depth resolution and dynamic range for depth profiles, and the lateral resolution for imaging, using Atom Sciences' patented Sputter-Initiated Resonance Ionization Spectroscopy technology. SIRIS technology allows high-resolution measurements of impurities and dopants in solid-state devices and has the potential to meet many of the analytical requirements of the semiconductor industry into the 21st century. Several companies

involved with the development of semiconductor devices and night-vision equipment have already indicated a strong interest in the SIRIS technology.

The Phase I ARPA/SBIR project began in February 1991 and was funded for \$55,729 over six months, with a six-month, no-cost extension. The Phase II project began near the end of September 1992, at an initial funding level of \$297,888 for two years. A supplementary portion of the project was approved in April 1993, bringing the total Phase II project funding to \$440,721. No-cost time extensions have been made subsequently.

By the fourth quarter of 1994, the ARPA/SBIR project had already provided significantly improved performance for SIRIS depth profiles, and these results were reported at scientific meetings. The outstanding new capabilities quickly caught the attention of the semiconductor and night-vision industries, and resulted in a dramatic increase in requests for commercial analyses. In fact, more than 80 percent of the 1994 commercial analyses performed with the SIRIS instrument were in the last quarter of the year. Atom Sciences projects that 1995 revenues from commercial analyses will be more than 100 percent above the 1994 level.

The heightened interest in SIRIS also spilled over to instrument sales. One of the three major instrument-component sales closed by Atom Sciences in

1994 can be attributed to commercialization of the ARPA/SBIR project. This sale, made to a semiconductor company in Japan for a component to a SIRIS instrument, resulted directly from the firm's 1994 can be attributed to commercialization of the ARPA/SBIR project. This sale, made to a semiconductor company in Japan for a component to a SIRIS instrument, resulted directly from the firm's interest in the data generated in the ARPA/SBIR project.

BSI Corporation

BSI Corporation (formerly Bio-Metric Systems, Inc.) is a medical-technology and diagnostic research-and-development firm of 70 employees. It is located in Eden Prairie, Minn., a suburb of Minneapolis. BSI's mission is to provide advanced technologies for surface modification and molecular immobilization to improve medical and diagnostic device performance. BSI products include PhotoLink surface-modification products.

BSI has received numerous SBIR awards since its inception in 1979. FY 1994 proved to be another successful year with seven Phase I awards and one Phase II award from the National Institutes of Health totaling over \$1.4 million. Awards in the past have also come from the DOD, NSF, DOE, NASA, and EPA.

One particularly successful surface-modification research-and-development area has been the creation of lubricous surfaces on medical devices. Medical devices currently on the market that use BSI's patented PhotoLink photoreagents include drug-infusion, chest-drainage, angioplasty and electrophysiology catheters, and ear-vent tubes.

Other product enhancements possible with the use of PhotoLink technology include hemocompatibility, watability, antimicrobial surfaces, reduced and improved tissue attachments, drug delivery and hydrophobicity. Immobilized biomolecules retain unusually high activity levels since the light-activated spacer technology holds the molecule of interest away from the device surface.

BSI is unique compared to most SBIR recipients in that its primary method of commercialization is through licensing. Currently, BSI has 38 license agreements in place covering over 70 different products or applications.

Licensing provides more widespread use of the technology than could be achieved through commercialization by BSI alone. Through this licensing strategy, further product development is largely financed by established licensees. This has enabled

BSI to expand the use of its SBIR-developed technologies far beyond the scope typically accessible to a small company. Private investors have also provided considerable capital.

Revenues for FY 1994 reached \$5.9 million. Management attributes the initial growth of BSI to the SBIR Program and continues to pursue SBIR funding for its conceptual feasibility research.

Cavitation-Control Technology, Inc.

Cavitation-Control Technology, Inc. is located in Farmington, Conn. The company's principal business is in medical research and development.

Between 1987 and 1993, Cav-Con received two SBIR Phase I awards and a Phase II award from the Department of Health and Human Services that together totaled \$600,000. These federal funds allowed Cav-Con to expand its medical research-and-development efforts to include collaboration on an extensive preclinical development program. The numerous journal publications that resulted from these HHS-supported studies have, in turn, directly assisted in attracting over \$1.1 million in private-sector funding. Ninety-three percent of these private funds are from pharmaceutical companies headquartered overseas, while essentially all such

funds are expended within the United States in support of Cav-Con's ongoing preclinical development work.

CFD Research Corporation

CFD Research Corporation in Huntsville, Ala., was founded with the goal of developing and effectively transferring technologies related to computational fluid dynamics. This goal is in synergy with the SBIR Program's commercialization objective.

Since its inception in 1987, the company has grown steadily to over 65 employees and more than \$6 million in annual revenue. About half of the work is devoted to research and development, and the remainder is focused on the applications and transfer of developed technology. Presently, CFDRC commercializes a suite of state-of-the-art engineering analysis software: CFD-VIEW, CFD-FASTRAN, CFD-ACE and CDF-GEOM. Each of these software packages had its genesis in a NASA or DOD SBIR project. These codes are currently used by industry (e.g., Chrysler, Caterpillar, Stanadyne, Applied Materials, IBM, and Motorola), as well as government agencies such as Navy/NAWC, Army/MICOM and Sandia National

Laboratories. CFDRC has also created several novel applications:

- biomedical studies for natural and prosthetic heart valves, vestibular (inner ear) mechanics, and an ultrasonic blood-flow meter;
- the design of low-NOX combustors and advanced fuel nozzles for aircraft engines and high-velocity injection nozzles for fire extinguishers;
- the optimization of diesel-fuel injectors for automotive companies, and Chemical Vapor Deposition reactors for semiconductor manufacturers; and
- an analysis of pilot-ejection seats and Air Turbo Rocket system components.

Some of the SBIR-funded nozzle designs are being considered by large corporations for potential use in their systems. CFDRC plans to continue to meet the challenges of the development and transfer of rapidly evolving technologies, as well as to continue as an active participant in the SBIR Program.

Cybernet Systems Corporation

Cybernet Systems Corporation of Ann Arbor, Mich., was founded in 1988. The firm provides innovative, leading-edge, quality solutions to complex problems using robotics, electromechanics, and hardware and software systems.

In 1989, NASA's Johnson Space Center granted Cybernet its first Phase I SBIR award. With this award, Cybernet developed the PER-Force (Programmable Environment Reality through Force) 6-Degrees-of-Freedom Handcontroller. Since then, Cybernet has successfully expanded and commercialized its force-reflecting virtual-reality product line with the continuing support of the SBIR Program.

Cybernet has worked with many federal laboratories, large and small businesses, not-for-profit institutions, and universities across the country. The company has a significant number of repeat federal and commercial customers: Ford Motor Company; A.I. DuPont Institute; NASA; ARPA; and the U.S. Air Force, Army, and Navy.

Cybernet employees have backgrounds in human factors, medical instrumentation, electronics, mechanical systems, software development, artificial intelligence, and robotics. The company develops more than ideas and designs; it measures its success by the tangible products it has built and produced.

Cybernet Systems is exploring the boundary between human performance and the machines mankind builds and controls. With SBIR sponsor-

ship, the company continues to extend human performance by combining the capabilities of man and machine to solve challenging, complex problems.

General Imaging Corporation

General Imaging Corporation is located in Alachua, Fl., in the University of Florida's Progress Center. Founded in 1985, the firm develops electronic X-ray imaging technology.

With the support of four SBIR awards from the U.S. Air Force (totalling \$1.5 million), the company has developed and licensed two solid-state electronic X-ray imaging systems. One is an intraoral X-ray imaging system for dental applications based on a direct-sensing, charge-coupled device array. The second system is a fiber-optically coupled array of CCDs for use in large-area X-ray imaging applications.

The dental X-ray system was licensed to Kaydex, a partnership formed between Yoshida Dental Equipment Manufacturing Company, Ltd. and its U.S. distributor, Kaycor International. The development of a second-generation prototype is expected to be completed in 1996; a 510-K application for FDA approval will be submitted shortly thereafter. It is expected that sales of the product could begin as early as December 1996.

The large-area X-ray imaging technology was licensed to Molecular Structure Corporation located in The Woodlands, Texas. MSC is the world's leading manufacturer of X-ray crystallography and X-ray diffraction instruments. The licensed technology will replace existing selenium-plate imaging technology. X-ray crystallography and diffraction instruments are used in materials research, including designer drugs for therapeutic and cancer therapy.

The SBIR Program has made the development of these technologies possible. For companies of this size, the SBIR Program is essential in obtaining funding for important high-risk technology-development programs that the private sector is unwilling to support.

Northwest Fuel Development, Inc.

Northwest Fuel Development, Inc. specializes in the development and utilization of waste methane. These fuel gas streams are available from a number of sources including coal mines, municipal waste-water-treatment plants and biomass processing facilities. The company's experience with these fuels ranges from power generation to chemical processing.

The Department of Energy's SBIR Program has provided the foundation for several projects administered by NW Fuel. One project led to the first commercial U.S. mine-site use of coal-mine waste methane. NW Fuel has developed, fabricated and installed power-generation facilities at two underground coal mines. Although these are relatively small units (less than 1 megawatt capacity each), they are commercially viable. Future expansion can increase the capacity of these units to the megawatt-plus level.

In addition to utilizing an energy resource that would otherwise be thrown away, the power-generation units also mitigate the emission of methane (a potent global-greenhouse gas) into the environment. NW Fuel is currently preparing a report to the EPA under its voluntary greenhouse-gas-emission reporting program. The company has identified the utilization and emission-mitigation of thousands of tons of methane during 1994. This is a direct result of the power generation units plus other methane emission controls that the company has implemented in association with these operations.

Other coal companies have applied the NW Fuel technology to run their methane exhaust blowers with their waste methane. This single SBIR project

has led to nearly \$1 million in capital investment at various coal mines with equipment that will continue to operate for decades.

Since electricity can be produced at very low cost in the coal-mining regions of the United States, additional technologies will need to be developed to fully utilize the waste methane. To that end, NW Fuel has undertaken the development of pressure-swing absorption processes for raising the waste methane gas quality to natural gas pipeline standards. The PSA processes provide potential for the economical removal of nitrogen in the waste-methane. The commercial viability of two different PSA processes currently under development by NW Fuel should be determined within the next two years. Development of these processes is also being supported by grants from DOE under its SBIR Program.

Another waste-methane source, agricultural biomass, is also being investigated by NW Fuel. Supported by an SBIR grant from the Department of Agriculture laboratory research for this effort is in progress at Oregon State University. The investigation will determine how much more methane can be produced from a combination of agricultural waste products compared to individual waste streams. Initial indications are that the anaerobic digestion of waste grass straw and dairy manure provides a synergistic effect to produce more methane than either of them as separate waste streams. The waste

methane would be burned in a power-generating unit similar to the one NW Fuel has developed for coal-mine applications.

The commercial success of the first minesite power-generating units prove the benefits of SBIR funding. No other federal or private effort has supported the research and development necessary for the successful implementation of this technology. Many other coal-mine waste-methane projects have been under development over the last two decades; however, the only commercial successes from those efforts have involved relatively simple issue of gas delivery to pipelines. The NW Fuel-DOE/SBIR effort has been the only one to develop a commercial process for utilizing non-pipeline quality waste methane from coal mines. In addition, the PSA development offers the potential for significantly broader use of coal-mine waste methane in the future.

Systems Planning and Analysis, Inc.

Systems Planning and Analysis, Inc. of Alexandria, Va., is an operations-research and technical and professional services firm. Its mission is to provide top-level decision-makers with timely assessments that integrate the technical, operational and programmatic aspects of strategic and defense issues. SPA assists senior executives and program/project

managers in defining key issues, trade offs, and cost-effectiveness alternatives.

SPA was incorporated in Maryland in 1972 and has been active as a small business since 1974. Initially specializing in the analysis of submarine and strategic issues, SPA first expanded its capabilities by undertaking anti-submarine warfare (ASW) analyses on behalf of the Navy in 1981. With the subsequent thawing of the Cold War, the ASW group reoriented its technical thrust toward multi warfare in the joint arena. This refocusing was facilitated by the winning of an SBIR award in 1988 for multi warfare integration analysis-technique development and a Phase II award in 1990 for the application of SPA's multi warfare-integration analysis techniques to existing naval-warfare issues. Since then SPA has been awarded a series of follow-on awards to expand the multi-warfare methodology — first to cover all navy joint mission areas, and then to integrate across the JMAs, developing investment balance review budget alternatives leading to the Navy's budget submission to the secretary of defense.

The Phase I SBIR award afforded SPA the opportunity to expand its analytical capabilities into multiwarfare analysis. SPA explored alternative approaches to integrating other warfare tasks such as anti-air warfare, anti-surface warfare, and strike warfare into a more comprehensive multi warfare-assessment methodology. The modular-analysis

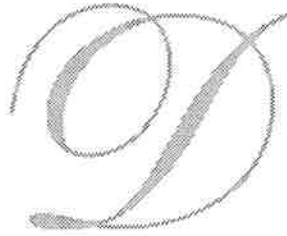
approach was viewed as promising and led to a Phase II award.

The Phase II SBIR award on multi warfare-assessment methodology was conducted through the Naval Surface Warfare Center at White Oak. A significant liaison also was established with the Space and Naval Warfare Systems Command and its Warfare System Architecture and Engineering office. The proposed modular approach was developed in the context of a naval-warfare operational situation that included a strike campaign with carrier-based aircraft and ship-based land attack cruise missiles, and a battlespace dominance or sea-control campaign that included threat submarines and air raids.

SPA applied the assessment methodology developed in Phase II to the problem of assessing the United States' ASW force requirements for the post-Cold-War environment. These requirements were developed in a multi warfare context and included cost-effectiveness as a key criteria.

Next the methodology was applied and expanded to conduct cost-effectiveness assessments in the Navy's newly established joint mission areas—for example, joint littoral warfare—that were designed to match the Naval services' requirements in the post-Cold War era. The result was that for the first time the Navy had a methodology that would allow trade-offs across JMAs.

SPA's work has led to real progress in the multi warfare-assessment arena and proved an excellent investment by expanding the state of the art of joint-warfare assessments for the Department of the Navy. The SBIR Program has been instrumental in SPA's ability to provide quality warfare assessments in a changing multipolar world.



Distribution of SBIR Awards

The geographic distribution maps (pages 27-28) show the distribution of FY 1994 SBIR awards (Phase I and Phase II combined) by state. The first map contains a state-by-state breakdown of all Phase I and Phase II awards. The second map provides a state-by-state breakdown of all FY 1994 SBIR awards to minority companies.

Exhibit One (pages 29-31) provides a more detailed look at the geographical distribution of SBIR awards, since it shows the amount of funding by metropolitan area (as defined by the Census Bureau). The metropolitan areas are listed in descending order by population (column 1). The next two columns, respectively, show the total FY 1994 SBIR funding and number of awards made to each metropolitan area. The last two columns contain the cumulative funding and SBIR awards for each metropolitan area.

Most SBIR awards (historically and in FY 1994) have gone to large metropolitan areas. However, small towns in rural settings are major participants in the SBIR Program. Totals of \$345 million (Phase I) and \$586 million (Phase II) have been awarded to communities with populations under 125,000. Taken as a group, these communities would rank first in the top five of all metropolitan areas in terms of cumulative dollars awarded. The following

areas received their first SBIR awards in FY 1994: Savannah, Ga.; Rapid City, S.D.; and Bismark, N.D.

The metropolitan areas have also been ranked by their combined Phase I and Phase II funding levels and number of awards for FY 1994, as well as cumulatively from FY 1983-94. Exhibit Two (page 32) contains the top 50 metropolitan areas. Large metropolitan areas dominate the ranking: 16 of the first 25 have populations greater than 1 million. The ranking is similar to that in FY 1993. The biggest gains were achieved by Cleveland-Akron, Ohio (from 41st to 37th place); and Norfolk-Virginia Beach-Newport News, VA, and Bryan-College Station, Texas, which did not make the top 50 last year.

In Exhibit Three (page 33) the metropolitan areas have been ranked in descending order by the cumulative number of their awards. If localities not part of a standard metropolitan statistical area (that is, localities generally with populations under 500,000) were listed, they would rank sixth in total SBIR awards received. Many of the communities with large numbers of SBIR awards are located near major universities or government laboratories.

The technology-investment policies of SBIR participating agencies are reflected in the level of funding they provide for awards in the various technology areas. These areas are listed in Exhibit Four (pages 34-37).

Exhibit Five (pages 38-39) summarizes the FY 1994 funding each participating agency provided in each technology area. The accompanying graph in Exhibit Six (page 40) illustrates the distribution of FY 1994 funds by technology for all agencies combined. Exhibit Seven (pages 41-42) and Exhibit Eight (page 43) show corresponding distributions for the entire program from FY 1983 through FY 1994.

Electronics device performance received the most funds and showed the most significant increase in funding in FY 1994. With regard to cumulative funding, optical devices and lasers surpassed information processing and management as the highest-funded technology area for the first time in the history of the SBIR Program.



Administrative Issues

New Office Designation

In December 1993, the Office of Innovation, Research and Technology was renamed the Office of Technology to reflect a broadened scope of activity.

Outreach and Awareness Package

In FY 1994, the Office of Technology engaged a contractor to create and distribute a new audiovisual package. The package was made available to all SBA field locations as well as the 11 agencies participating in the SBIR Program. The material was designed for viewing by people at different interest and knowledge levels. It also serves as a teaching outline and self-study package.

Publications Update

During FY 1994, all publicly distributed SBIR documents were updated and made available on the SBA's electronic bulletin board, SBA OnLine. The bulletin board can be accessed 24 hours a day via modem or the Internet, eliminating the printing, mailing and storage costs previously incurred for SBIR publications. Information is published on the bulletin board at the same time it is available in hard copy.

National Conferences

The Department of Defense and the National Science Foundation sponsored SBIR conferences in FY 1994 in Washington, D.C.; Seattle, WA.; and Houston, TX.

The SBA has offices located throughout the United States. For the one nearest you, look under "U.S. Government" in your telephone directory, or call the **SBA Answer Desk at (800) 8-ASK-SBA**. To send a fax to the SBA, dial (202) 205-7064. For the hearing impaired, the **TDD number is (704) 344-6640**.

To access the agency's electronic public information services, you may call the following:

- **SBA OnLine:** electronic bulletin board – modem and computer required
 - (800) 697-4636 (limited access)
 - (900) 463-4636 (full access)
 - (202) 401-9600 (D.C. metro area)
- **Internet:** using uniform resource locators (URLs)
 - **SBA Home Page:** <http://www.sba.gov>
 - **SBA gopher:** <gopher://gopher.sba.gov>
 - **File transfer protocol:** <ftp://ftp.sba.gov>
 - **Telnet:** <telnet://sbaonline.sba.gov>
 - **U.S. Business Advisor:** <http://www.business.gov>

You also may request a free copy of *The Resource Directory for Small Business Management*, a listing of for-sale publications and videotapes, from your local SBA office or the SBA Answer Desk.

GEOGRAPHIC DISTRIBUTION

FY 1994 PHASE I AND PHASE II AWARDS

(value in thousands)



GEOGRAPHIC DISTRIBUTION

FY 1994 PHASE I AND PHASE II AWARDS TO MINORITY COMPANIES

(value in thousands)



EXHIBIT ONE

DISTRIBUTION OF SBIR FUNDING BY METROPOLITAN AREAS (ordered by population)

<i>Metropolitan Area</i>	<i>Population (K)</i>	<i>FY 94 (\$K)</i>	<i>FY 94 No. of Awards</i>	<i>FY 83-94 (\$K)</i>	<i>FY 83-94 No. of Awards</i>
NEW YORK, NY	15529	22264	160	136063	851
LOS ANGELES, CA	13074	57235	358	358929	2094
CHICAGO-LAKE COUNTY, IL	7381	5944	40	54082	318
PHILADELPHIA, PA	5697	16747	150	138236	851
SAN FRANCISCO, CA	5534	58026	386	361826	2145
DETROIT-ANN ARBOR, MI	4600	8967	58	51361	317
BOSTON-LAWRENCE-SALEM-LOWELL	4055	80610	540	599255	3550
DALLAS-FT.WORTH, TX	3655	2904	23	28794	169
HOUSTON-GALVESTON, TX	3634	6289	42	37796	253
WASHINGTON, DC-MD-VA	3565	49030	304	327024	1992
MIAMI-FT. LAUDERDALE, FL	2912	1097	9	5024	38
CLEVELAND-AKRON, OH	2765	4959	36	19948	133
ATLANTA, GA	2560	3641	26	22843	155
ST. LOUIS, MO-IL	2438	828	9	6932	52
PITTSBURGH-BEAVER VALLEY, PA	2316	3818	20	24583	152
MINNEAPOLIS-ST. PAUL, MN-WI	2295	7843	65	50219	333
SEATTLE-TAKOMA, WA	2284	11267	67	80985	481
BALTIMORE, MD	2280	10154	66	53475	350
SAN DIEGO, CA	2201	27984	171	181815	1080
TAMPA-ST. PETE-CLEARWATER, FL	1914	501	6	3110	27
PHOENIX, AZ	1900	2535	18	18116	127
DENVER-BOULDER-LONGMONT, CO	1847	24257	141	120173	749
CINCINNATI-HAMILTON, OH, KY, IN	1690	895	7	5832	35
MILWAUKEE-RACINE, WI	1552	1130	9	6799	44
KANSAS CITY, MO-KS	1517	1472	7	5694	40
NEW ORLEANS, LA	1334	384	5	5709	50
NORFOLK-VA BEACH-NEWPORT NEWS, VA	1309	2841	14	12889	85

<i>Metropolitan Area</i>	<i>Population (K)</i>	<i>FY 94 (\$K)</i>	<i>FY 94 No. of Awards</i>	<i>FY 83-94 (\$K)</i>	<i>FY 83-94 No. of Awards</i>
COLUMBUS, OH	1299	1755	14	16175	99
SACRAMENTO, CA	1291	1120	13	12421	81
SAN ANTONIO, TX	1276	2721	15	13841	96
INDIANAPOLIS, IN	1212	231	3	3432	28
BUFFALO-NIAGRA, NY	1181	3811	27	34184	184
JACKSONVILLE, DAYTONA BEACH, FL	1173	26	1	792	6
PORTLAND, OR	1152	2879	23	11139	74
PROVIDENCE-PAWTUCKET, RI	1108	1934	13	19401	109
CHARLOTTE-GASTONIA, NC	1065	749	3	905	6
SALT LAKE CITY-OGDEN, UT	1061	5049	35	52843	307
OKLAHOMA CITY, OK	982	559	2	3143	23
ROCHESTER, NY	980	1854	10	16694	92
HARTFORD-NEW BRITAIN-BRISTOL, CT	967	5454	36	43693	255
LOUISVILLE, KY-IN	962	1152	6	3151	20
MEMPHIS, TN-AR-MS	959	73	1	1724	14
MIDDLESEX-SOMMERSET-HUNTER, NJ	950	5221	21	25682	157
MONMOUTH-OCEAN, NJ	935	670	2	6738	40
DAYTON-SPRINGFIELD, OH	933	8322	49	55869	313
NASHVILLE, TN	930	760	5	3427	31
BIRMINGHAM, AL	911	745	4	5348	35
GREENSBORO-WINSTON SALEM-HILLTOP, NC	899	1122	8	3911	25
ORLANDO, FL	898	2684	20	25283	139
ALBANY-SCHENECTADY, NY	843	4949	35	21009	138
HONOLULU, HI	816	2156	16	13097	81
RICHMOND-PETERSBERG, VA	810	678	2	2662	15

EXHIBIT ONE

DISTRIBUTION OF SBIR FUNDING BY METROPOLITAN AREAS (ordered by population)

<i>Metropolitan Area</i>	<i>Population (K)</i>	<i>FY 94 (\$K)</i>	<i>FY 94 No. of Awards</i>	<i>FY 83-94 (\$K)</i>	<i>FY 83-94 No. of Awards</i>	<i>Metropolitan Area</i>	<i>Population (K)</i>	<i>FY 94 (\$K)</i>	<i>FY 94 No. of Awards</i>	<i>FY 83-94 (\$K)</i>	<i>FY 83-94 No. of Awards</i>
WEST PALM BEACH-BOCA RATON, FL	755	911	11	7138	39	CHATTANOOGA, TN-GA	425	4150	19	10965	56
STOCKTON-MODESTO, CA	749	100	1	1285	7	LANSING-E LANSING, MI	424	883	6	5134	34
TULSA, OK	733	67	1	4360	31	WORCESTER, MA	407	2240	14	17262	95
AUSTIN, TX	726	5407	28	29094	164	SAGINAW-BAY CITY-MIDLAND, MI	403	0	0	1247	9
SCRANTON, PA	725	0	0	594	3	CANTON, OH	400	75	1	495	6
ALLENTOWN-BETHLEHEM, PA-NJ	656	322	5	5966	45	YORK, PA	397	0	0	250	3
RALEIGH-DURHAM, NC	650	6661	40	38856	239	LANCASTER, PA	393	2007	10	17357	81
SYRACUSE, NY	649	1758	9	6741	39	JACKSON, MS	392	50	1	326	4
GRAND RAPIDS, MI	648	0	0	244	2	DES MOINES, IA	381	190	3	2466	19
OMAHA, NE-IA	614	0	0	541	7	COLORADO SPRINGS, CO	380	2636	22	20107	120
TOLEDO, OH	611	369	5	7031	48	MELBOURNE-TITUSVILLE-PALM BEACH, FL	361	1988	14	27101	152
GREENVILLE-SPARTANBURG, SC	606	116	2	622	7	SPOKANE, WA	356	853	6	4434	29
TUCSON, AZ	602	7248	41	31833	195	FORT WAYNE, IN	356	70	1	370	3
NEW HAVEN-MERIDEN-MIDDLETON, CT	596	6171	42	39097	228	MADISON, WI	344	3395	27	13776	90
KNOXVILLE, TN	591	3349	19	33852	179	SALINAS-SEASIDE-MONTEREY, CA	339	1596	5	4212	20
HARRISBURG-LEBANON-CARLISLE, PA	577	831	1	1341	7	SANTA BARBARA-SANTA MARIA, CA	339	6964	37	38484	218
LAS VEGAS, NV	569	70	1	4564	23	PENSACOLA, FL	337	54	1	3405	20
EL PASO, TX	561	0	0	50	1	LEXINGTON, KY	332	173	3	1894	18
BATON ROUGE, LA	545	0	0	2132	9	READING, PA	321	0	0	538	2
SPRINGFIELD, MA	517	1339	9	7274	54	UTICA-ROME, NY	315	1393	7	6440	38
YOUNGSTOWN, OH	510	0	0	50	1	APPLETON-OSHKOSH-NEENAH, WI	307	0	0	890	6
LITTLE ROCK-N LITTLE ROCK, AR	505	315	3	1705	11	ATLANTIC CITY, NJ	297	350	1	1722	8
CHARLESTON, SC	485	50	1	525	5	EUGENE-SPRINGFIELD, OR	263	4044	10	12253	57
ALBUQUERQUE, NM	474	6685	47	64184	384	SALEM, OR	262	1169	9	4252	30
WICHITA, KS	470	70	1	299	3	BINGHAMTON, NY	261	0	0	3314	12
COLUMBIA, SC	444	68	1	427	3	NEW LONDON-NORWICH, CT-RI	259	1951	9	5194	37
FLINT, MI	434	0	0	1114	5	POUGHKEEPSIE, NY	256	1679	15	12065	88

EXHIBIT ONE

DISTRIBUTION OF SBIR FUNDING BY METROPOLITAN AREAS

(ordered by population)

<i>Metropolitan Area</i>	<i>Population (K)</i>	<i>FY 94 (\$K)</i>	<i>FY 94 No. of Awards</i>	<i>FY 83-94 (\$K)</i>	<i>FY 83-94 No. of Awards</i>	<i>Metropolitan Area</i>	<i>Population (K)</i>	<i>FY 94 (\$K)</i>	<i>FY 94 No. of Awards</i>	<i>FY 83-94 (\$K)</i>	<i>FY 83-94 No. of Awards</i>
DULUTH, MN-WI	243	0	0	35	1	MEDFORD, OR	140	50	1	100	2
SOUTH BEND-MISHAWAKA, IN	241	47	1	1188	7	REDDING, CA	133	0	0	49	1
PROVO-OREM, UT	240	263	3	3180	21	PASCAGOULA, MS	128	0	0	348	4
SAVANNAH, GA	239	75	1	75	1	BURLINGTON, VT	124	1178	6	7479	45
ANCHORAGE, AK	235	0	0	543	2	LAFAYETTE-W LAFAYETTE, IN	124	145	3	4068	24
HUNTSVILLE, AL	233	9990	63	55052	315	LAS CRUCES, NM	123	881	4	8046	45
ROANOKE, VA	224	5131	30	27846	180	BLOOMINGTON-NORMAL, IL	122	0	0	196	2
RENO, NV	224	427	3	6722	32	CHARLOTTESVILLE, VA	121	1867	16	7617	50
TALLAHASSEE, FL	218	50	1	294	4	BRYAN-COLLEGE STATION, TX	120	2402	21	12428	86
KALAMAZOO, MI	217	42	1	1235	8	LAWTON, OK	120	71	1	3563	16
PORTSMOUTH-DOVER-ROCHESTER, NH	215	519	3	3781	26	STATE COLLEGE, PA	114	705	3	3077	23
WATERBURY, CT	211	1613	8	20141	89	BELLINGHAM, WA	113	401	3	2189	12
PORTLAND, ME	205	1286	7	9225	57	MIDLAND, TX	111	0	0	646	4
GAINESVILLE, FL	199	1774	10	11707	77	FAYETTEVILLE-SPRINGDALE, AR	107	514	1	2709	15
WACO, TX	187	0	0	50	1	SANTA FE, NM	106	656	10	12700	71
YAKIMA, WA	183	65	1	315	4	BLOOMINGTON, IN	101	210	3	5080	30
CHAMPAIGN-URBANA-RANTOUL, IL	171	472	4	9558	56	KOKOMO, IN	101	0	0	50	1
ASHEVILLE, NC	170	150	2	441	5	ROCHESTER, MN	98	0	0	295	3
CEDAR RAPIDS, IA	168	55	1	2226	13	FITCHBURG-LEOMINSTER, MA	96	722	3	3379	25
NASHUA, NH	163	1603	16	5212	42	ELMIRA, NY	90	2755	19	17049	99
TOPEKA, KS	160	50	1	1215	7	BISMARK, ND	86	50	1	50	1
WATERLOO-CEDAR FALLS, IA	151	0	0	555	3	BANGOR, ME	83	100	1	143	2
OLYMPIA, WA	146	145	2	2459	17	PITTSFIELD, MA	80	69	1	655	6
FARGO-MOOREHEAD, ND-MN	145	0	0	50	1	VICTORIA, TX	75	49	1	49	1
MANCHESTER, NH	145	1014	4	2594	12	RAPID CITY, SD	75	0	0	374	4
JACKSON, MI	144	0	0	250	3	CASPER, WY	71	0	0	33	1
ATHENS, GA	141	75	1	2248	13	GRAND FORKS, ND	69	125	2	1284	10

EXHIBIT TWO

SBIR AWARDS BY METROPOLITAN AREAS

(ordered by total dollars, FY 83-94)

<i>Metropolitan Area</i>	<i>Population (K)</i>	<i>FY 94 (\$K)</i>	<i>FY 94 No. of Awards</i>	<i>FY 83-94 (\$K)</i>	<i>FY 83-94 No. of Awards</i>	<i>Metropolitan Area</i>	<i>Population (K)</i>	<i>FY 94 (\$K)</i>	<i>FY 94 No. of Awards</i>	<i>FY 83-94 (\$K)</i>	<i>FY 83-94 No. of Awards</i>
BOSTON-LAWRENCE-SALEM-LOWELL, MA	4055	80610	540	599255	3550	AUSTIN, TX	726	5407	28	29094	164
SAN FRANCISCO, CA	5534	58026	386	361826	2145	DALLAS-FT.WORTH AREA	3655	2904	23	28794	169
LOS ANGELES, CA	13074	57235	358	358929	2094	ROANOKE, VA	224	5131	30	27846	180
WASHINGTON, DC-MD-VA	3565	49030	304	327024	1992	MELBOURNE-TITUSVILLE-PALM BEACH, FL	361	1988	14	27101	152
SAN DIEGO, CA	2201	27984	171	181815	1080	MIDDLESEX-SOMMERSET, NJ	950	5221	21	25682	157
PHILADELPHIA, PA	5697	16747	150	138236	851	ORLANDO, FL	898	2684	20	25283	139
NEW YORK, PA	15529	22264	160	136063	851	PITTSBURGH-BEAVER VALLEY, PA	2316	3818	20	24583	152
DENVER-BOULDER-LONGMONT, CO	1847	24257	141	120173	749	ATLANTA, GA	2560	3641	26	22843	155
SEATTLE-TAKOMA, WA	2284	11267	67	80985	481	ALBANY-SCHENECTADY, NY	843	4949	35	21009	138
ALBUQUERQUE, NM	474	6685	47	64184	384	WATERBURY, CT	211	1613	8	20141	89
DAYTON-SPRINGFIELD, OH	933	8322	49	55869	313	COLORADO SPRINGS, CO	380	2636	22	20107	120
HUNTSVILLE, AL	233	9990	63	55052	315	CLEVELAND-AKRON AREA	2765	4959	36	19948	133
CHICAGO-LAKE COUNTY, IL	7381	5944	40	54082	318	PROVIDENCE-PAWTUCKET-FALL RIVERS, RI	1108	1934	13	19401	109
BALTIMORE, MD	2280	10154	66	53475	350	PHOENIX, AZ	1900	2535	18	18116	127
SALT LAKE CITY-OGDEN, UT	1041	5049	35	52843	307	LANCASTER, PA	393	2007	10	17357	81
DETROIT-ANN ARBOR, MI	4600	8967	58	51361	317	WORCESTER, MA	407	2240	14	17262	95
MINNEAPOLIS-ST PAUL, MN-WI	2295	7843	65	50219	333	ELMIRA, NY	90	2755	19	17049	99
HARTFORD-NEW BRITAIN-BRISTOL, CT	967	5454	36	43692	255	ROCHESTER, NY	980	1854	10	16694	92
NEW HAVEN-MERIDEN-MIDDLETON	596	6171	42	39097	228	COLUMBUS, OH	1299	1755	14	16175	99
RALEIGH-DURHAM, NC	650	6661	40	38856	239	SAN ANTONIO, TX	1276	2721	15	13841	96
SANTA BARBARA-SANTA MARIA, CA	339	6964	37	38484	218	MADISON, WI	344	3395	27	13776	90
HOUSTON-GALVESTON, TX	3634	6289	42	37796	253	HONOLULU, HI	816	2156	16	13097	81
BUFFALO-NIAGARA FALLS, NY	1181	3811	27	34184	184	NORFOLK-VA BEACH-NEWPORT NEWS, VA	1309	2841	14	12889	85
KNOXVILLE, TN	591	3349	19	33852	179	SANTA FE, NM	106	656	10	12700	71
TUCSON, AZ	602	7248	41	31833	195	BRYAN-COLLEGE STATION, TX	120	2402	21	12428	86

EXHIBIT THREE

SBIR AWARDS BY METROPOLITAN AREAS

(ordered by FY 83-94 decreasing # of awards)

<i>Metropolitan Area</i>	<i>Pop. (K)</i>	<i>FY 94 (\$K)</i>	<i>FY 94 No. of Awards</i>	<i>FY 83-94 (\$K)</i>	<i>FY 83-94 No. of Awards</i>	<i>Metropolitan Area</i>	<i>Pop. (K)</i>	<i>FY 94 (\$K)</i>	<i>FY 94 No. of Awards</i>	<i>FY 83-94 (\$K)</i>	<i>FY 83-94 No. of Awards</i>
BOSTON, LAWRENCE, SALEM, LOWELL	4,055	80610	540	599255	3550	KNOXVILLE, TN	591	3349	19	33852	179
SAN FRANCISCO, CA	5534	58026	386	361825	2145	DALLAS-FT.WORTH, TX	3655	2904	23	28794	169
LOS ANGELES, CA	13074	57235	358	358929	2094	AUSTIN, TX	726	5407	28	29094	164
WASHINGTON, DC-MD-VA	3565	49030	304	327024	1992	MIDDLESEX-SOMMERSET, NJ	950	5221	21	25682	157
SAN DIEGO, CA	2201	27984	171	181815	1080	ATLANTA, GA	2560	3641	26	22843	155
PHILADELPHIA, PA	5697	16747	150	138236	851	MELBOURNE-TITUSVILLE-PALM BEACH, FL	361	1988	14	27101	152
NEW YORK, NY	15529	22264	160	136063	851	PITTSBURGH-BEAVERTON VALLEY, PA	2316	3818	20	24583	152
DENVER-BOULDER-LONGMONT, CO	1847	24257	141	120173	749	ORLANDO, FL	898	2684	20	25283	139
SEATTLE-TAKOMA, WA	2284	11267	67	80985	481	ALBANY-SCHENECTADY, NY	843	4949	35	21009	138
ALBUQUERQUE, NM	474	6685	47	64184	384	CLEVELAND-AKRON, OH	2765	4959	36	19948	133
BALTIMORE, MD	2280	10154	66	53475	350	PHOENIX, AZ	1900	2535	18	18116	127
MINNEAPOLIS-ST PAUL, MN-WI	2295	7843	65	50219	333	COLORADO SPRINGS, CO	380	2636	22	20107	120
CHICAGO-LAKE COUNTY, IL	7381	5944	40	54082	318	PROVIDENCE-PAWTUCKET- FALL RIVERS, RI	1108	1934	13	19401	109
DETROIT-ANN ARBOR, MI	4600	8967	58	51361	317	ELMIRA, NY	90	2755	19	17049	99
HUNTSVILLE, AL	233	9990	63	55052	315	COLUMBUS, OH	1299	1755	14	16175	99
DAYTON-SPRINGFIELD, OH	933	8322	49	55869	313	SAN ANTONIO, TX	1276	2721	15	13841	96
SALT LAKE CITY-OGDEN, UT	1041	5049	35	52843	307	WORCESTER, MA	407	2240	14	17262	95
HARTFORD-NEW BRITAIN-BRISTOL, CT	967	5454	36	43693	255	ROCHESTER, NY	980	1854	10	16694	92
HOUSTON, GALVESTON, TX	3634	6289	42	37796	253	MADISON, WI	344	3395	27	13776	90
RALEIGH-DURHAM, NC	650	6661	40	38856	239	WATERBURY, CT	211	1613	8	20141	89
NEW HAVEN-MERIDEN-MIDDLETON, CT	596	6171	42	39097	228	POUGHKEEPSIE, NY	256	1679	15	12065	88
SANTA BARBARA-SANTA MARIA, CA	339	6964	37	38484	218	BRYAN-COLLEGE STATION, TX	120	2402	21	12428	86
TUCSON, AZ	602	7248	41	31833	195	NORFOLK-VA BEACH-NEWPORT NEWS	1309	2841	14	12889	85
BUFFALO-NIAGARA FALLS, NY	1181	3811	27	34184	184	LANCASTER, PA	393	2007	10	17357	81
ROANOKE, VA	224	5131	30	27846	180	HONOLULU, HI	816	2156	16	13097	81

EXHIBIT FOUR

TECHNOLOGY AREAS

1000 COMPUTER, INFORMATION PROCESSING, ANALYSIS

1100 Computer and communication systems

- 1110 Computer systems technology
- 1120 Communication and control systems
- 1130 Networks and architectures
- 1140 Computer security

1200 Information processing and management

- 1210 Data and information processing
- 1220 Artificial intelligence
- 1230 Computer software
- 1240 Robotics and automation
- 1250 Man-machine interface

1300 Signal and image processing

- 1310 Signal processing
- 1320 Image processing
- 1330 Navigation, guidance, positioning

1400 Systems studies

- 1410 General studies
- 1420 Operations and systems analysis
- 1430 Safety systems, health and risk analysis

1500 Mathematical sciences

- 1510 Math fundamentals
- 1520 Numerical modeling
- 1530 Math modeling

2000 ELECTRONICS

2100 Microelectronics

- 2110 Microelectronics: materials, concepts, processing
- 2120 Compound semiconductors
- 2130 Photovoltaics
- 2140 Optoelectronics

2200 Electronics device performance

- 2210 Electronic device performance, packaging, reliability
- 2220 Radiation damage and hardening
- 2230 Testability

2300 Electronic equipment and instrumentation

- 2310 Electronic equipment and systems
- 2320 Data-and information-processing equipment
- 2330 Sensors, transducers, instrumentation
- 2320 Data-and information-processing equipment
- 2330 Sensors, transducers, instrumentation

2400 Electromagnetic radiation/propagation

- 2410 RF technology
- 2420 Electronic warfare
- 2430 Target detection
- 2440 Metal and mine detection

2500 Microwave and millimeter wave electronics

- 2510 Microwave electronics
- 2520 Millimeter wave electronics

2600 Optical devices and lasers

- 2610 Optical-and IR sensors, components
- 2620 Optical-fiber technology
- 2630 Laser technology
- 2640 Higher-frequency EM radiation

EXHIBIT FOUR

TECHNOLOGY AREAS

3000 MATERIALS

3100 Advanced materials

- 3110 Metallic, magnetic, highT, conducting & superconducting materials
- 3120 Polymers
- 3130 Ceramics
- 3140 Composites and lightweight materials
- 3150 Construction materials
- 3160 Fire, fabric, and insulation materials
- 3170 EM transparent materials
- 3180 Biomaterials

3200 Materials processing and manufacturing

- 3210 Materials processing
- 3220 Manufacturing methods
- 3230 Joining and welding technology
- 3240 Separation/characterization of multiphases

3300 Coatings, corrosion and surface phenomena

- 3310 Corrosion
- 3320 Coatings
- 3330 Thin films and surfaces

3400 Materials performance

- 3410 Failure, fracture, fatigue
- 3420 Lubrication, wear and seals
- 3430 Repair
- 3440 Nondestructive evaluation

3500 Fundamentals and instrumentation

- 3510 Materials fundamentals/general
- 3520 Instrumentation

4000 MECHANICAL PERFORMANCE OF VEHICLES, WEAPONS, FACILITIES

4100 Hydrodynamics

- 4110 Hydrodynamics
- 4120 Watercraft

4200 Aerodynamics

- 4210 Fundamental aerodynamics
- 4220 Aerodynamic performance
- 4230 Aerodynamic facilities, instrumentation

4300 Acoustics

- 4310 Underwater acoustic detection and communication
- 4320 Vibration-related acoustics

4400 Mechanical performance of structures and equipment

- 4410 Shock vibration and structural performance of vehicles, facilities, equipment
- 4420 New structural concepts
- 4430 Performance of engine, equipment, mechanical components
- 4440 Weapons performance and effects

4500 Control

- 4510 Control concepts
- 4520 Vehicle/weapon motion control
- 4530 Structural controls

4600 Mechanical measurements

- 4610 Mechanical measurements (pressure, velocity, etc.)

EXHIBIT FOUR

TECHNOLOGY AREAS

5000 ENERGY CONVERSION AND USE

5100 Transport sciences

- 5110 Fluid mechanics
- 5120 Flow/fluid measurement and enhancement
- 5130 Heat transfer
- 5140 Refrigeration/cryogenics

5200 Propulsion/combustion technology

- 5210 Propulsion systems
- 5220 Propellants, fuels, explosives
- 5230 Combustion
- 5240 Fire detection
- 5250 Exhaust gases and gas analysis

5300 Large scale energy usage

- 5310 Industrial energy processes and utilization
- 5320 Physics, nuclear physics, fusion and plasma
- 5330 Energy use in buildings

5400 Energy conversion/electric power

- 5410 Batteries, fuel cells, electrochemistry, energy storage
- 5420 Alternative energy conversion
- 5430 Electric power technology

6000 ENVIRONMENT AND NATURAL RESOURCES

6100 Ocean science

- 6110 Ocean science and instrumentation

6200 Atmospheric science

- 6210 Atmospheric science and monitoring
- 6220 Remote sensing
- 6230 Chemical and biological measurement
- 6240 Particulates and aerosols
- 6250 Pollution abatement and environment control

6300 Water management

- 6310 Water monitoring and characterization
- 6320 Water treatment
- 6330 Water management and utilization
- 6340 Ice, snow, frost detection

6400 Earth sciences

- 6410 Earth sciences
- 6420 Soil measurement and manipulation

6500 Environment protection

- 6510 Nuclear, chemical, biological waste management
- 6520 CBR defense

EXHIBIT FOUR

TECHNOLOGY AREAS

7000 LIFE SCIENCES

7100 Medical instrumentation

- 7110 Medical measurements
- 7120 Measurements/techniques for radiation/imagery
- 7130 Medical devices
- 7140 Devices/systems for physically impaired

7200 Biotechnology and microbiology

- 7210 Biotechnology and genetic engineering
- 7220 Cellular biology
- 7230 Drugs, vaccines, toxicity, immunology, therapeutic agents
- 7240 Disease detection and screening

7300 Behavioral sciences

- 7310 Behavior, human factors, cognition
- 7320 Training, testing, simulation
- 7330 Social studies

7400 Physiology and miscellaneous

- 7410 Physiological mechanisms, injury, miscellaneous
- 7420 Dental
- 7430 Food, nutrition, agriculture
- 7440 Biotic resources
- 7450 Animal models and veterinary medicine
- 7460 Plant physiology

EXHIBIT FIVE
FY 1994 PHASE I AND II AWARDS BY TECHNOLOGY AREA AND AGENCY
(dollars in thousands)

		<i>DOD</i>	<i>DOE</i>	<i>NASA</i>	<i>HHS</i>	<i>NSF</i>	<i>DOT</i>	<i>EPA</i>	<i>NRC</i>	<i>ED</i>	<i>DOA</i>	<i>DOC</i>	<i>TOTAL</i>
1000	Computer, Information Processing, Analysis												
1100	Computer and communication systems	53323	5318	7357	16637	7885	1994	0	200	1410	150	941	95213
1200	Information processing and management	23715	1348	3644	10621	3470	928	165	150	702	330	594	45668
1300	Signal and image processing	26658	1423	3864	6338	2976	1990	0	0	40	330	547	44167
1400	Systems studies	4516	150	135	738	65	778	0	176	0	0	0	6557
1500	Mathematical sciences	2404	0	1733	0	784	0	0	0	0	100	0	5022
2000	Electronics												
2100	Microelectronics	35849	4861	7455	2379	3325	0	0	0	0	245	444	54558
2200	Electronics device performance	13201	16826	38355	18721	19338	499	420	50	971	845	349	109576
2300	Equipment/electronic and instrumentation	20905	2857	3926	4239	1646	1769	0	300	0	760	549	36952
2400	Electromagnetic radiation/propagation	20405	9519	1026	79	840	300	110	0	316	50	295	32940
2500	Microwave/and millimeter wave electronics	2016	149	492	75	584	0	0	0	0	0	0	3316
2600	Optical devices and lasers	48533	4342	12868	8620	5348	883	0	100	0	300	350	81346
3000	Materials												
3100	Advanced materials	33559	22210	8284	18965	20419	1062	769	173	524	545	350	106859
3200	Materials/ processing/manufacturing	17182	4644	1372	1906	3014	0	494	0	0	778	147	29538
3300	Coatings, Corrosion and surface phenomena	26590	6745	3945	805	2833	0	495	0	0	50	348	41812
3400	Materials performance	7761	3595	1107	722	649	820	0	0	0	23	50	14726
3500	Fundamentals/Instrumentation	4004	150	1687	1702	683	0	0	250	0	61	50	8586

**multiple technology areas assigned to awards*

Note: Totals have been computed using a newer, more advanced and exacting computational system. This system will be used for all future generations of this report.

EXHIBIT FIVE
FY 1994 PHASE I AND II AWARDS BY TECHNOLOGY AREA AND AGENCY
(dollars in thousands)

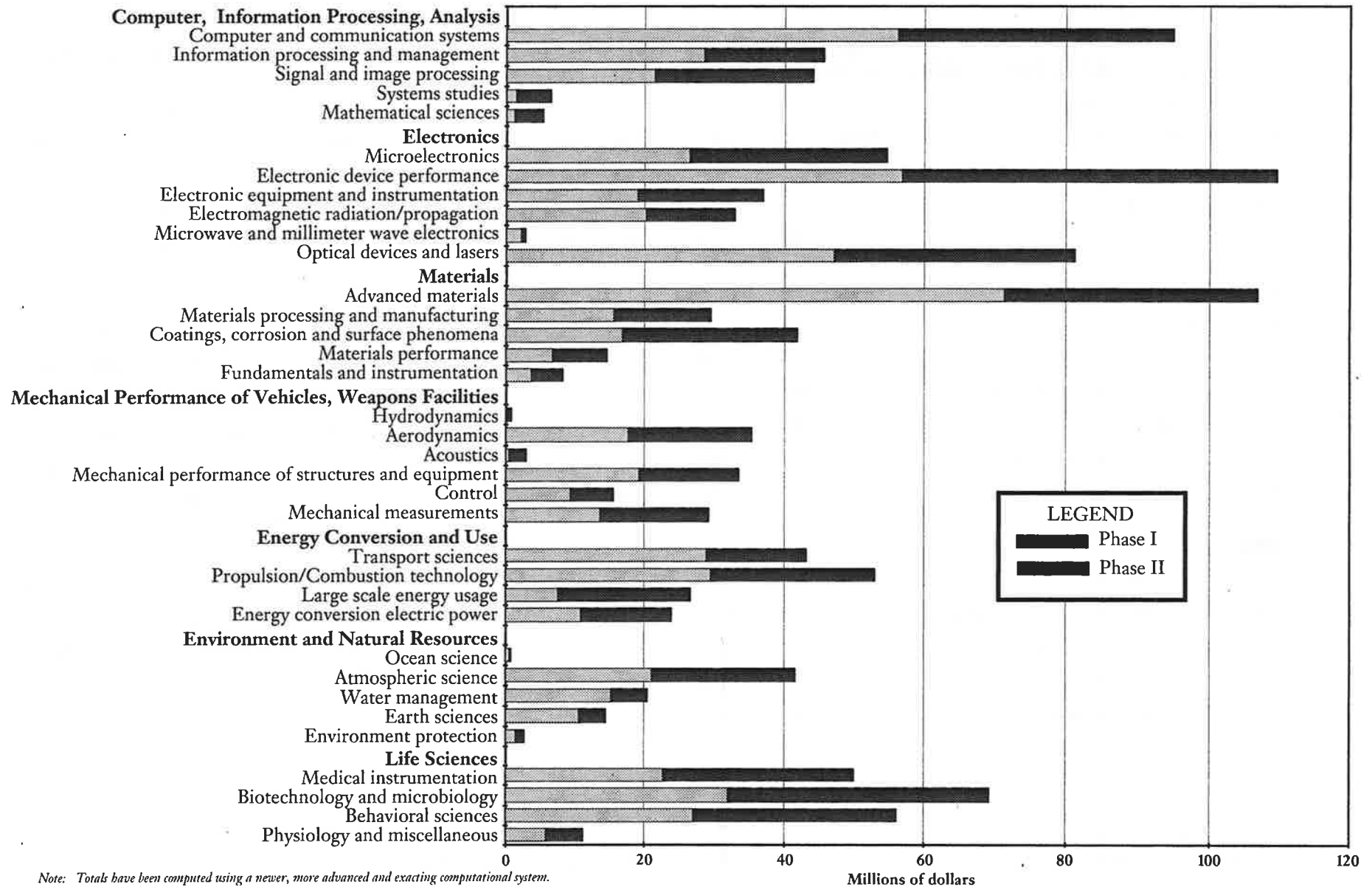
		<i>DOD</i>	<i>DOE</i>	<i>NASA</i>	<i>HHS</i>	<i>NSF</i>	<i>DOT</i>	<i>EPA</i>	<i>NRC</i>	<i>ED</i>	<i>DOA</i>	<i>DOC</i>	<i>TOTAL</i>
4000	Mechanical Performance of Vehicles, Weapons, Facilities												
4100	Hydrodynamics	698	0	0	0	0	0	0	0	0	0	0	698
4200	Aerodynamics	27280	222	6209	81	712	424	0	0	0	50	298	35277
4300	Acoustics	2835	0	139	0	130	0	0	0	0	50	47	3201
4400	Mechanical performance of structures and equipment	24740	1421	3630	1312	2074	95	0	0	40	161	150	33622
4500	Control	8195	2169	1196	3333	499	49	0	0	40	50	149	15780
4600	Mechanical measurements	13067	7045	2654	3343	1107	1036	330	223	0	315	198	29318
5000	Energy Conversion and Use												
5100	Transport sciences	21376	5609	6893	4457	3803	199	165	50	0	244	383	43179
5200	Propulsion/combustion technology	25157	13398	6467	1883	2863	2097	550	50	0	150	400	53013
5300	Large-scale energy usage	7470	13176	2333	2272	839	0	165	0	40	265	198	26759
5400	Energy conversion/electric power	12880	4574	4739	909	735	0	0	0	0	200	0	24037
6000	Environment and Natural Resources												
6100	Ocean science	0	0	0	0	295	0	0	0	0	0	0	295
6200	Atmospheric sciences	17490	6898	6121	3455	3179	1811	1251	150	0	945	447	41748
6300	Water management	9379	1926	3703	1644	1857	197	770	50	0	1020	148	20693
6400	Earth sciences	8340	2243	93	1260	1457	249	0	100	40	800	49	14630
6500	Environment protection	2172	150	570	0	65	0	55	0	0	50	0	3061
7000	Life Sciences												
7100	Medical instrumentation	9825	3292	2608	30805	2240	299	330	100	200	100	298	50097
7200	Biotechnology and microbiology	9150	3143	1691	51448	1703	337	165	0	0	1367	0	69004
7300	Behavioral science	26041	6740	2675	14325	2657	422	330	764	1135	713	345	56146
7400	Physiology and miscellaneous	1419	0	923	6293	890	0	0	0	40	1688	100	11353

*multiple technology areas assigned to awards

EXHIBIT SIX

DISTRIBUTION OF FY 1983-94 PHASE I AND II AWARDS AMONG TECHNOLOGY AREAS

(multiple technology areas assigned to awards)



Note: Totals have been computed using a newer, more advanced and exacting computational system.
This system will be used for all future generations of this report.

EXHIBIT SEVEN
FY 1983-94 PHASE I AND II AWARDS BY TECHNOLOGY AREA AND AGENCY
(dollars in thousands)

		<i>DOD</i>	<i>DOE</i>	<i>NASA</i>	<i>HHS</i>	<i>NSF</i>	<i>DOT</i>	<i>EPA</i>	<i>NRC</i>	<i>ED</i>	<i>DOA</i>	<i>DOC</i>	<i>TOTAL</i>
1000	Computer, Information Processing, Analysis												
1100	Computer and communication systems	212911	20107	37636	48421	18160	6119	50	910	5282	822	1549	351967
1200	Information processing and management	262380	23711	88219	76729	21861	4745	415	1241	8591	2246	1930	492069
1300	Signal and image processing	206333	12874	46738	30927	12776	7759	0	481	693	830	2571	321983
1400	Systems studies	84663	6357	8081	17790	2826	3198	250	3601	1094	2262	0	130121
1500	Mathematical sciences	77244	3905	49233	12825	9627	643	200	2493	188	379	330	157067
2000	Electronics												
2100	Microelectronics	199551	21068	34090	4004	20874	541	0	243	0	345	514	281231
2200	Electronics device performance	71232	22150	52622	27821	21193	1291	570	646	1317	1381	453	200676
2300	Electronic equipment and instrumentation	174123	41547	50162	29740	12921	6001	2171	1756	2060	3716	1764	325961
2400	Electromagnetic radiation/propagation	216574	12483	6480	2223	2927	1877	507	50	346	99	980	244646
2500	Microwave and millimeter wave electronics	59352	6360	13263	1165	1037	49	49	0	30	0	227	81531
2600	Optical devices and lasers	299146	51358	84007	46331	24601	4171	1201	1901	87	1559	2189	516551
3000	Materials												
3100	Advanced materials	249550	79358	64649	39656	41286	7430	2864	340	554	4557	954	491198
3200	Materials processing and manufacturing	81757	42108	29348	13111	20413	1058	5012	350	30	2737	912	196836
3300	Coatings, corrosion and surface phenomena	146040	34203	34506	16134	20063	787	3630	100	0	899	418	256781
3400	Materials performance	85745	19391	20180	2082	12164	6173	275	1371	0	1638	320	149339
3500	Fundamentals and instrumentation	21944	9158	13519	22948	9511	422	1289	476	0	303	815	80385

**multiple technology areas assigned to awards*

Note: Totals have been computed using a newer more advanced and exacting computational system. This system will be used for all future generations of this report.

EXHIBIT SEVEN

FY 1983-94 PHASE I AND II AWARDS BY TECHNOLOGY AREA AND AGENCY

(dollars in thousands)

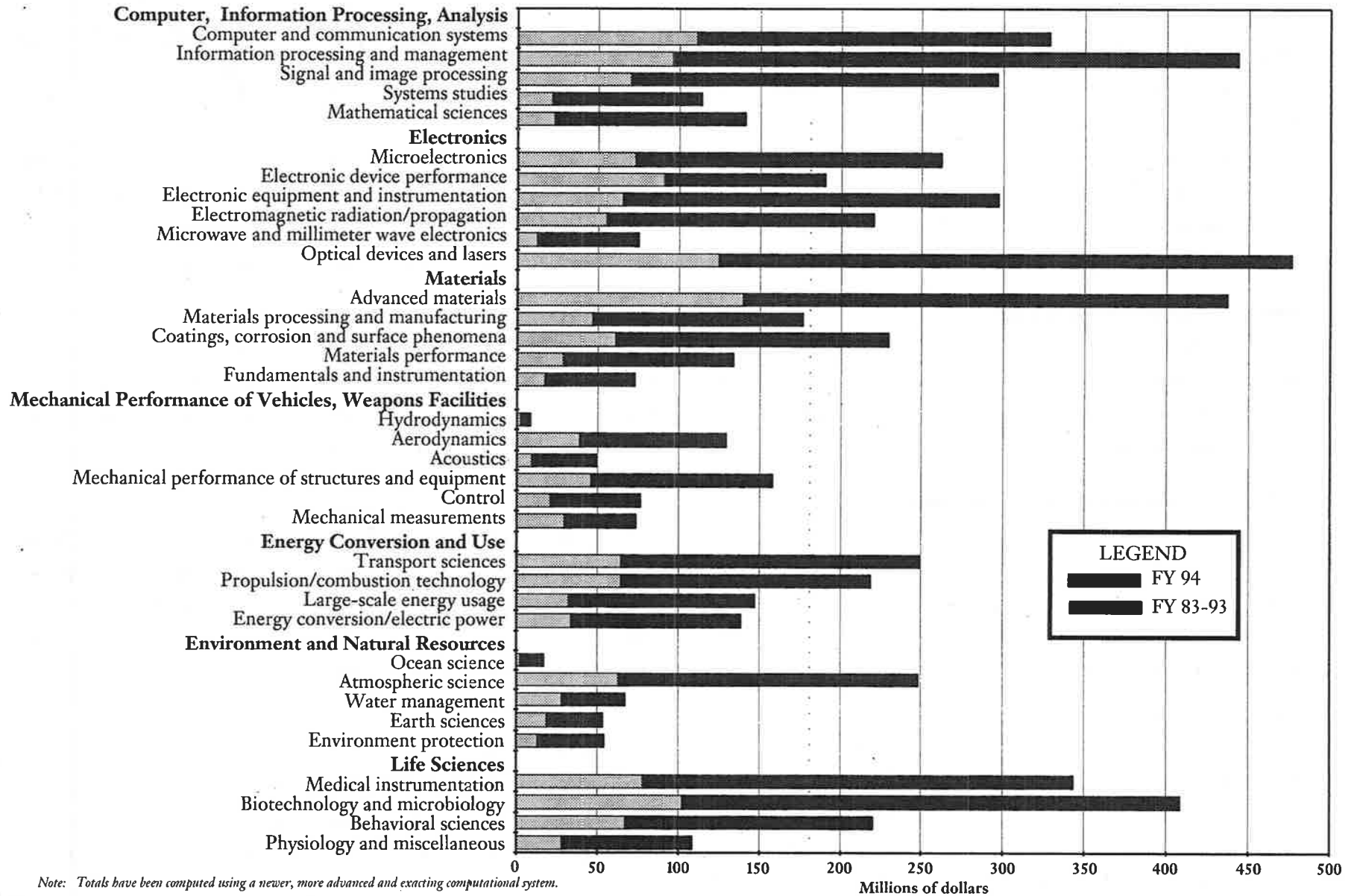
		DOD	DOE	NASA	HHS	NSF	DOT	EPA	NRC	ED	DOA	DOC	Total
4000	Mechanical Performance Of Vehicles, Weapons, Facilities												
4100	Hydrodynamics	7891	1099	720	0	329	97	0	0	0	0	259	10395
4200	Aerodynamics	81176	809	51632	131	2230	2088	0	0	0	100	368	138534
4300	Acoustics	45104	2242	4570	664	645	399	0	50	529	50	867	55120
4400	Mechanical performance of structures and equipment	139200	4462	19948	4706	6734	2738	0	200	110	451	173	178721
4500	Control	38515	10303	22778	5413	2646	1395	0	345	40	290	149	81874
4600	Mechanical measurements	42211	11718	12461	6060	3407	2360	430	421	118	415	326	79927
5000	Energy conversion and use												
5100	Transport sciences	115201	38161	78313	23823	10451	796	1059	1606	0	2374	418	272202
5200	Propulsion/combustion technology	121551	51496	42979	4770	9126	5228	3635	100	0	969	500	240352
5300	Large-scale energy usage	29352	106209	6978	6824	6239	396	626	475	40	922	724	158783
5400	Energy conversion/electric power	77352	33230	25751	6769	8586	100	837	0	0	1117	0	153742
6000	Environment and Natural Resources												
6100	Ocean science	9138	2395	2305	0	2098	50	0	0	0	0	2359	18344
6200	Atmospheric science	96728	44912	47500	34737	17459	5525	14418	250	0	3782	3795	269105
6300	Water management	29889	4713	15151	4227	7911	1096	5970	338	0	3829	421	73545
6400	Earth sciences	23582	17488	1983	1559	9910	644	522	688	40	2854	275	59545
6500	Environment protection	26758	11936	3326	683	4177	889	12586	1078	0	596	0	62028
7000	Life Sciences												
7100	Medical instrumentation	32127	11028	13346	299581	8203	1980	429	200	11302	1460	328	379984
7200	Biotechnology and microbiology	33640	19206	6304	369055	18770	687	1288	50	342	10143	190	459675
7300	Behavioral sciences	93649	8888	10789	95488	8232	4219	530	1063	10450	3948	415	237671
7400	Physiology and miscellaneous	10117	3547	12491	54861	11927	792	324	0	170	28407	1621	124257

*multiple technology areas assigned to awards

EXHIBIT EIGHT

DISTRIBUTION OF FY 1983-94 PHASE I AND II AWARDS AMONG TECHNOLOGY AREAS

(multiple technology areas assigned to awards)



Note: Totals have been computed using a newer, more advanced and exacting computational system.
This system will be used for all future generations of this report.

**All of the SBA's programs and services are provided
to the public on a nondiscriminatory basis.**

Requests for copies of this SBA report should be sent to:

**U.S. Small Business Administration
Office of Technology
409 Third Street, S.W.
Washington, D.C. 20416
Telephone (202) 205-6450**