SMALL BUSINESS ADMINISTRATION'S SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

HEARING

BEFORE THE

SUBCOMMITTEE ON GOVERNMENT PROGRAMS

OF THE

COMMITTEE ON SMALL BUSINESS
HOUSE OF REPRESENTATIVES

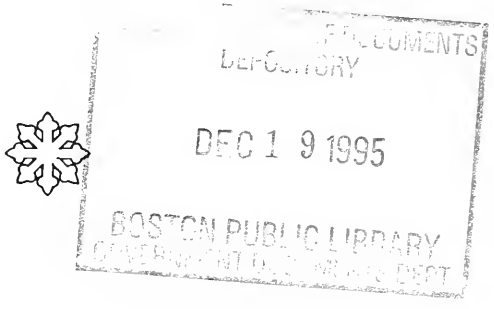
ONE HUNDRED FOURTH CONGRESS

FIRST SESSION

WASHINGTON, DC, APRIL 6, 1995

Printed for the use of the Committee on Small Business

Serial No. 104–25



U.S. GOVERNMENT PRINTING OFFICE

90–136 CC WASHINGTON : 1995

For sale by the U.S. Government Printing Office
Superintendent of Documents, Congressional Sales Office, Washington, DC 20402
ISBN 0-16-052018-5

SMALL BUSINESS ADMINISTRATION'S SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

HEARING

BEFORE THE

SUBCOMMITTEE ON GOVERNMENT PROGRAMS

OF THE

COMMITTEE ON SMALL BUSINESS
HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTH CONGRESS

FIRST SESSION

WASHINGTON, DC, APRIL 6, 1995

Printed for the use of the Committee on Small Business

Serial No. 104–25

U.S. GOVERNMENT PRINTING OFFICE

90–136 CC WASHINGTON : 1995

For sale by the U.S. Government Printing Office
Superintendent of Documents, Congressional Sales Office, Washington, DC 20402
ISBN 0-16-052018-5

COMMITTEE ON SMALL BUSINESS

JAN MEYERS, Kansas, *Chair*

JOEL HEFLEY, Colorado
WILLIAM H. ZELIFF, JR., New Hampshire
JAMES M. TALENT, Missouri
DONALD A. MANZULLO, Illinois
PETER G. TORKILDSEN, Massachusetts
ROSCOE G. BARTLETT, Maryland
LINDA SMITH, Washington
FRANK A. LoBIONDO, New Jersey
ZACH WAMP, Tennessee
SUE W. KELLY, New York
DICK CHRYSLER, Michigan
JAMES B. LONGLEY, JR., Maine
WALTER B. JONES, JR., North Carolina
MATT SALMON, Arizona
VAN HILLEARY, Tennessee
MARK E. SOUDER, Indiana
SAM BROWNBACK, Kansas
STEVEN J. CHABOT, Ohio
SUE MYRICK, North Carolina
DAVID FUNDERBURK, North Carolina
JACK METCALF, Washington
JOHN J. LaFALCE, New York
RON WYDEN, Oregon
NORMAN SISISKY, Virginia
KWEISI MFUME, Maryland
FLOYD H. FLAKE, New York
GLENN POSHARD, Illinois
EVA M. CLAYTON, North Carolina
MARTIN T. MEEHAN, Massachusetts
NYDIA M. VELÁZQUEZ, New York
CLEO FIELDS, Louisiana
WALTER R. TUCKER III, California
EARL F. HILLIARD, Alabama
DOUGLAS "PETE" PETERSON, Florida
BENNIE G. THOMPSON, Mississippi
CHAKA FATTAH, Pennsylvania
KEN BENTSEN, Texas
KAREN McCARTHY, Missouri
WILLIAM P. LUTHER, Minnesota
PATRICK J. KENNEDY, Rhode Island

JENIFER LOON, *Staff Director*
JEANNE M. ROSLANOWICK, *Minority Staff Director*

SUBCOMMITTEE ON GOVERNMENT PROGRAMS

PETER G. TORKILDSEN, Masschusetts, *Chairman*

JOEL HEFLEY, Colorado
SUE MYRICK, North Carolina
SUE W. KELLY, New York
DICK CHRYSLER, Michigan
DAVID FUNDERBURK, North Carolina
VACANT
GLENN POSHARD, Illinois
RON WYDEN, Oregon
KWEISI MFUME, Maryland
CLEO FIELDS, Louisiana
BENNIE G. THOMPSON, Mississippi

LAURI RAINS, *Subcommittee Staff Director*

CONTENTS

SMALL BUSINESS ADMINISTRATION'S SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

THURSDAY, APRIL 6, 1995

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON GOVERNMENT PROGRAMS,
COMMITTEE ON SMALL BUSINESS,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:05 a.m., in room 2359–A, Rayburn House Office Building, Hon. Peter Torkildsen, (chairman of the subcommittee), presiding.

Chairman TORKILDSEN. Good morning. The subcommittee will come to order. This hearing marks the last in a series of hearings reviewing the Small Business Administration Programs. It is appropriate that the last of these hearings should be on the most forward looking of its programs, the SBIR or Small Business Innovation Research Program. As we look toward the future of small business, we must necessarily include high technology. It is in this sector that some of the highest paying jobs are created. It is from this sector that much of the greatest growth will come.

Technology-oriented small businesses are fertile ground for innovation that suffer under a number of constraints. Access to capital is the most obvious problem and it is one that we have addressed in other hearings of the full committee. But the more challenging issue and the one which the SBIR Program attempts to address is this. How do we take the tremendous creativity and flexibility of the small company and give it a forum where the innovative technologies these companies develop can be utilized by the Government and the commercial marketplace?

We have all heard stories of commercialization of technologies developed for the space program or the NIH yielding tremendous benefits for the consumer and companies that have commercialized them. Should not small companies have a similar opportunity? The SBIR Program was created to help answer that question.

SBIR challenges agencies and departments that have massive, extramural research budgets in excess of $100 million to take a nominal percentage of those funds and set them aside for small business which competes for research projects at two levels—the feasibility study and the research phase—in which then they commercialize the resulting product or technology.

The percentage of research and development dollars set aside for small business increases every 2 years from 1.5 percent in 1993 and 1994 to 2 percent in 1995 and 1996 and not less than 2.5 per-

cent thereafter. In 1992, Congress added a pilot program entitled the Small Business Technology Transfer Program which directs small businesses which wish to apply for STTR grants to partner with a nonprofit research institution, normally a university, with the small business doing not less than 40 percent of the work and the research institution doing not less than 30 percent of the work.

We will be interested in hearing how the pilot has been proceeding and if there is any measurable difference between the work product small businesses generate under SBIR, as opposed to what they generate under STTR. SBIR has, by all accounts, been a tremendous success. Through 1994, almost $5 billion in awards has been made funding 33,000 projects out of the 215,000 proposals which agencies have received. In 1995, it is expected that almost $1 billion of federally sponsored research funding 55,000 projects will be awarded. These projects range from neural network computers to natural insect control compounds to tumor detection drugs.

But despite the success, the program must be examined and several critical questions asked. How can we continue the growth of this program with ever-shrinking defense and other dollars? What effect will this Congress' efforts to reduce the deficit have on extramural research? How can we increase the number of small businesses which participate and which are successful in getting awards? How do we guarantee that these companies' intellectual property rights are preserved and protected?

We hope that these and many other questions will be answered today. I will yield to the ranking member of the subcommittee when he is able to arrive.

Now I will introduce our witnesses for today. We are very fortunate to have both users and administrators and advocates all on the same panel. They are Mr. Constantine Bassilakis from Grey Fox Technologies; Mr. Roger Little, president of the Spire Corporation; the Honorable Jere Glover, who is certainly no stranger to this committee, who is Chief Counsel for Advocacy for the Small Business Administration; Mr. Robert Neal, Associate Deputy Administrator for Government Contracting; and Mr. Victor Rezendes, Director of Energy and Science Issues for United States GAO; Dr. Samuel Barish, SBIR/STTR Program Manager for DOE; and Dr. Robert Norwood of Commercial Development and Technology Transfer with NASA.

Thank you gentlemen for coming to testify today. I would like to start with Mr. Constantine Bassilakis.

TESTIMONY OF CONSTANTINE A. BASSILAKIS, PRESIDENT, GREY FOX TECHNOLOGIES, INC., ANDOVER, MASSACHUSETTS

Mr. BASSILAKIS. Good morning, Chairman Torkildsen and members of the subcommittee.

Chairman TORKILDSEN. Mr. Bassilakis, I apologize for interrupting. All of your statements will be incorporated into the record as written. If I could ask each witness to summarize. We would ask you to please hold your summary to 5 minutes and we have the little indicator to let you know your time constraint, and thank you very much.

Mr. BASSILAKIS. My name is Connie Bassilakis and I am president of Grey Fox Technologies, a small business firm specializing

in gas turbine systems and related technologies. I am extremely honored to have the opportunity to share my favorable experiences with the SBIR Program and to offer my recommendations on how this program can be further enhanced from the viewpoint of a new small business firm.

Grey Fox Technologies was incorporated in January 1994 and is primarily staffed with former General Electric Aircraft Engine employees. Its principle place of business is in Andover, Massachusetts, and employees are located in both Massachusetts and Ohio.

Our SBIR experience has been very favorable. We won three awards out of the six Phase I SBIR proposals that we submitted in 1994. We are proud of this accomplishment, but it will be a tough act to follow. The Air Force made our first Phase I award in May 1994 for an evaluation of the most promising technologies for advanced fighter engines. Grey Fox technologies submitted this proposal in January 1994, just 2 months after attending its first national SBIR conference. This would not have been possible without the knowledge gained at the conference and the assistance provided by the SBA, DTIC regional office and other Government agencies.

NASA made our second Phase I award for an innovative fuel nozzle concept in December 1994. This research project has the potential to improve temperature patterns and significantly reduce NOx formation. Results to date are favorable. If successful, this research project has a significant worldwide market potential for both aircraft and industrial gas turbine applications.

The Army made our third Phase I SBIR award in February 1995. The objective of this research project is to demonstrate the feasibility of developing a simple, low cost method of repairing metal matrix composite components in order to reduce the ownership cost of advance gas turbine engines.

The SBIR Program has had a significant impact on our company by providing an excellent foundation for launching a new business. This foundation has enabled Grey Fox to win two non-SBIR contracts from General Electric in the second half of 1994. The larger of these subcontracts consisted of performing work packages in support of the TF34 engine that is currently powering the Navy's S3A and the Air Force's A10 aircraft.

This foundation has also enabled Grey Fox to submit other non-SBIR proposals, such as a gas turbine powered locomotive proposal submitted in response to DOT's high speed rail solicitation in January 1995. This proposal is still pending. The competition is tougher outside the SBIR arena, but we are determined to be successful and have already started working with the State of Massachusetts to help promote the development of high speed rail transportation.

The SBIR Program is sound and well managed. However, there are four areas where I believe this program can be further improved by reducing the amount of paperwork burden facing new startup businesses.

First, reduce proposal documentation requirements. Most small businesses cannot afford the time or expense required to prepare documentation in the elaborate detail that is required when the cost of a Phase II proposal exceeds $500,000. While this type of information may be necessary to protect the Government's interest

when dealing with multimillion dollar contracts, it is counterproductive to a small startup business where the focus must be developing new products and technologies.

Second, simplify the accounting system requirements. Phase II accounting system requirements are another area where too much emphasis is placed to the detriment of the small startup business firms. Requiring elaborate accounting segregation of unallowable costs, types of costs, et cetera, does not enhance small business research activities. The Government can assure it is receiving a fair and reasonable value by relying on progress reports and program review meetings that are already a part of the Government's management process.

Third, offer contract alternatives. One of the reasons for the elaborate accounting system requirements is the use of cost-plus fixed fee contracts. This can be easily remedied for the small startup business by authorizing the use of firm, fixed priced contracts that are much easier to accommodate.

Fourth, review terms and condition requirements. It is not unusual for Phase I contracts to contain over 90 contract provisions. This is overkill and unwarranted, again placing unnecessary burden on small startup companies.

Finally, Mr. Chairman and members of the subcommittee, I appreciate having this opportunity to share our experience with the SBIR Program with you today. Keep up your excellent work in helping to make the SBIR Program even better. I will be pleased to answer any questions that you may have our testimony.

[Mr. Bassilakis' statement may be found in the appendix.]

Chairman TORKILDSEN. Thank you very much, Mr. Bassilakis, for your testimony. I now would like to ask Mr. Roger Little, president of the Spire Corporation in Bedford, Massachusetts, for his testimony.

TESTIMONY OF ROGER G. LITTLE, PRESIDENT, SPIRE CORPORATION, BEDFORD, MASSACHUSETTS

Mr. LITTLE. Thank you, Mr. Chairman. I am the president of Spire. We are in Bedford. We have been in business a number of years. The SBIR Program has been instrumental in our growth. When we started about 12 years ago, we were a $6 million company and today we are $18 million plus in sales.

The SBIR Program contributed to our technology base and products in a number of ways. I want to give you two examples. One is in photovoltaic. This is a solar cell. This is a silicon device which converts sunlight to electricity and under DOE support about 10 years ago, we began to develop the technology for this. Today, we manufacture and sell the capital equipment to produce photovoltaic modules and we sell it all over the world. We export to Third World countries, as well as Europe and Japan, the seeds of which were developed under the DOE SBIR Program.

More recently, we have had support from NASA to do space solar cells and we have developed a very efficient cell which will be used, we believe, in satellite global communications. It will take us a little while to get it there, but we think it is going to make a big impact on systems such as iridium.

Another example is shown by this artificial knee. Our solar cell processing technology was used to improve the performance of this artificial knee in the human body. Originally, Oak Ridge Research Labs did work to show that the technology could be applied to a knee to make it harder and more wear resistant in the body. Under SBIR funding from NSF principally, we were able to bring this into commercialization and today we process maybe 25 percent of the number of artificial joints produced in the United States.

Currently, we have NIH support to advance that technology by adding very hard coatings to orthopedic devices. So, the program has made major contributions to Spire and our growth. The STTR Program is a good idea. I think it relates to the fact that we were able to get Oak Ridge technology into our orthopedic's business. The STTR Program would help do that in many instances. But currently there is just not enough money in STTR to do much with it and it is my guess that the proposal costs generated for a small amount of funds that were available this past year were greater than the ultimate funding.

The SBIR Program has grown and it has become better over the years. With the heavy emphasis on commercialization, however, they are becoming more of a disconnect between the topics and the ability to commercialize them. To emphasize far out, very innovative technology, is to make commercialization come even later on. If somehow this could be brought closer together, especially in the defense community. There are some topics there which may be just impossible to commercialize.

In most cases, there is not enough time to go from Phase I to Phase II to a commercial product. Even in the examples that I have cited, 5 to 10 years are the kinds of timeframes it took after the initial funding. So, I have felt that a Phase III kind of concept which would be a heavily cost-shared program, maybe 50/50 between the small business and the Government, would help that transition and give more time to get some of these ideas into commercialization.

Thank you very much.

[Mr. Little's statement may be found in the appendix.]

Chairman TORKILDSEN. Thank you very much for your testimony, Mr. Little. Now I would like to ask the advocate, Mr. Jere Glover for your testimony.

TESTIMONY OF JERE W. GLOVER, CHIEF COUNSEL FOR ADVOCACY, U.S. SMALL BUSINESS ADMINISTRATION

Mr. GLOVER. Thank you, Mr. Chairman. I am indeed pleased to be here. I would like to introduce first, Jeffrey Kane, who is a special assistant to the Administrator of SBA for Innovation and the program managers from the various agencies, if I could ask them to stand for just a moment. These are the individuals who with very limited resources have done an excellent job of implementing this program. We have a number of them here, plus several of them are going to be testifying later today. But I think they deserve special recognition for the fine job they have done through the years.

Chairman TORKILDSEN. You have just explained the high number of attendees at this hearing. Thank you very much.

Mr. GLOVER. One of the interesting topics that is being debated in Washington today is whether there is a need for legislation to give special emphasis to small business. I think after almost 30 years of discussions about the R&D, we can certainly answer that question yes, in this case.

In 1967, there was a blue ribbon panel of Government officials convened to study innovation and come up with recommendations. The findings were that small business was the creator of the vast majority of innovations and that the Government had done virtually nothing to help them and the Government should do more.

In 1986, this committee conducted a series of hearings and published the Studies on Small Business and Innovation, a nice small little book that we did in combination with the Senate Small Business Committee and we began the process. One of the things we heard from every Government agency was promises that they would do better. They assured us that they were going to do a better job.

Shortly after that, as Deputy Chief Counsel at the Office of Advocacy working for Milt Stewart, we conducted another focus group and panel initiative report on Small Business and Innovation. After that, the President had a domestic policy review staff, President Carter. The report came back again that if we wanted to encourage innovation, we obviously had to use the most productive sector of economy, small business. The President actually issued a memorandum directing all agencies to do more for small business.

In 1982, again this committee began looking at this problem and based on recommendations that came out of the 1980 White House Conference—this was the number six recommendation—was that the SBIR legislation be passed. This committee held hearings and discussed this topic at some length. This is a fairly controversial issue and when it was brought to the floor for a vote it took 2 days of debate and over 30 pages of the Congressional Record. I am pleased to report to you that the bill did obviously pass and the President signed it.

More interestingly is that this is a bill that had wide bipartisan support, but probably even more interesting is that it had 100 percent Republican support, thanks in part to then Ranking Minority Member of this subcommittee, Joe McDade, who fought bravely for this legislation and was able to convince every Republican to vote for it. Given the fact that it was a close vote, that was a fairly significant factor.

But let me quote a few of the people who debated this issue at the time, because I think their comments are even more true today. Mr. DeMars from New Hampshire, "SBIR legislation finally gives Federal encouragement to the segment of our economy that provides most of our jobs and innovations."

Mr. Mitchell of Maryland basically stated, "Presidential directives are ignored. Internal memorandums are not implemented and Congress is given the runaround. After 5 years of Congressional pressure and 5 years of requests by agencies that they be permitted to voluntarily implement the good intentions, there has been no change. In fact, the SBA's Office of Economic Research has indicated small business participation has actually declined."

Mr. Goldwater, "The innovative sector of the American economy, science, small science and technology-based enterprises are virtually excluded from effective participation. Small business, the most effective sector of the economy receives a mere 3.5 percent of the $30 billion Federal R&D expenditures in 1980."

The legislation was passed. The 1986 White House Conference took up this issue and was ranked as the 14th highest issue that the legislation be reauthorized, strengthened, and expanded. In the White House Conferences that are being held around the country today, it remains an important recommendation and one of the top recommendations on innovation and science sessions that are being conducted right now.

The truly great thing about the SBIR legislation is that it has one of the highest returns to the taxpayer. It simply reprograms money that would have gone to large firms, universities and Government labs which are far less efficient, far less innovative, and less able to commercialize their technologies. One of the surprising studies that we have found is that small businesses under this program are as likely to commercialize the technology, between 30 and 40 percent, as the private sector with its own money which is a phenomenal rate since you figure that virtually none of the Federal R&D money, other than this program, really results in significant commercialization. So, it is truly a marvelous program.

Unfortunately, small businesses' share of total R&D expenditures really still are around 3 to 4 percent. They really have not gone up very much. Had we not had this program, those numbers would have gone down even more.

In my written testimony, I highlighted a number of studies and the fact there were seven full GAO reports and three other reports, all reviewing this program. It is probably one of the most studied programs and I share the conclusions of these reports, that this is truly a great program. Over 30 States have implemented SBIR assistance programs and it is in fact, one of those private, public partnerships that has really worked and is important and needs to be maintained and strengthened.

Thank you.

[Mr. Glover's statement may be found in the appendix.]

Chairman TORKILDSEN. Thank you very much, Mr. Glover. Now I would like to ask the person who is no stranger to this committee, Mr. Robert Neal, for his testimony.

TESTIMONY OF ROBERT L. NEAL, ASSOCIATE DEPUTY ADMINISTRATOR FOR GOVERNMENT CONTRACTING AND MINORITY ENTERPRISE DEVELOPMENT, U.S. SMALL BUSINESS ADMINISTRATION

Mr. NEAL. Thank you, Mr. Chairman. Mr. Chairman and distinguished members of the subcommittee, it is my pleasure to be before you today to talk about the successful, high technology programs administered by the Small Business Administration, the Small Business Innovation Research Program, and the Technology Transfer Pilot Program.

The purpose of the Small Business Innovation Research Program is to involve the small business entrepreneur in the Federal research and develop agenda and to promote commercialization of

new technology. The Small Business Innovation Act accomplished this purpose of setting aside a fixed percentage of extramural R&D funds for small business. Each Federal agency with an extramural R&D budget greater than $100 million for any fiscal year must establish a SBIR Program. Currently, there are 11 participating agencies under the original 1982 law. The set aside was .5 percent.

Over the subsequent years, the program has slowly grown such that the second reauthorization, P.L. 102564 set aside is currently at 2 percent with an increase schedule for fiscal year 1997 to 2.5 percent.

The small businesses win SBIR awards in grants or contracts through a competitive process, in response to solicitations issued by each participating agency. SBA is not a participating agency and does not make R&D awards to businesses but serves as the coordinator for the program. Under the act, the SBIR Program is a three-phase process which must be followed. The three phases are Phase I, awards of approximately 6 months and up to $100,000 are made for research to evaluate the scientific and technical merit and feasibility of an idea.

Under Phase II, as a result of Phase I, those projects which are the best are funded for 1 or 2 years up to a $750,000 to further develop the proposed ideas to meet the agency's needs.

Phase III, private sector investment and support help bring an innovation to the marketplace. No SBIR funds are expended in Phase III. There are no additional appropriations to fund this work. All SBIR funding is set aside from existing R&D budgets of the participating agencies. In its 13 years of performance, the SBIR Program has met and surpassed all of its objectives. The program has grown at a steady rate, in an orderly manner, and with impressive accomplishments.

In the history of the SBIR, in response to 158 solicitations, the 11 Federal agencies in the program have made over 37,000 competitive awards with more than $5.3 billion. In fiscal year 1994, based on preliminary results from reports just received, over 4,000 awards were made worth $700 million. The most satisfying accomplishment of the SBIR Program, however, is its success in developing and commercializing innovations derived from Federal research. Preliminary results from an ongoing study of SBIR commercialization indicate that the number of SBIR projects resulting in high technology products and services has been successful beyond our expectations. The study suggests that fully 38.9 percent of these projects were commercialized.

It is not only the numbers that are so gratifying, but the range of technological innovations developed. The list of accomplishments is a long one, including environmental projects to improve our water and air, medical products with a demonstrated ability to improve our well being, educational products that help the handicap learn, transportational projects that help us to travel efficiently and safety, and many projects to improve our supply and use energy to help us communicate, to assure our national safety, and to improve our food supply.

In summary, the success of the SBIR Program is unqualified. This attests to the strength of the small business entrepreneurs and their creativity.

With respect to the Small Business Technology Transfer Pilot Program, Title II of P.L. 102564 established this new program. The program also involves small businesses in the Federal research and development effort. The essential difference between the SBIR and STTR Programs is that the small businesses must have a research institution as a partner. The partner must be either a nonprofit research institution, such as a university or a federally funded research and development center.

The STTR Program has three phases also. It consists of Phase I which is basically a feasibility study; Phase II which is the actual research and development effort; and Phase III, again a commercialization phase. Its funding is based on a set aside of extramural R&D budgets of those agencies with annual extramural budgets of $1 billion or more. There are five agencies that meet this criteria and all directed to set aside not less than .05 percent of the extramural R&D obligations for fiscal year 1994 and will set aside .1 percent for fiscal year 1995 and .15 percent for 1996.

As with the SBIR Program, the funding for this program is set aside from existing expenditures. There are no funding obligations for this program. It is much too soon to determine the success or failure of the program based on completed projects, because the program has just completed its first year and is only partially through its second year. The activity of the first year indicates that the program has been well received by small business and by the research institutions. In the first year of operation, small firms submitted 1,950 proposals for Phase I awards. Participating agencies actually made 183 Phase I awards for over $17 million.

In conclusion, the SBIR Program continues to grow and to deliver a wide spectrum of high technology innovations to improve the lives of all Americans. The STTR Program, while still very new, has been implemented efficiently in a timely manner. These programs play a vital role in the participation of small businesses in our Federal research and development efforts.

I will be pleased to answer any questions that you may have at the end of this testimony. Thank you.

[Mr. Neal's statement may be found in the appendix.]

Chairman TORKILDSEN. Thank you very much, Mr. Neal. Now we will hear from Mr. Victor Rezendes.

TESTIMONY OF VICTOR S. REZENDES, DIRECTOR, ENERGY AND SCIENCE ISSUES, RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION, U.S. GENERAL ACCOUNTING OFFICE

Mr. REZENDES. Thank you, Mr. Chairman. It is a pleasure to be here today to talk about GAO's recent report on the interim status of the SBIR Program. What I would like to do for you is just briefly summarize those.

We have three basic objectives in this report. One is whether the quality of research has kept pace with the increase in the percentages of awards. Second, whether implementation of the technical assistance program has occurred at the various agencies. Finally, whether there is any duplicate funding of research.

The focus of our whole effort was on the five largest Federal agencies with the most SBIR awards which account for about 90

percent of the money that is being spent. Our bottom line is the expansion of the program apparently is keeping pace with the increase in funding. Although it is still too early to tell what is going to happen down the road when the percentages reach 2.5 percent in 1997, from those that we have seen earlier on, the numbers appear to be consistent.

To give you a little idea about the competition, we have seen that the number of proposals by agencies have increased from 9 percent to 30 percent at the various agencies. Over 20,000 proposals have been received. The ratio of the awards of proposals has remained fairly constant from a low of about 8 percent at DOE to about 28 percent at NIH. Looking back over the last 3 years, we find virtually no change in the ratios from the previous 2 years.

Let me move on now to the Technical Assistance Program. We found that none of the five agencies that we looked at were implementing the discretionary technical assistance. As you know, that program provides $4,000 for Phase I and $4,000 annually from the award for Phase II projects. There was pretty much a consensus from the agencies that we talked to that they did not really see much need for the Technical Assistance Program primarily because technical merits of the program is an important part in their assessment of the program.

NASA, for example, scores the technical piece as 40 percent of the score in deciding who gets awards. Also, there seems to be a consensus among the agencies we reviewed that the whole administration of this piece of the act would become very burdensome with a large number of small awards which would be difficult administratively to handle, plus the fact that there is a requirement that there only be one vendor to provide this technical assistance by agency. Some, particularly DOD, found that an unrealistic way of managing the program.

Finally, I want to talk about duplicate funding. This is probably the only problem area we did find. It has become a problem. The extent of the problem is really unknown. Primarily because there is not a lot of data out there which identifies and compared all the projects between agencies. We do have some case studies though. Some agencies have told us that they find examples of a few companies receiving two, three, or sometimes five times funding for the same project between agencies.

We have one classic case here where Justice has filed treble damages of $4.2 million against one firm alleging that this one company received $1.4 million in duplicate funding from NSF, NASA, and various DOD agencies. This one company recycled 11 research ideas 40 times.

Most of the people we spoke to in the agencies, however, feel that this is only a small percentage of or only a few companies that are responsible for this. We really do not have a feel as to the magnitude of the problem. Contributing to this is a number of issues I want to just run through quickly for you. One is innovation is a certification process to begin with. These companies are supposed to certify and identify any other research proposals that are duplicate through other agencies. Just the whole certification form is unclear to some firms in exactly what they are certifying to and some are fraudulently certifying.

There is also a problem with the definition as to what is a duplicate proposal. As you know, in the scientific arena what seems duplicate on the surface may not be when you look behind the various proposal. There needs to be more definition and guidance to the various companies as to what we really mean by duplicate.

Finally, the last piece is there is not, as I mentioned, an information system in place that effectively would exchange the information between the various agencies to tell them who all other agencies are providing awards to. SBA does keep a centralized database, but that is mostly for reporting to Congress later on and there is like a 9-month delay in the data. That needs to be corrected. There needs to be a more real time process where agencies can go and use that as a clearing house to identify duplicate research funding.

Thank you, Mr. Chairman.

[Mr. Rezendes' statement may be found in the appendix.]

Chairman TORKILDSEN. Thank you very much for your testimony, Mr. Rezendes. Now Dr. Samuel Barish with the Department of Energy.

TESTIMONY OF DR. SAMUEL J. BARISH, SBIR/STTR PROGRAM MANAGER, OFFICE OF ENERGY RESEARCH, U.S. DEPARTMENT OF ENERGY

Dr. BARISH. Mr. Chairman and members of the subcommittee, I am pleased to be here today to discuss the SBIR and STTR Programs of the Department of Energy.

My name is Sam Barish and I have managed the DOE SBIR Program for the past 11 years and the STTR Program since its inception in 1993. I am very familiar with research programs with my 13 years of experience in high energy physics research. Sitting behind me is my colleague, Dr. Robert Berger, who has been invaluable in running the SBIR and STTR Programs over the past year.

First I would like to share with the subcommittee some of our experiences in implementing the SBIR Program. The SBIR reauthorization legislation emphasized the program's goal of increasing private sector commercialization of technology developed through Federal research and development. In this regard, we are very pleased with the assistance in commercialization we have provided to our Phase II awardees, which is unique in the SBIR agencies.

A large majority of SBIR awardees have excellent skills in science and engineering research, but are relatively new to the business world and lack experience in product development, financing business growth, raising venture capital, and marketing. To meet the primary goal of the SBIR legislation, increasing private sector commercialization of SBIR research, the Department has provided non-SBIR funds to support a three-stage commercialization assistance project for the last 6 years.

In the first stage, the companies were provided with weekly instructions and individual advice and counsel over a 4-month period in the preparation of a business plan to potential sponsors. The primary emphasis was on the marketing and financial aspects of the business plan which was critiqued in detail. Very few of the companies had prepared a business plan before.

The second stage consisted of intensive assistance in putting together sound, clear and concise visual materials describing a business opportunity that could be presented in 20 minutes to potential sponsors. The participants also practiced and received critiques on their presentations.

In the third and final stage, a commercialization opportunity forum was held in which about 25 companies made individual presentations to about 60 decisionmakers from large corporations and venture capital firms in an effort to interest them in either joint ventures, licensing, venture capital investments or other teaming arrangements.

One-on-one sessions between the SBIR awardees and the potential sponsors were also held at the forum and these sponsors included Boeing, Dupont, General Dynamics, Westinghouse Electric, Xerox, and many venture capital firms.

As a result of participation in the 1991 project, the small companies have already received more than $14 million for commercialization of their research with a projected royalty stream of an additional $24 million from option agreements over the next 4 years. About 43 percent of the firms that completed the project have received further funding for their work. All of the companies that participated in the project over the last 6 years have developed skills in business plan development and these skills will be very useful in pursuing other commercial opportunities, including future SBIR projects from any Federal agency. Both the SBIR awardees and potential sponsors felt the project was very worthwhile.

Next I would like to describe our unique system of maintaining continuity of funding between Phases I and II. In planning the awards of Phase II grants, attention was paid to the potential cash flow problem that a small business would experience if it were to suffer a hiatus in funding between Phases I and II. Such a gap in funding is most difficult for businesses that are either very new or very small.

In our first year of Phase II awards in 1984, a system was devised and implemented that allowed Phase I awardees to submit their Phase II proposals before their Phase I grants ended, if they felt they were ready to do so. For each of the 12 years in which Phase II awards were made, such grantees who were chosen for Phase II funding, were able to begin their projects with no interruption in funding between the phases.

Since 1984, 35 percent of our Phase II awardees have had continuous funding between Phases I and II, and this DOE-developed system has received very favorable reaction from the small business community. Concerning on-time performance, during each of the programs 12 years, we have issued every solicitation on schedule and met every deadline for the selection of Phase I and Phase II awards.

Now I would like to make two suggestions for improvements in the program. To increase the return on the Government's annual investment of nearly $1 billion in the SBIR Program, we believe that at most 1 percent of the SBIR set aside should be used to fund projects like the DOE commercialization assistance project and to provide administrative support for the program. The SBIR reau-

thorization legislation provides for discretionary technical assistance that can be implemented by Federal agencies to assist SBIR awardees in, for example, commercialization efforts. Due to its complexity, as we have already heard, no agency has implemented this provision.

First, we recommend a modification to the legislation, so that a small fraction of SBIR set-aside funds can be used to provide commercialization assistance to SBIR awardees. This would mean projects like the DOE commercialization assistance project could be funded from the SBIR set aside. In the past this project has been supported by non-SBIR funds.

The conduct of high quality SBIR Program which serves the small business community requires a significant commitment by the Federal agencies. The provision in the SBIR reauthorization legislation, which prevents agencies from using SBIR set-aside funds for administrative support, is a serious impediment and can hamper the program's operation and the service it provides to small businesses.

Second, we recommend that the legislation allow the use of a small fraction of the SBIR set-aside funds to support administrative costs of the program's operation.

Finally, I would like to discuss briefly the STTR pilot program which has been in operation for just over 1 year. During this time, the Department has issued two Phase I solicitations, and in response to the first one for fiscal year 1994, we received 487 proposals and funded 21 of them. The results of the evaluation of the proposals indicate the scientific and technical quality of the funded projects is high. About two-thirds of the nonprofit research institutions participating with the small businesses in these projects are DOE national laboratories and about one-third are universities.

Although it is far too early to evaluate the STTR Program, it appears to be an effective vehicle for combining the scientific and technical expertise of researchers at national laboratories and universities with the commercialization skills and incentive of small businesses to develop products and processes for the marketplace.

This concludes my prepared testimony. I would be happy to answer your questions.

[Dr. Barish's statement may be found in the appendix.]

Chairman TORKILDSEN. Thank you very much, Dr. Barish. Now completing our panel is Dr. Robert Norwood of NASA. Dr. Norwood.

TESTIMONY OF DR. ROBERT L. NORWOOD, DIRECTOR, COMMERCIAL DEVELOPMENT AND TECHNOLOGY TRANSFER DIVISION, OFFICE OF SPACE ACCESS AND TECHNOLOGY, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Dr. NORWOOD. Good morning, Mr. Chairman and distinguished members of the subcommittee. It is a pleasure to appear before the subcommittee today to discuss NASA's SBIR and STTR Programs. NASA has over 10 years of experience with SBIR and has made nearly 4,300 Phase I and Phase II awards. We believe that energetic and high quality small businesses have made valuable contributions of new and innovative technology which support NASA's aeronautics and space research mission.

NASA has increased its partnership with small businesses in a number of ways, in both direct and in subcontracting awards. Those successes, combined with NASA's SBIR awards, demonstrate a keen interest in working with small businesses. NASA has also taken steps to increase the commercial applications of SBIR technology to increase U.S. competitiveness.

While we do support the SBIR and STTR Programs, it is important that we maintain balance between the R&D, the basic NASA R&D Program, and the SBIR Program. If the option arises, we would prefer to examine the increase to the SBIR set-aside percentage.

I will be happy to discuss any SBIR and STTR issues. Thank you.

[Dr. Norwood's statement may be found in the appendix.]

Chairman TORKILDSEN. Thank you, Dr. Norwood. You certainly win the award for condensing your statement. I would like to applaud all the witnesses because none of you went over your 5 minutes suggested time and that is sincerely appreciated.

I have a number of questions, however, I will defer to my colleagues on the panel first. Mr. Thompson or Mr. Fields. Congressman Thompson.

Mr. THOMPSON. Thank you, Mr. Chairman. This would basically be to Mr. Glover. In your experience as Counsel for the Small Business Innovation Research Program, have you found anything that would say that that program costs the taxpayer more money or that it provided poor quality of product or anything that would suggest that program is anything less than positive?

Mr. GLOVER. No, I have not, nor have any of the other GAO reports or SBA Program office review of this. Everybody that has looked at this program finds it to be a wonderful example of how a set-aside program, well thought through, has been very successful. I think it is a model and it is something that this subcommittee especially should be proud of. It is something that came from the grassroots. Small business recommended it, knew they had a problem, and there was no other way to solve the problem.

Quite frankly, I was involved in the Carter administration and working on the Reagan administration and there was literally nothing that could be done to make the agencies change. I heard agencies come in and promise that they would do better in 1978, this committee, and they did not. Voluntary programs in this case, did not work. This program has been a beautiful success, the research. You can go through all the types of great technology that has come out of this program. It generates jobs. It creates tax revenues. All these studies have been produced. I have summarized many of them in my written testimony.

It is a wonderful success. The quality of the research is excellent and the taxpayers receive a real bang for their bucks out of this.

Mr. THOMPSON. What if critics would say that well this is another one of those set-aside programs that, lack of a better term, boondoggle created to make people feel good?

Mr. GLOVER. Certainly people can say that about anything. I think there is no evidence to support that in this case and I think very little evidence in many cases on programs, but this is clearly one that has been studied to death. This program was not some-

thing that came easily. It was fought hard in every step of the process. The agencies were literally dragged, kicking and screaming into this program. They would not have done it without it.

We have heard just two examples of the technology that we have seen to be successful. This is a program that many countries around the world have copied. The States are doing follow on assistance in setting up their own programs. It really does work.

I have always maintained leave it to the Government contractors or contracting officers. Interesting, we just did an analysis, six companies do more business with the Government than all small businesses, all minority businesses and all women-owned business—six companies. Six companies do more than all the small business. Leave it to the Government, that is what you will see. Huge companies who have the lobbyists, who have the people here to make sure that they get their views of point, who have the former generals, the former admirals. They are going to win and small business is going to lose.

Without this legislation, small business got crumbs in the area they are most productive in which is research and development. Everybody knows, nobody, the Government labs, Government research, big business, universities, do not commercialize their products. It is an exception when they do. Small business does the majority of innovations. Despite that, except for this program, you do not see any increase in the Federal funds to be the most productive. Quite frankly, most cost effective. Small businesses do not have the overhead.

When is the last time you heard about a small business with a yacht they were writing off and charging their research and development funds? We just do not do that.

Mr. THOMPSON. Thank you very much. Mr. Neal, following that line of thinking, would it be safe to say that the free enterprise system, as it relates to small businesses, many times is not in best interest of small business, unless you have a program like this?

Mr. NEAL. This program is essential in order to give small businesses the opportunity to participate in Federal R&D sector. As Jere had indicated, sole source contracting is really the norm for Federal contracts. You want to deal with somebody that you are familiar with. You want to deal with someone that has that known reputation.

Small businesses, because they lack the clout, because they lack the name recognition, but they have the creativity, they have the lower overhead, provide ample opportunities for us to obtain products and services and research results at a much lower cost, and we found that they have been much more innovative and creative than the larger business.

This is something that we found is essential in terms of moving ahead in keeping this Nation on the forefront of developing technological innovations. This program has shown itself time and time again to be very effective, administered very well, and it is essential to keeping small businesses involved in Federal research and development.

Mr. THOMPSON. For my final comment, Mr. Chairman, what resistance have any of your agencies found from the larger contractors when you have identified small business components to do

business with? Have they done it cooperatively or have they resisted or what?

Mr. REZENDES. For SBIR, in order to participate you have to have 500 employees or less. So, the large businesses are out. However, there are partnerships in SBIR projects between small businesses and large businesses as subcontractors which they are allowed to participate in. So, they can participate in the program, but in a subcontracting role, large businesses.

Mr. THOMPSON. I guess my point is are those six companies that we identified potentially as the largest contract, are they pursuing more work that would ultimately hurt the smaller businesses or are they accepting the participation by the smaller businesses in this program as something that is necessary and reasonable?

Mr. GLOVER. I think we have to look at the large firms' approach to this. I think most large businesses and I cannot address the specific six companies that are doing the most for the Government, but most large firms like the SBIR Program. Quite frankly, the Japanese companies like the SBIR Program. They do more shopping over here to find our technology than our own companies do. But by and large, big firms like the SBIR technology because it is a great place to find innovative, new ideas, breakthrough ideas. So, when the SBIR award winners come out, the venture capitalists and large firms look to see what is there to commercialize. So, it has been a very successful program.

Mr. NEAL. Congressman Thompson, one thing I want to emphasize is that the key in terms of expanding the number of small businesses that participate rests with the contracting officers and the agencies. They identify those opportunities that are available to the small businesses. Now as a large business operator, you will find the large businesses will go after every opportunity where they can increase their revenues. So, it is in their own best interest to go after each contracting opportunity.

But the agencies have to be very careful and the agencies have demonstrated that once they have been given goals and targets to shoot toward that they have been very careful and work very diligently to meeting those goals and targets and finding more and more opportunities for small business. So, this incentive, this target that has been set out through this program has been very productive for small businesses in identifying new opportunities for them to be involved in Federal research and development.

Mr. THOMPSON. Thank you. Thank you, Mr. Chairman.

Chairman TORKILDSEN. Thank you, Mr. Thompson. Mr. Fields.

Mr. FIELDS. Thank you, Mr. Chairman. Mr. Neal, what percentage of minority participation—has there been an increase and to what degree has that increase been as it relates to this program?

Mr. NEAL. In our review of the program, we realize that one of the large areas where we have a lot of work that we have left to do would be with minority research and development firms. We have discovered that they are underrepresented on the whole and what we have been doing is looking at our programs at augment the SBIR and STTR Program to find more effective ways to reach out to the minority business community.

In fact, we have contracted with a small ad agency to go out and develop for us a strategy for reaching out to more small minority

and women-owned businesses for participation in the SBIR Program.

Mr. FIELDS. In the area of research and development?

Mr. NEAL. Yes, in the area of research and development.

Mr. FIELDS. How many do you have today?

Mr. NEAL. I do not have that number available with me right now, but I can provide that to you at a later date.

Mr. FIELDS. But you do have minority companies participating?

Mr. NEAL. Yes, we do. But we recognize it is under-represented.

Mr. FIELDS. The gentleman mentioned many of the big companies subcontract because the rules provide that you have got to have 500 employees or less. How often do you see that occur, where a minority or a small business receives the contract and then subcontracts with one of the bigger firms?

Mr. NEAL. I do not have the numbers with me, but that is a very, very rare occurrence, because what you will find in most instances is that the size of the small minority firms are such and the types of projects that they are involved in, because of their nature, the characteristics of the firm, they would not get a very large contract where they could subcontract out a great deal and it would still be somewhat profitable for them.

So what we find is situations where the contracts and the size of those contracts sort of fit the nature and the size of the firm. Most of the minority firms that are participating are very small.

Mr. FIELDS. If I may ask the gentleman, I think the gentleman made mention of the large companies subcontracting. Do you have any information you want to share in terms of examples that have taken place in the past or presently taking place?

Mr. REZENDES. No, I do not have any examples, but in your interest of minorities, I believe across the Federal agencies roughly 10 percent of the SBIR awardees are minority or disadvantaged small businesses. The National Science Foundation and the Department of Defense has conducted national conferences for SBIR, three per year over the past 10 to 15 years. There have been significant sessions at these meetings over the last several years specifically designed to increase participation of minority businesses. Special sessions for outreach at all three of these conferences, once per year.

Dr. NORWOOD. I would like to add that I think at NASA we have shown that we are able to include the minority and women-owned business in our SBIR Program. As a matter of fact, over the last 3 years for 1992, 1993, and 1994, we have shown about a 20 percent participation rate, sometimes a little more, sometimes a little less, in minority and women-owned businesses in the SBIR Program that are, of course, awarded on merit.

In addition to that, I personally have attended many conferences that have been held in the Midwest to provide information to minority and women-owned businesses on how to participate in NASA's SBIR Program. We have done the same thing for STTR with providing information to university associations, historically black colleges, universities and minority institutions to get the information out so they can participate on the basis of sound information. I think we have got a very good record.

In addition, I would like to add a little comment based on the question by Congressman Thompson. We also at NASA have found that in our high technology programs that small businesses do provide a major advantage and new technology in completing our mission, both aeronautics and space missions. Quite often, the small businesses are participating as second and third tier partners with the large firms in providing the technological solutions we need to complete our mission.

Mr. FIELDS. How many small businesses do you all do business with? Do you have that information?

Dr. NORWOOD. I can get that information and provide it for the record. But just out of the SBIR Program, we know that we have about 97 awards for the fiscal year 1994 program in Phase I, out of a total of 412 for minority and women-owned businesses.

Mr. FIELDS. When you say minority and women-owned business, what percentage would go to women and what percentage would go to other minorities of that 97?

Dr. NORWOOD. The information I have here, if I could just select the fiscal year 1994 year for just Phase I, since we have not done the Phase II, about a little more than 12 or 13 percent has gone to minority firms, small businesses and about 7 percent would go to women-owned businesses. So, it is about a two to one ratio. But overall, if you consider into participation of minority and women-owned businesses for 1994, it is over 20 percent.

Mr. FIELDS. Yes, sir.

Mr. REZENDES. I was just going to shed a little light on the percentage of minority and disadvantaged firms. In 1992, we issued a report looking at what percentage of the success rate to Phase III commercialization of projects and we looked between 1984 and 1987. At that point, there were around 10 percent of the awards made at Phase II were to disadvantaged and minority firms.

Mr. FIELDS. When you say 10 percent disadvantaged and minority, that includes women, does it not?

Mr. REZENDES. I believe so. No, it does not.

Mr. FIELDS. It does not. But you have a breakdown in terms of how many women-owned firms receive this?

Mr. REZENDES. No, sir, I do not.

Mr. FIELDS. I have one final question to Mr. Little. What is your appreciation of the program? Have you found any problems in the industry with this program?

Mr. LITTLE. As I remarked, sometimes the topics are fairly esoteric which makes them difficult to commercialize. So, my recommendation would be, as we emphasized commercialization to bring them back closer to Earth and that would be one recommendation.

Mr. FIELDS. What do you mean closer to Earth?

Mr. LITTLE. For instance, a lot of research efforts are in the basic research side where you are studying things which take a long time to apply. So, if more emphasis were put on engineering topics and applications' topics, you would be closer to the marketplace.

Mr. FIELDS. My time is up. I thank the gentleman.

Chairman TORKILDSEN. Thank you, Congressman Fields. To follow on a few of the points already raised. The disconnect that you see between research and commercial application is that entirely in

the SBIR Program? Do you see some of that in the STTR Program? Can you just expand upon that a little bit, Mr. Little?

Mr. LITTLE. I think it exists in any research arena. The more basic you are, usually the longer it takes to get you to a commercial product. So, it gets to the specific topic of interest. We have had projects where we were looking at space-based neutral particle beams and it was really difficult to get that one down to Earth. So, that gives you an example, as opposed to we have recently bid on a topic which is a DOE topic to improve a machine that we currently make, in effect, or to make a next generation machine. That is a real topic. At the end of that program, we will have a product.

Chairman TORKILDSEN. Mr. Rezendes from the GAO, in your testimony you mentioned about technical assistance not being implemented, yet you did not identify that as a problem. Is that provision—and it is not mandatory, but it is a possibility—is that redundant from your perspective? Is that just not necessary?

Mr. REZENDES. Basically, from the five agencies we have talked to, I think the consensus there was, yes, I think they basically feel that way, that the award which was relatively so small compared to the number of people who they would have to be giving them to, would be an administrative burden to monitor them.

Plus, as I mentioned earlier, they view the technical aspects of the proposal an important part in scoring, whether it should receive an award or not. That if an applicant came in with request for technical assistance, that that would be sort of viewed as something is wrong or deficient in the application.

Chairman TORKILDSEN. Mr. Little and Mr. Bassilakis, would you concur that that technical assistance provision really is not relevant because what you are offering to these agencies are a certain degree of technical proficiency to begin with?

Mr. LITTLE. I think that is a good point and I would not argue against it. $5,000 is not a lot of support anyhow, so it may not be worth the effort to structure something for a $5,000 contribution. But yes, we are the experts.

Chairman TORKILDSEN. Mr. Bassilakis.

Mr. BASSILAKIS. I agree with that position. Our experience gained while attending the national SBIR conference and the other SBA's seminars has provided us with more than enough background and knowledge on how to submit proposals and negotiate contracts. I would like to see the support funds converted into more SBIR funds for conducting basic research.

Dr. BARISH. Mr. Chairman, if I could elaborate on the redundancy that Mr. Rezendes mentioned. That is certainly true, but there are actually two provisions concerning discretionary technical assistance in the legislation. One is technical assistance which I agree 100 percent is redundant. The other is—and I am reading out of the law—developing and commercializing new commercial products and processes resulting from such SBIR projects. Now that is something that is sorely needed. However, the way the law is written it is very difficult to implement, and that is why none of the agencies have thus far chosen to implement it.

Chairman TORKILDSEN. Let us expand on that. What are the difficulties in implementation from an agency perspective?

Dr. BARISH. One vendor only. My interpretation of the law is that it has to be for a current project, either a Phase I or a Phase II. Many of the projects that we have supported, in fact, a large fraction with the commercialization assistance project, are projects that have completed Phase II several years down the road, but have been unsuccessful in commercialization. We have been able to use non-SBIR funds to help such project in commercialization efforts.

With the legislation, I believe that you could not use the funds for projects that have expired. So, that is one problem and the other one is the $4,000 per year of support. That is somewhat difficult.

Chairman TORKILDSEN. So is that consistent with what Mr. Little testified to earlier about doing something in Phase III, possibly using SBIR funds?

Dr. BARISH. That is a little different. What I think Mr. Little would like to do is allow SBIR funds to be used in Phase III. The law right now does not permit it. It only allows SBIR funds to be used in Phases I and II. I think he would like to have cost-shared Phase III. The Government could participate 50/50 with the small business to help in Phase III commercialization efforts, Roger, if I am correct?

Chairman TORKILDSEN. OK.

Dr. NORWOOD. Mr. Chairman, I would like to add a couple of comments in support of two of the items that Dr. Barish just mentioned. First of all, providing support to the program. We agree that it would be useful to allow flexibility in the SBIR set aside, within that set aside, to be able to have flexibility to use a fixed percentage, small fixed percentage of that program to administer the program. Right now those administration funds must come out of other R&D resources and in a declining and constrained budget environment, it just adds further burden on our R&D Program.

Also, it would be useful if we could change from the approach that is in the current law about using the one vendor and the $4,000 for commercialization activities and allow additional flexibility within the SBIR resources at a fixed rate to help us do commercialization.

Chairman TORKILDSEN. Has anyone in the panel thought along those lines for administrative costs? If you were seeking a change to allow SBIR funds for administrative costs, would you be looking for a fixed percentage, and if so, what amount would you be seeking?

Dr. NORWOOD. Yes, I think a fixed percentage would certainly be appropriate to safeguard everyone's interest and certainly something in the neighborhood of 2.5 to 3 percent would be sufficient, at least from our viewpoint.

Chairman TORKILDSEN. Dr. Barish, any thoughts on that?

Dr. BARISH. My written testimony and my oral testimony are that a maximum—this is our agency—a maximum of 1 percent of the SBIR funds could be used to support either administrative costs for the program's operation with all of the proposal evaluations, thousands of them, et cetera, and commercialization assistance efforts, a maximum of 1 percent.

Chairman TORKILDSEN. Mr. Glover, as the advocate, would you have any concerns about doing something like that?

Mr. GLOVER. I do have concerns about it. If we do it, just a quick math, it looks like it is between $10 and $30 million, depending on who you are talking to. The agencies already provide programs and they have got resources. Some assistance might be appropriate, but I would look at it very carefully and it is something I would be very concerned about. Because we do not ask big firms—we do not take money out of their budgets to do that—there is a specific amount, salary and expenses. What we are saying is oh, you are small businesses, so you are going to have to pay part of the salaries and expenses for this program.

Excuse me, large firms do not have to pay that. I think we have to be very careful about dipping into that, because it would be very easy for the agencies to raid this fund and they have certainly made through the years a lot of different attempts to do that.

But I do recognize that by and large these programs are underfunded by the agencies today. They do not have enough administrative costs. So, it is a serious problem. I am just not sure—I do not have a fixed number for you as to what that should be, but I think probably what it would be is whenever we reauthorize it, add some more to what we are giving. Not take it away from small business, but take it away from the other overall expenses.

Chairman TORKILDSEN.

Mr. Rezendes?

Mr. REZENDES. I want to echo those same concerns. We have the same concerns also, particularly in a fixed percentage for administrative costs is that it makes it very difficult from an oversight perspective, from the Congress perspective to look at how those monies are being spent and managed. Right now, it is clear that those costs cannot come out of these accounts. As Congress always has the direction and the discretion to add more administrative staff and money to the other parts of these budgets to handle this which makes it more visible and more manageable.

Chairman TORKILDSEN. The only problem is we do not have any more money to add, but short of that. Dr. Barish?

Dr. BARISH. Just to follow up. SBIR is different than the other agencies programs and the reason why it is different is because you have to have at least one annual solicitation—we send ours to tens of thousands of people—and that means you get a lot of proposals. You have heard that the proposal-to-award ratio is about 10 to 1. In other programs in the Federal agencies, you do not generally get a ratio of proposals to awards of 10 to 1, and you have to evaluate them in a very short time.

The SBA policy directive says we have to make the awards 6 months after we receive the proposals, so that places a significant burden on all the agencies. So, it really is different than the other programs. If we are trying to do a good job, we need the support to serve the small businesses.

Chairman TORKILDSEN. Let us follow on that because that is always an important part when we are talking about Government awards. What do you think the cost or your best estimate of the cost of administrating the program for both Energy and for NASA would be Dr. Norwood? What is the cost of administering this program, as it is coming out of your budget now, given that you do

have to review 10 times as many applications as actual awards that you grant?

Dr. NORWOOD. For this most recent fiscal year in terms of just dollar value throughout the NASA Program, it is about $3 million is required to administer the program. So, my percentage was based on continuing the level of support we have now which is an excellent level of support, but continuing that as the program continues.

Dr. BARISH. At DOE this year we have a $70 million SBIR budget and a $3.5 million STTR budget. That is supported by four full-time Federal permanent employees and a support services contract of about $300,000 per year.

Chairman TORKILDSEN. Thank you. Following with that, Mr. Glover or Mr. Neal, whoever is best able to answer that. What is the SBA cost for administering the program right now?

Mr. NEAL. The actual figures for 1994 is that the total budget allocated to the SBIR or STTR Program office was $981,000 and we had 11 personnel assigned to administer the program. For 1995, the figure is $957,000 and we will have 9 individuals assigned to administer the program.

Chairman TORKILDSEN. Before we go to another——

Mr. REZENDES. Before we leave this point, I do not think from my perspective I want to argue whether, in fact, they need the money or do not need money for administration. I guess the only thought I would want to leave with you is that if you are going to use it as a percentage of the program, you are going to lose sight over how the money is being spent within that. If you can afford to spend the money as a set aside, you can afford to also spend the money up front. The more you have identified it and made conscious decisions in the budget as to what it is being used for, the more easy it is to provide the oversight that Congress needs to run these funds.

Dr. NORWOOD. I just wanted to make a clarification. In the number I gave you that is a NASA-wide number. So, it is not just headquarters.

Chairman TORKILDSEN. Understood. Thank you. Any other comments on the subject before we move on to another one? Another interesting item from the GAO report was the possibility of a scam, and any time you have a Government award program you run the risk of someone attempting to turn the program into a scam. It is extremely serious and it is something that we all have to take diligent steps to see it does not happen. Would anyone on the panel like to offer either steps that as an individual agency can be taken or what coordination is necessary? Mr. Neal.

Mr. NEAL. Mr. Chairman, what we have looked at is that recognize that there is this possibility, and approximately a year ago we began developing a real time computerized system that would allow the agencies to look at what awards had been made at other agencies. The implementation of that computerized system is moving along well and we would expect very soon to have that available to the agencies, so that they could verify this.

Chairman TORKILDSEN. You are developing that or you have that in place now?

Mr. NEAL. What we are looking at right now is that we are looking at roughly 3 to 4 months before it will be fully operational.

Chairman TORKILDSEN. That will be very good news, I think. In your review, do you think that will be sufficient or will other steps be necessary to prevent what is happening?

Mr. NEAL. In our working closely with GAO, because we had started working on it before they had really identified a real time computerized system as being one of the methods that would help cut down on fraudulent activity, we have been discussing with them the characteristics of the system to ensure that the system that we put together would meet many of the criteria they feel would be necessary in order to provide the antifraud deterrent necessary for the agencies.

Chairman TORKILDSEN. Mr. Rezendes.

Mr. REZENDES. There are two others that I would add to this list, in addition to a real time system. One is the certification procedure itself. The NSFIG is taking a look at the actual form and there may be just a form problem here as well as the company signing on the front page that they are certifying this. There is a whole bunch of attachments to it. It is not really clear from the company's perspective of what they are really certifying to. If the duplication point and disclosure were right above that or in closer proximity, then the cause and effect becomes clearer.

Second, as I said also needs to be done is some clear definitions as to what is duplication here. It means a lot of things to a lot of people and providing some additional guidance to the applicants as to what we really mean by that. I also think that there is a responsibility on the applicant's part to some kind of disclosure. Even if the applicant knows that down deep inside this is not a duplicate research project, it seems to me there is—I would put this in the same category as conflict of interest—there is actual conflict of interest and potential or appearance of conflict of interest.

There should be a disclosure requirement on the part of the applicant to at least disclose where else he has gone with similar type proposals, so the agency can then take appropriate action to determine whether, in fact, these are duplicate or not and whether they want to fund them.

Chairman TORKILDSEN. Mr. Neal, comment on those two.

Mr. NEAL. In response to those two items, and as I said we have been working closely with the GAO with respect to this issue, because we want to avoid any appearance of this program's right for fraud. We are in the process of reviewing the GAO recommendations and looking at the certification form and clarifying that and then also developing a definition that will make it much easier for the small businesses to understand that when they submit their proposals that we are looking to avoid any possible duplication of funding at any of the agencies. So, we are working very closely with the GAO in ensuring that that is taken care of.

Chairman TORKILDSEN. If I could ask also, Mr. Little and Mr. Bassilakis, as users, these steps I think would seem reasonable to you. If you could comment on that and is there anything else from your perspective, so that unscrupulous users do not get into the system to begin with?

Mr. LITTLE. I think what I heard is quite reasonable. Even now when you submit a proposal, you have to indicate whether you are submitting the same proposal elsewhere. On occasion, we have been awarded the same proposal twice from two different agencies and had to turn it down. I have not heard quantitatively how big a problem that is. I heard one flagrant example, but I do not know. I am surprised it is a significant problem.

Chairman TORKILDSEN. Mr. Bassilakis.

Mr. BASSILAKIS. From my perspective, as a new startup company, I do not really have much to add in this particular area. However, I am confident that I can state, in behalf of all small business firms, that unscrupulous firms should be permanently barred from future participation in the SBIR Program.

Chairman TORKILDSEN. The need for some type of better definition of what is similar or duplication is important. Under the program as it is now if, for instance, DOE funds a program that may be mostly basic research, some commercial possibilities, but that is a particular program and then NASA decides that they need the same type work done, is there a program by which NASA can readily find out that DOE has already completed the work? Is that part of this overall program? If anyone can respond to that, Mr. Neal or Dr. Barish or Dr. Norwood?

Mr. REZENDES. The SBA has a requirement in its policy directive that in the solicitation of each agency, a company is asked to identify in its proposal whether it has submitted the same or essentially the same proposal to any other Federal agency and Mr. Little just commented that Spire does that. What the agencies do is after they choose proposals for awards, they look in that section and they see, as the company has said, it has done the same, it has submitted something elsewhere, or it has not. If it has not, we stop that.

The problem in the GAO report is there have been several examples that companies have said they have not submitted it elsewhere and that is not true. If the company has submitted elsewhere, then we check the status of that proposal with another agency to make sure that it is not being funded twice.

Chairman TORKILDSEN. Understand looking at that from an aspect of making sure that we are stopping fraud, my question from the opposite tack and not assuming a fraud case, but let us say a legitimate company applies to Energy, but does not apply to NASA, can NASA find out what else is out there, what work is being done, if per chance the company that is doing work for Energy just did not apply to NASA? Is there some procedure?

Mr. REZENDES. Yes, it can, but the time delay is somewhat significant and SBA is trying to develop a system to reduce that time delay, so it will be more current and more accessible.

Chairman TORKILDSEN. Will the real time computer system that SBA is working on provide information of that nature as well?

Mr. NEAL. The real time system is designed to allow the agencies to look in and where there are instances where it appears to be duplication, that will prompt them to go and inquire at the other agency that may have made the award to get into more detail as to find out whether or not this is actual duplication. So, it sort of

serves as a flag to the other agencies that there may be duplication in terms of the awards there.

Mr. REZENDES. May I make a comment on that? It is on SBA's behalf. I want to mention that this is not as easy as it seems. What we are talking about is proprietary information. In some cases, peoples' ideas and notions and you just do not want to have that broadcast everywhere for everyone to see, but you do want to have some kind of system where it would trigger a conversation beyond that if, in fact, there is a notion that there is duplication going on.

Also, I wanted to comment just a little on this question about the magnitude of this. I really do not have any idea. What we are parroting here is some anecdotal information we have received from the various agencies and Justice Department, and no one has ever done a comprehensive analysis to determine exactly how much duplication there is out there. From the agencies we have spoke to, there is a notion that this is—only a few firms that are involved in this. But the reality is, we really do not know.

Mr. GLOVER. The one thing that we do know is that out of 35,000 awards through the years, that only two have actually been referred for action by any of the inspector generals of the various agencies, and the agencies have looked at it to some extent. So, we know it is not widespread. No case of fraud is appropriate, but I do not want to leave you with the impression that this is a significant problem that occurs on a regular basis. I think it is laudable that we fix it so that we reduce the chances of it, but I think we need to keep it in perspective, that it is a rare, rare situation.

Chairman TORKILDSEN. For a final question on this subject, Mr. Neal, will the computer you are developing for real time, will that contain the abstracts of these proposals on them or how much information will actually be there?

Mr. NEAL. I can provide you with the details of it. But as it is right now, as had been mentioned by the GAO representative, we are being very careful as to not put too much information in there to violate the proprietary information rights of the firms that are participating in the program. But I can provide you with the details as to the schematics as to how the system is being put together and what will be the criteria for the information that will be available.

Chairman TORKILDSEN. That would be fine. A few other general areas and then we will bring the hearing to a conclusion. Mr. Glover, you mentioned the high return to taxpayers. Just for the record, could you expand a little bit on that, the benefit, both financial and other, that the taxpayers receive from this program?

Mr. GLOVER. Yes, the National Science Foundation has probably done more work in this area than anyone else has, and I will be happy to provide that to you specifically. But in general, the commercialization of this has resulted in a large number of jobs being created and that if we look at the benefit to the economy from those jobs having been created, we find that exceeds the cost of the program. Some of the more notable examples were listed in my testimony and we talk about how some of those examples have been very, very successful in terms of breakthrough. Both in Mr. Neal's testimony and mine go into some length about that. So, I think that on balance we have seen the taxpayers receive that.

I will be happy to provide the NSF study to you. I think there is one other study that went and looked at that from one other agency, but it has been far more productive than one would normally expect a Government research program to be.

Chairman TORKILDSEN. The larger point I would like to move into now, I guess it goes back to the idea of having definitions as to what constitutes funds that have to be counted toward the set aside. Is there a standardization process within that? I think it is mentioned in generic terms, but is there a standard process by which every agency has to meet the same type of definitions or are agencies given broad latitude to decide what funding needs to be counted for the set aside for SBIR? Dr. Barish.

Dr. BARISH. I think the law is fairly clear and it says that if an agency has over $100 million of extramural research and development funds, then it has to have an SBIR Program. Extramural means research supported outside employees of the agency. What we do in our agency is take the research and development budget and estimate within each of the departmental elements how much of it is extramural, and that forms the basis of the SBIR funds. We take 2 percent of that to fund Phase I and Phase II SBIR projects. I may mention that in the DOE we have spent every single dollar of that SBIR set aside on Phase I and Phase II projects for 12 years in a row.

Chairman TORKILDSEN. Dr. Norwood.

Dr. NORWOOD. I concur in that.

Chairman TORKILDSEN. Just a very small question. Mr. Little, in your testimony you mentioned that you have quite a bit of exports. Could you give us a percentage of what your company sales are in terms of exports?

Mr. LITTLE. My company sales were $18 million last year and I believe $4 million were exports.

Chairman TORKILDSEN. So pretty significant. For Mr. Neal or anyone on the panel, has there been any research done on—while it is not a primary goal of it—how furthering the SBIR Program can lead these small companies, not only to sell to the Government but to sell across our boundaries. Has there been any work done in that area?

Mr. GLOVER. We are doing some right now. We are looking at the patents that are granted to U.S. firms, SBIR firms versus the overall market to try to determine if there is some international patents, where we stand with international patents, and what is happening there. One of the real problems that we recognize exists is small firms by and large do not file for foreign patents as frequently or in the same proportion as large firms do.

So quite often the small firms do not have the resources to go file the foreign patents. It is a serious problem. We are looking at that fairly carefully. We will have a study done. It is funded for this year. It will be coming out later this year and we will be able to look and see that and we ask them specifically to look at SBIR award winners as a sub-class of that survey.

Chairman TORKILDSEN. Mr. Neal, would you like to add to that?

Mr. NEAL. Yes, as part of our larger effort at the Small Business Administration, we are trying to take our SBIR award winners and include them in our efforts to get them involved in international

trade and international trade activities. So, what we do is we work very closely with our economic development office of international trade to make available the list, so that when they are out on trade missions or working with foreign nations, that they can make firms that are interested in new technology and high technology firms aware of the firms that we have working in our SBIR and STTR Programs.

So we do exchange that information and we encourage the SBIR firms to utilize the other services of the SBA. That is where we spend a great of our time and effort right now in trying to further integrate the other services that are provided and make it available to participants of the program.

Chairman TORKILDSEN. Would anyone else like to comment in that area? The final subject that I would like everyone just to deal with is one that several of you mentioned in your testimony and I mentioned in my opening remarks is that we are looking at declining budgets all around. I think most people accept that as reality. There has been some suggestion of changing the percentage that has been set aside, but could all of you just walk through what you think the appropriate balance would be, still targeting funds for small business under SBIR where incubation of great technologies happens quite often, but without putting in unrealistic constrain on what our scarcer dollars in virtually, or what I think will be every department of the U.S. Government. Who would like to start?

Dr. NORWOOD. I will start. In 1992, a NASA representative testified before a committee, Small Business Committee, and this issue was raised then. Essentially the NASA view was that we would prefer to keep the set-aside percentage rate at the level that it was. The upcoming and ongoing budget cuts and reductions to the NASA, in particular R&D Program, it puts severe strain on our ability to do R&D. Consequently, if the rate, for example, that is planned to go up in 1997 from 2 percent to 2.5 percent, if that increases is, in fact, going to occur, it is going to take those resources that would have gone into programs and put them into SBIR.

We do support SBIR and believe it is an important and valuable program, but the issue is one of balance and whether or not you wanted to put more into SBIR when your overall R&D budget is decreasing is an issue that we need to revisit. So, if the opportunity arises, we would like to see that change in the planned increasing rate revisited.

Chairman TORKILDSEN. Mr. Glover, you might want to say something on that.

Mr. GLOVER. Yes, I would be delighted to share a contrary view. Small businesses represent about 50 percent of the gross domestic product in the United States. Certainly the majority of innovations come out of small businesses. Scientific costs at large firms and universities and Government labs is several times higher than at small businesses, so we are far more efficient at providing good quality research at lower prices.

I think as we see that number shrink, it is important that we look to see if we cannot expand the percentage that small business has, provided that we do not push it beyond where the quality is there.

So I would object strongly to reducing it. I think the Government needs to get the most efficient, most productive sector of the economy in. We have got to remember small business still only gets 3 percent of total R&D expenditures and considering that, every study says small business has less overhead, has less cost per scientist, and more innovations per employee, and more innovations per R&D dollar. It seems that to cut that back would fly in the face of good solid business.

In the discussion of private enterprise, we have to remember Government contracting is not private enterprise. We have a system that we have artificially set up and competition is way down on the list. The thing that has always upset me is how many Government contracts and especially at the different agencies that we talk about are awarded with no competition. Small business gets about 40 percent of the competitive solicitations across the board. The reason they only get 20 percent overall is because they get such a low percentage of the sole-source contracts. Probably the most important thing we can do for small business overall is make it competitive.

The beauty of this program, it is the most competitive program. We have got 10 people fighting for every award that is granted. To cut back on this program would be a horrible mistake and I would oppose it vehemently.

Mr. REZENDES. I would add a comment to that. I think from our perspective we only looked at from the recipients, the SBIR side. We found that there it is a very competitive prospect and there are a lot of potential awardees. We found out, as I mentioned earlier, no diminishing in terms of the ratio between proposals and awardees. So, obviously, there is a need and in our previous work showed us some success in the program as these projects mature and become commercial. There are some paybacks here.

I guess we really should get into Dr. Norwood's point. The point I want to make is that he is inferring that the agencies are giving up some critical research that they cannot get done through this program. That is not the side that we have looked at or I believe any of the other panel have looked at is the NASA research that is going by the waste.

I think what really needs to be done is each of the agencies involved need to come forward with what exactly, what tradeoffs that they are making and what they are giving up for doing this program. That is the piece that is missing here.

Chairman TORKILDSEN. The program was certainly designed to extend R&D work to small business. It was not designed to set aside funds for small business that went into work other than R&D. Mr. Little.

Mr. LITTLE. I think that the small business percentages, in effect, are shrinking anyhow. It shrinks for two factors. One is with the advent of the SBIR Program and its growth, small businesses almost get no mainline R&D funding from agencies. They are directed to go to the SBIR Program. So, that has come down on mainline funding.

The second thing is the percentage is based on the extramural R&D budgets. As the budgets for R&D are cut back throughout the

agencies, the extramural piece will be cut back the most. So, we should fight hard to keep that 2.5 percent.

Chairman TORKILDSEN. Does anyone on the panel have any historic numbers on that and where we can expect to be in the next budget? Is that available? Perhaps if I could ask, to the extent possible, if Mr. Neal and Mr. Glover could assemble that. I do not expect it to be readily available, but it would require working with the agencies to assemble it. It think it would be very helpful to the subcommittee.

Mr. GLOVER. We will be happy to do that. The SBIR managers get together basically on a monthly basis and we will ask them to pull that together. Most of them are here today.

Chairman TORKILDSEN. Thank you.

Dr. NORWOOD. Mr. Chairman, may I add a couple of additional remarks to the comments that you just heard about?

Chairman TORKILDSEN. Please do.

Dr. NORWOOD. The issue of the set-aside percentage. Let me say overall NASA has tried and is very successful in increasing the overall percentage of small businesses and the total amount of awards to small businesses, not only for all of the efforts and activities at NASA, but as far as R&D is concerned. For example, if you look overall at NASA, in 1983, about $480 million was awarded to small businesses for the NASA Programs, not just R&D but for NASA Programs.

In 1994, excluding SBIR, $1.01 billion was awarded to small businesses directly and an additional amount was awarded in terms of subcontracts. So, we have gone from $480 million to over a billion dollars for small businesses, not including SBIR.

If you look at the portion of that small business, again not including SBIR, that is strictly for R&D purposes, in 1994 that number was $301 million, a little over $301 million which has increased from about $250 million in fiscal year 1993. So, we do support the program.

I think our record and our numbers show that we have made great strides in including small businesses in our overall program and particularly in our R&D Program, and all we are asking for is to adjust the rate of increase or to revisit, if the opportunity comes up, the rate of increase, so we can have a balance in our overall R&D Program.

NASA, in particular, a lot of our science and other missions are funded out of the R&D budget. That is part of their extramural R&D budget. So, when you put funds into SBIR which is of course valuable and we have attested to the fact that it is valuable, you unbalance the program. All we are suggesting is that we get a chance to revisit that if the opportunity comes up.

Chairman TORKILDSEN. Dr. Barish.

Dr. BARISH. To comment on some of the possible differences of opinion among the agencies and also the small business community. I think it is important to remember that in the four purposes of the original legislation in 1983, two of them in some sense were potentially in conflict with each other. One purpose is commercialization of Federal research and development.

The second is satisfying the R&D interests of the agencies. Trying to achieve those two goals simultaneously is going to lead to these sources of conflict.

Chairman TORKILDSEN. Thank you. Mr. Glover.

Mr. GLOVER. I will be happy to quote from the testimony for this subcommittee some 16 years ago the exact same kinds of screams and gnashing of teeth when the bill was passed. I will be happy to quote when the bill was reauthorized, the same kind of concerns. What I am pleased about is that the agencies, while not liking the program because it messes with what they really want to do, has been so well received and the agencies are to be commended for the fine job they have done, and I think the direction that has been given in the past is wise and I think we want to continue in that direction.

But I can tell you over 30 years of looking at this problem and reviewing the record, without direction from the Congress it will not happen. I have seen Presidential memorandums ignored. I have seen promises by agencies ignored and when you look at the total amount that goes to small business, we still only see 3 percent. That has not changed. The SBIR Program has kept it from going down.

But we still are not spending the money in the most productive, innovative sector of our economy. If we are ever going to have a commercialization program that matches our foreign competitors, this is the one that seems to work the best of any we have tried, and to cut it back instead of expanding it, seems to me to be the wrong thing to do.

Chairman TORKILDSEN. Would anyone else like to make any other comments on any of the subjects we have touched upon today? If not, I think it is appropriate that we conclude with Mr. Glover's remarks.

I thank the witnesses for their testimony and this hearing is adjourned.

[Whereupon, at 11:46 a.m., the subcommittee adjourned, subject to the call of the chair.]

APPENDIX

Committee on Small Business
Subcommittee on Government Programs
The House of Representatives

Opening Remarks
of
The Honorable Glenn Poshard

April 6, 1995

I thank Chairman Torkildsen for holding this morning's hearing on the Small Business Innovation and Research (SBIR) program and the Small Business Technology Transfer (STTR) pilot program. As one of the drafters of the STTR program, I look forward to today's testimony, and I want to thank the panel for joining us to discuss these two programs so very important to moving our nation's small business community into the 21st century.

I believe the SBIR has been successful in its efforts to stimulate technological innovations developed by small businesses. In the twelve years this program has been in existence, over 33,000 SBIR awards have been made to move hi-tech products, processes and services out of the laboratory and into the commercial marketplace.

This program's ability to foster small business owners and entrepreneurs to enter into a highly competitive and unpredictable market has had tremendous results. One in four SBIR participants have recorded commercial sales success within six years of receiving their award. The program has been equally successful in bringing new innovations and products into the world market including those that improve the environment and the physical well-being of people in the United States and around the world.

It is my understanding a number of agencies, including some testifying before the committee today, have concerns over the SBIR set-aside being increased from two percent to two and a half percent in Fiscal Year 1997. I understand the concern many share for the concept of set-asides, however, we must recognize the fact that it is the small business sector that continues to create more jobs than any other business sector in America.

What is so unique and important about small business is it is representative of a very diverse group of business owners and entrepreneurs. I believe small business fosters the participation of many groups of Americans often under-represented in the business community. Like many of the Small Business Administration programs, the SBIR program offers opportunities to small businesses that without such a program would never have a chance of developing or marketing their products or services.

The Small Business Technology Transfer program, which I had the privilege of including in the Small Business Research and Development Enhancement Act of 1992, is an important step in creating important partnerships between the research and small business communities. The STTR program complements the SBIR program in that it capitalizes on a vast new reservoir of commercially-promising ideas which originated in universities, federal laboratories, and nonprofit research institutions. While both programs are separate and distinct, they both harness the ability of small businesses to innovate and commercialize research.

I believe the STTR has been successful in its mission to create a strong incentive for researchers and small companies to find each other and work together. Researchers, research institutions and small businesses, by working with one another, can take advantage of STTR funding and the many opportunities that come along with it. This program brings people together in order to help foster business and a better and more advanced tomorrow.

The STTR program supplies funding at the most critical point in technology commercialization - before investors are willing to make risk investments, and after Government research funding sources consider the project too commercial to fund. For too many years, our nation's technology languished in this gap only to be recognized by foreign competitors and developed abroad. As the STTR program continues to grow and develop, it has the potential to strengthen our nation's competitiveness in the world market.

Thank you again to Chairman Torkildsen for holding today's hearing, and for sharing interest in these two programs designed to foster small business participation in meeting the research and development needs of the federal government. I hope Congress and the Administration will continue to see the benefits the SBIR and STTR programs have had on everyone involved. By continuing to bring government and the small business community together, we create jobs for today while we create technology and innovation for tomorrow.

OPENING STATEMENT
OF CHAIRMAN PETER G. TORKILDSEN

HEARING ON THE SMALL BUSINESS INNOVATION RESEARCH PROGRAM

Thursday, April 6, 1995
10 a.m.

The Committee will come to order.

This hearing marks the last in a series of hearings reviewing the Small Business Administration's programs. It is appropriate that the last of these hearings should be on the most forward-looking of its programs, the Small Business Innovation Research Program.

As we look toward the future of small business we must necessarily include high technology; it is in this sector that some of the highest paying jobs are created. It is from this sector that most of the greatest growth will come. Technology-oriented small businesses are a fertile ground for innovation, but suffer under a number of constraints. Access to capital is the most obvious problem, and it is one that we have addressed in other hearings of the full Committee. But the more challenging issue, and the one which the SBIR program attempts to address, is this: how do we take the tremendous creativity and flexibility of the small company and give it a forum where the innovative technologies these companies develop can be utilized by the government and the commercial marketplace? We've heard all the stories of the commercialization of technologies developed for the Space Program or the National Institutes for Health yielding tremendous benefits for the consumer and the companies that have commercialized them. Shouldn't small companies have a similar opportunity?

The Small Business Innovation Research Program was created to help answer that question. SBIR challenges agencies and departments that have massive extramural research budgets - in excess of $100 million - to take a nominal percentage of those funds and set them aside for small business which competes for research projects at two levels; the feasibility study

and the research phase, and which then may commercialize the resulting product or technology. The percentage of research and development dollars set aside for small business increases every two years, from 1.5% in 1993 and 1994, to 2% for 1995 and 1996, and not less than 2.5% thereafter.

In 1992, Congress added a pilot program entitled the Small Business Technology Transfer program, which directs small businesses which wish to apply for STTR grants to partner with a nonprofit research institution, normally a university, with the small business doing not less than 40% of the work. We will be interested in hearing how the pilot has been proceeding, and if there is any measurable difference between the work product small businesses generate under SBIR as opposed to that which they generate under STTR.

SBIR has, by all accounts, been a tremendous success. Through 1994, almost $5 billion in awards has been made, funding 33,000 projects out of the 215,000 proposals which agencies have received. In 1995, it is expected that almost a billion dollars of Federally-sponsored research, funding 5500 projects, will be awarded. These projects range from neural network computers to natural insect control compounds to tumor detection drugs.

But despite this success, the program must be examined and several critical questions asked. How can we continue the growth of this program with ever-shrinking defense and other dollars? What effect will this Congress' efforts to reduce the deficit have on extramural research? How can we increase the numbers of small businesses which participate and which are successful in getting awards? How do we guarantee that these companies' intellectual property rights are preserved and protected?

We hope that these and many other questions will be answered today.

At this time, I will yield to the ranking member, Mr Poshard, for an opening statement.

STATEMENT OF

DR. SAMUEL J. BARISH

SBIR/STTR PROGRAM MANAGER

OFFICE OF ENERGY RESEARCH

U.S. DEPARTMENT OF ENERGY

BEFORE THE

COMMITTEE ON SMALL BUSINESS

SUBCOMMITTEE ON GOVERNMENT PROGRAMS

U. S. HOUSE OF REPRESENTATIVES

APRIL 6, 1995

Mr. Chairman and Members of the Subcommittee:
I am pleased to be here today to discuss the Small Business Innovation Research (SBIR) program and the Small Business Technology Transfer (STTR) pilot program at the Department of Energy (DOE).

Over the twelve years of its existence, the SBIR program has matured significantly. We have issued fourteen Phase I solicitations, reviewed approximately 16,720 proposals, and selected for funding over 1,780 Phase I projects and over 640 Phase II projects. Each year we have issued the solicitation on schedule, met every deadline for the selection of both Phase I and Phase II awards, and published books of abstracts of our Phase I and Phase II projects. Our SBIR budget for Fiscal Year 1995 is $70 million.

The quality of the research selected for awards has remained very high. We are very pleased that eleven of our projects have received R&D-100 Awards from Research and Development Magazine, which selects the 100 most significant technical products each year.

Many companies with Phase II awards have made great strides toward commercializing the results of their research. The DOE has collected numerous examples of Phase III success and has implemented a special program to assist awardees with commercialization.

First, I would like to share with the Committee some of our experiences in implementing the SBIR program.

ASSISTANCE IN COMMERCIALIZATION EFFORTS

A large majority of SBIR awardees have excellent skills in science and engineering research but are relatively new to the business world and lack experience in product development, financing business growth, raising venture capital, and marketing. To meet the primary goal of the SBIR legislation, increasing private sector commercialization of SBIR research, the Department has provided non-SBIR funds to support a Commercialization Assistance Project for the last six years. For the past five years, this three-stage project for Phase II awardees has been conducted by Dawnbreaker, a private organization from Rochester, New York, selected by and under a grant from DOE.

In the first stage, the companies were provided with weekly instructions and individual advice and counsel, over a four-month period, in the preparation of a business plan to potential sponsors. The primary emphasis was on the marketing and financial aspects of the business plan, which was critiqued in detail. Very few of the companies had prepared a business plan before.

The second stage consisted of intensive assistance in putting together sound, clear, and concise visual materials describing a business opportunity that could be presented in 20 minutes to potential sponsors. The participants also practiced and received critiques on their presentations. In the third and final stage, about 25 companies made individual presentations to about 60 decision makers from large corporations and venture capital firms in an effort to interest them in either joint ventures, licensing, venture capital investments, or other teaming arrangements.

One-on-one sessions between the SBIR awardees and the potential sponsors were also held. Most of the SBIR companies were seeking further funding for their projects to develop a product or process for the commercial marketplace. The potential sponsors included Air Products and Chemicals, ARCO, Babcock & Wilcox, Boeing, Dow Chemical, Dupont, General Dynamics, Hoechst Celanese, Monsanto Chemical, Rohm & Haas, Shell Development, Westinghouse Electric, Xerox, and many venture capital firms. The second and third stages of the project were held in the Washington, D.C. area.

As a result of participation in the 1991 Commercialization Assistance Project, the most recent project for which analysis has been completed, the small companies have already received more than $14 million for commercialization of their research,

with a projected royalty stream from option agreements of an additional $24 million over the next four years. About 43 percent of the firms that completed the project have received further funding for their work.

All of the companies that participated in the project over the past two years have developed skills in business plan development. These skills will be very useful in pursuing other commercial opportunities, including future SBIR projects from any Federal agency. Both the SBIR awardees and the potential sponsors felt the project was very worthwhile.

As part of the Commercialization Assistance Project, we have distributed the document "Business Planning for Scientists and Engineers" to our Phase II awardees. The document describes the process of developing a business plan, from which a clear description of a business opportunity can be presented to potential funding sources. We will continue to encourage the commercialization of products and processes developed under SBIR support.

INCREASED EMPHASIS ON COMMERCIALIZATION

The SBIR reauthorization legislation (Public Law 102-564) placed increased emphasis on commercialization of SBIR research by requiring the consideration of commercial potential in the Phase

II evaluation process. Specifically, the following four factors were to be evaluated: (1) the small business concern's record of commercializing SBIR or other research, (2) the existence of Phase II funding commitments from private sector or non-SBIR funding sources, (3) the existence of Phase III follow-on funding commitments for the subject of the research, and (4) the presence of other indicators of commercial potential of the idea. The Department's SBIR program has developed a system to evaluate each of these four factors. As a result, commercial potential of Phase II proposals has been an important factor in the evaluation process for the past two years.

CONTINUITY OF FUNDING BETWEEN PHASES I AND II

In planning the awards of Phase II grants, attention was paid to the potential cash flow problem that a small business would experience if it were to suffer a hiatus in funding between Phases I and II. Such a gap in funding is most difficult for businesses that are either new or very small. In our first year of Phase II awards (1984), a system was devised and implemented that allowed Phase I awardees to submit their Phase II proposals before their Phase I grants ended, if they felt they were ready to do so. For each of the twelve years in which Phase II awards have been made, such grantees who were chosen for Phase II funding were able to begin their projects without interruption in funding. Since 1984, about 35 percent of our Phase II awardees

have had continuous funding between Phases I and II. This DOE-developed system has received very favorable reaction from the small business community.

EMPHASIS ON HIGH TECHNICAL QUALITY OF AWARDS

The proposal review process has been designed to maximize the quality of proposals selected for awards, while maintaining fairness and timeliness of the process. The attainment of high technical quality of SBIR projects has been made possible by adopting the principle of merging contributions made to SBIR by different departmental elements into a single SBIR fund. This has enabled us to select for awards proposals of the highest technical quality, regardless of the technical topic area.

By submitting well-designed topics for inclusion in the solicitation, and by publicizing the solicitation within the respective technical communities, the various programs can increase the probability that funds contributed to SBIR will return to the respective programs in the form of SBIR-supported projects. To achieve overall program balance, the number of technical topics included in the solicitation is roughly proportional to the respective technical program's contribution to the SBIR fund.

SUCCESS IN PHASE III

The companies from our first five cycles of awards have already received over $300 million in Phase III funding, which is twice the SBIR support they were given. The Phase II projects of these companies started between 1984 and 1988. The data come from letters received annually from each of the Phase II awardees on their progress in obtaining funding for Phase III.

For example, ThermoChem, Inc. of Columbia, Maryland, as a result of a DOE SBIR project, has been awarded $37 million from DOE's Clean Coal Technology Program and Wisconsin Power and Light to demonstrate its pulse combustion technology for the efficient, environmentally benign utilization of coal. The pulse combustion process increases the heat transfer rate. The heated materials (e.g., coal or organic waste products) react with steam to chemically disassociate, resulting in an environmentally clean conversion of the coal into a clean-burning, hydrogen-rich gas. A demonstration plant near Gillette, Wyoming is planning to convert more than 400 tons of coal per day into a fuel gas with an energy content 2-3 times higher than that produced by existing systems. In another application, ThermoChem has installed a system for the recovery of energy and process chemicals from "black liquor," a waste product of paper production. Funding of $9 million is being supplied by the Weyerhaeuser Paper Company, the California Energy Commission, DOE, and others for a

demonstration project at the Weyerhaeuser paper mill in New Bern, North Carolina. Thermochem has grown from three employees at the time of their first SBIR award (from DOE) to 70 employees today.

TRI, Inc. (formerly TeleRobotics International) of Knoxville, Tennessee used DOE SBIR funding to develop a remotely operable video camera for security and surveillance applications. The product, "Omniview," is an omni-directional video viewing system that can capture an entire hemispherical (180 degrees) field of view, electronically providing pan, tilt, zoom, rotation, and magnification throughout the image with no moving parts. Omniview offers greater reliability over mechanical systems which require motors, lubricants, and wires, i.e., things that can go wrong. Recognizing the value of this technology, Motorola Corporation has provided a multi-million dollar investment in TRI for the rights to manufacture and market the Omniview product. As a result, the company is valued at $24 million, a tremendous achievement for a firm with only six employees. Further growth is expected: in the next year, employment is anticipated to triple; within three to five years, TRI's partner is expected to increase its investment by 200 percent. TRI claims that it would not have attracted its follow-on investment had it not been for their DOE SBIR awards and their subsequent participation in the DOE Commercialization Assistance Program.

QUEST, Integrated, Inc., of Kent, Washington has used DOE SBIR funding to develop ultra-high pressure waterjet systems that have significantly reduced the time to clean, decontaminate, and maintain coolant pumps inside nuclear reactors. QUEST developed a high-pressure nozzle that effectively equalizes the water pressure external to the waterjet and allows the waterjet to cut and clean deep underwater. QUEST also devised a robotic system that is lowered inside the reactor tank, where it locates reference elements on the reactor jet pumps, automatically deploys the high-pressure nozzle and cleaning head inside the pump, and cleans the pump in-situ. The system has been used in reactors in the United States, Japan, and Taiwan. Service time has been greatly reduced, and cooling capacities have been significantly improved. Over $6 million in commercial sales have been registered. QUEST has grown from 65 to 115 employees over the past two years. A significant part of this growth is due to the commercial nuclear services business based on the technology developed in the DOE SBIR program.

Under an SBIR grant from DOE, LSR Technologies, Inc., of Acton, Massachusetts developed a novel particulate control device called a Core Separator. It functions by means of inertial separation and has achieved higher performance than any other device of its kind. It is particularly well-suited to the combustion of coal and biomass fuels which contain significant quantities of mineral matter. In the U.S., for example, annual expenditures to control

dust or particulate emissions exceed expenditures for all gaseous emissions combined. Sales of the LSR Core Separator units in the U.S. and abroad have exceeded $2.5 million. Two license agreements have been signed, and a joint venture company has been established. To date, more than $4 million of funding has been received for further development and commercialization of the technology, a significant achievement for a five-year-old company that started with two employees.

SUGGESTIONS FOR IMPROVEMENTS IN THE PROGRAM

To increase the return on the government's annual investment of nearly one billion dollars in the SBIR program, we believe that a small fraction (one percent) of the SBIR set aside should be used to fund projects like the DOE Commercialization Assistance Project and to provide administrative support for the program's operation.

The SBIR reauthorization legislation provides for discretionary technical assistance that can be implemented by Federal agencies to assist SBIR awardees in, for example, commercialization efforts. Due to its complexity, no agency has implemented this provision. We recommend a modification to the legislation so that a small fraction of SBIR set aside funds can be used to provide commercialization assistance to SBIR awardees. This would allow projects like the DOE Commercialization Assistance

Project to be funded out of the SBIR set aside. In the past, this project has been supported by non-SBIR DOE funds.

The conduct of a high quality SBIR program which serves the small business community requires a significant commitment by the Federal agencies. The provision in the SBIR reauthorization legislation which prevents agencies from using SBIR set aside funds for administrative support is a serious impediment and can hamper the program's operation and the service it provides to small businesses. We recommend that the legislation allow the use of the SBIR set aside funds to support administrative costs of the program.

SBIR PROGRAM EFFECTIVENESS

I believe that the SBIR program has had a positive impact on the Department's research and development programs. SBIR has effectively broadened the pool of available scientists and engineers now contributing to DOE research, and has enriched the Department's research programs. Also, in many areas, the SBIR efforts have been integrated with the ongoing DOE research in a complementary and effective manner, and technology developed under SBIR support has been transferred to the private sector.

CONCLUSION

The SBIR program has the special benefit of enabling the Department to obtain effective, innovative solutions to important problems by the private sector, which has a commercial incentive to pursue the resulting technology and bring it to the marketplace. The growing number of grantees, many of whom started in business in response to SBIR solicitations, has become a significant resource for the solution of future high risk, high technology problems for the Department.

SMALL BUSINESS TECHNOLOGY TRANSFER (STTR) PILOT PROGRAM

The DOE STTR pilot program has been in operation for just over one year. During this time, the Department has issued two Phase I solicitations. In response to the first solicitation for FY 1994, 487 proposals were received; 21 were chosen for awards at a maximum of $100,000 each for projects to be conducted over a nine-month period. The DOE STTR budget was $2.1 million in FY 1994 and is $3.5 million in FY 1995.

The results of the evaluation of the proposals indicate that the scientific/technical quality of the funded projects is high. About two-thirds of the non-profit research institutions participating with the small businesses in these projects are DOE national laboratories, and about one-third are universities.

Although it is far too early to evaluate the STTR program, it appears to be an effective vehicle for combining the scientific and technical expertise of researchers at national laboratories and universities with the commercialization skills and incentive of small businesses to develop products and processes for the marketplace.

This concludes my prepared testimony. I would be happy to answer your questions.

TESTIMONY PRESENTED TO THE HOUSE OF REPRESENTATIVES

SMALL BUSINESS COMMITTEE'S SUBCOMMITTEE ON GOVERNMENT PROGRAMS

Hearings On

U. S. SMALL BUSINESS INNOVATIVE RESEARCH PROGRAM

Thursday, 6 April 1995
Washington, DC

C. A. Bassilakis
President
GREY FOX Technologies, Inc.
Andover, MA.

Good morning Chairman Torkildsen and members of the Subcommittee. My name is Constantine (Connie) Bassilakis and I am President of Grey Fox Technologies - a small business firm specializing in gas turbine related technologies. I am extremely honored to have been given the opportunity to share my favorable experiences with the Small Business Administration's SBIR program and offer recommendations on how the program can be further enhanced from the view point of a new small business firm.

I thought it might be helpful, before starting my testimony, if I first provided a brief overview of my experience due to my newness to the SBIR program. I joined the Pratt & Whitney Aircraft Division of United Technologies Corporation (UTC) in 1957 as a systems engineer after graduating from Rensselaer Polytechnic Institute (RPI) with a BSME. During the next 36 years with UTC and later, General Electric Aircraft Engines, I held many critical engineering, business development, and program management positions in the gas turbine industry. I also supplemented this work experience by obtaining an MSME and MBA from RPI. In late 1993, I founded Grey Fox Technologies after attending and becoming motivated at an excellent National SBIR Conference held in Washington on October 13-15, 1993 sponsored by DoD and NSF.

Now on to my testimony.

Grey Fox Technologies Overview

As you well know, the aircraft engine industry has been downsized due to reductions in defense funding, a slowdown in the world's commercial air transport business and intensive international competition. The industry is being forced to further reduce head count and other expenses to meet stockholder commitments. This environment is cutting into the industry's capability to explore the onger term technologies needed to protect its market position in the next century against growing international competition. Grey Fox Technologies has been structured to supplement the aircraft engine industry's critical need for new technologies by competing for U. S. Government contracts such as those related to the SBIR and STTR programs. As you will hear in a few moments, our track record shows that we have been very successful in meeting this objective.

Grey Fox Technologies was formed by former General Electric Aircraft Engine (GEAE) employees. Its principal place of business is in Andover, Massachusetts with employees located in both Massachusetts and Ohio. Grey Fox Technologies is staffed with an extremely talented team of gas turbine engineering, manufacturing, and product support professionals.....with a track record second to none in the gas turbine industry. The Grey Fox Technologies Team has extensive, hard learned experience on what it takes to design, develop and commercialize advanced technology concepts for aircraft, industrial, and marine gas turbine applications. In addition, the Grey Fox Technologies team has demonstrated skills in setting up and managing a wide range of consortium efforts.

Grey Fox Technologies is dedicated to growth....doing useful work....developing a product niche and providing good jobs for both former salary and hourly aerospace industry employees. As an added benefit to the U. S. Government, Grey Fox Technologies is creating an inventory of critical resources - both retired and laid-off aerospace employees - that will be available and up-to-date with modern gas turbine technology in the event of a national emergency.

SBIR Experience

Grey Fox Technologies won awards for three out of the six Phase I SBIR proposals it submitted in 1994. This will be a "tough act to follow."

The Air Force made the first award in May 1994 for "Further Development of Integrated High Performance Turbine Engine Technology (IHPTET) Concepts." Grey Fox Technologies submitted this proposal in January 1994....just two months after I attended my first National SBIR Conference. This would not have been possible without the knowledge obtained at the Conference, and other assistance provided by the SBA, SBIR Program Managers and the Defense Technical Information Center's Northeastern Regional Office.

NASA made the second award for an "Air Assisted Fuel Atomization System" project in December 1994. This SBIR project has the potential to improve temperature patterns and reduce NOx formation. Results to date are favorable. If eventually successful, this research project has a significant world-wide market potential for both aircraft and industrial gas turbine applications.

The Army made the third award for a "Rejuvenation of Thermal Fatigue in Metal Matrix Composite (MMC) Material" project in February 1995. The objective of this research project is to demonstrate the feasibility of developing a simple, low cost method for repairing MMC materials in order to reduce the ownership costs of advanced technology gas turbines.

Grey Fox Technologies submitted its first Phase II proposal for "Further Development of IHPTET Concepts" in response to an invitation from the Air Force in December 1994. A decision on this proposal is still pending.

SBIR Program Impacts

The SBIR program has provided a sound foundation for launching an exciting new business. This foundation has enabled Grey Fox Technologies to win two non-SBIR related subcontracts from GEAE in the second half of 1994....the larger of which was successfully performing three work packages in support of the component improvement program for the TF34 engine currently powering the Navy's S3Â and the Air Force's A10 aircraft. This SBIR foundation also enabled Grey Fox Technologies to submit the proposal "A Low Cost, Innovative Recuperated Gas Turbine Propulsion System for the Next Generation, High-Speed Rail Program" in response to DoT's BAA 95-1 in January 1995.

Seventeen direct employees...two of which were full time.... and seven independent contractor consultants were used in 1994. Grey Fox Technologies' total sales in 1994 were approximately $150,000....40% of which was generated from the SBIR program. Grey Fox Technologies sales are currently projected to exceed $400,000 in 1995. This will result in an increase in the number of full and part time employees.

I want to state for the record, that **without the SBIR foundation mentioned above, Grey Fox Technologies would not be in existence today!**

SBIR Improvements

The SBIR program is a sound and well-managed program. I want to give you my input on how the program can be improved from the viewpoint of reducing the paperwork burden facing a new start-up small business.

1) Cost Proposals - Most small start-up businesses cannot afford the time or expense required to prepare proposals in the elaborate detail that is required when an SBIR proposal exceeds $500,000. Yet, if we want to be responsive, (and receive an award), we are required to comply with these rules at the expense of other more critical and productive endeavors such as marketing, recruiting, research, planning, etc. There are over 30 data elements required in a Phase II cost proposal and several corresponding questions to be answered. While this type of information may be necessary to protect the Government's interest when dealing with multi-million dollar contracts, it is counterproductive to the small business environment where the emphasis must be focused on developing new technology and new businesses. From our previous experience, we have found that there is more than adequate experience in the Government's procurement offices to determine whether or not the proposed effort and price are reasonable.

2) Accounting Systems - Accounting system requirements for Phase II contracts are another area where too much emphasis is misplaced to the detriment of the small start-up business. What might be considered as a moderate accounting system for a going concern, in most instances, is considered to be cumbersome by start-up firms. Requiring elaborate accounting segregation for unallowable costs, types of costs, etc., does not facilitate the conduct of small business innovative research. Nor does it recognize that in many cases, the leaders of the start-up business are working at low or no compensation, do not rent or buy elaborate facilities, offer modest benefits, etc..... essentially performing each contract on a cost share basis. For these Phase II contracts, the Government can ensure it is receiving fair and reasonable value, by the relying on technical reports and evaluation that are currently part of the process.

3) Type of Contract - Usually, one of the reasons for an elaborate accounting system is the use of a cost plus fixed fee (CPFF) type contract. This can be easily remedied by the use of firm fixed price (FFP) contracts that are administratively much easier to accommodate.

4) Terms and Conditions - One of our recently awarded Phase I contracts contained over 90 contract provisions. This is overkill and unwarranted. Again, placing an unnecessary burden on the entrepreneur that is inconsistent with the amount of dollars involved.

Closing Remarks

Again, Mr. Chairman and members of the Subcommittee, I appreciate having this opportunity to share our experience with the SBIR program with you today. Keep up your excellent work in helping to make the SBIR program even better! I will be pleased to answer any questions that you may have.

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

OFFICE OF CHIEF COUNSEL FOR ADVOCACY

TESTIMONY OF

JERE W. GLOVER

CHIEF COUNSEL FOR ADVOCACY

UNITED STATES SMALL BUSINESS ADMINISTRATION

BEFORE THE

SUBCOMMITTEE ON GOVERNMENT PROGRAMS

COMMITTEE ON SMALL BUSINESS

OF THE

HOUSE OF REPRESENTATIVES

APRIL 6, 1995

Good Morning, Chairman Torkildsen and members of the Committee: It is a particular pleasure for me to appear before the Sub-Committee on Government Programs to discuss the Small Business Innovation Research program (SBIR).[1] The subject of small business innovation is one about which I learned a good deal early in my career in Washington working with this very Committee when I staffed Joint House and Senate Hearings on Small Business Innovation in 1978. The issue before the Committee then was that the federal government was excluding small business innovators from many federal research programs. The Committee asked every government agency to explain why it wasn't fully utilizing the small business community in its research activities. The most extreme example at that time was NIH, which had no research contracts with small business. The Committee was not satisfied with the answers then, and neither was I.

When I moved to the Office of Advocacy as Deputy Chief Counsel reporting to Milt Stewart, we conducted a series of focus groups and studies that led to the 1978 report by Advocacy on Small Business Innovation. The efforts of this Committee as well as the Office of Advocacy led to legislation that established the SBIR program (H.R.5607 and S.1860 (Small Business Innovation Act of 1979)). Enactment of this legislation was one of the top recommendations of the 1980 White House Conference on Small

---

[1] My testimony this morning reflects the independent views of the Chief Counsel for Advocacy and may or may not reflect the views of the Administration.

Business.

I was Counsel to that first White House Conference, and was pleased, but not surprised, to see that the number one recommendation of the Innovation and Technology Committee of the conference delegates was:[2]

> "Support and urge passage of S.1860, the Small Business Innovation Act of 1979, and companion bill H.R.5607..."

To underscore the importance of this issue in 1980, the recommendation was voted the sixth most important of the 60 recommendations by the entire conference delegation.

This issue was also addressed by the delegates to the 1986 White House Conference on Small Business where the entire delegation ranked the SBIR support as the 14th most important recommendation out of 60 as follows (it was the number one recommendation of the Innovation Committee):[3]

> "The Senate and the President should join the House of Representatives in reauthorizing the Small Business Innovation Research (SBIR) program by enacting H.R.4260 before the present Congress adjourns."

The recommendation went on to request expansion and permanence of

---

[2] **Report to the President: America's Small Business Economy: Agenda for Action**, By the White House Commission on Small Business, April 1980

[3] A Report to The President of the United States: The White House Conference on Small Business, November 1986

the program.

The delegates to the current (June 1995) White House Conference on Small Business have indicated strong support for the SBIR program in the state conferences (56 of the 59 state conferences have been held as of this date). The Committees on Technology and Information Revolution for virtually every state have supported continuation and/or expansion of the SBIR program as one of their top recommendations in the working groups. It is reasonable to expect that the elected and appointed delegates will include some indication of support for the SBIR program in the 1995 Conference report.[4]

The resulting Small Business Innovation Development Act of 1982 (Public Law 97-219) had broad bi-partisan support in Congress and was signed into law by President Reagan. The SBIR program thus has its roots in the hearings and findings of this Committee and in the grass-roots efforts of the small business community.

As with any major initiative, we had our share of critics who, lacking faith in the capabilities of small businesses, were certain that the program would result in:

Lowered quality of research,

---

[4] White House Conference Notes, America On-Line™, placed on-line by the staff of the White House Conference on Small Business, 1995.

Too few applicants/proposals, resulting in the need to fund poor proposals,

Abuses of the program by proposal mills,

No/poor commercialization of the research.

These critics led a hard-fought battle. The research establishment at the time consisted of the federal research laboratories, universities and large businesses. The idea that small businesses could be more innovative and could commercialize products as well or better than they was offensive to them. The "not-invented-here" syndrome and the threat to their comfortable relationships in controlling the nation's research agendas drove their attacks on the program.

As you are well aware from the many studies and reports on the SBIR program, the critics were dead wrong in their concerns. In fact, what actually resulted was the unleashing of the most creative talent that America possesses by a well-managed program. It has become so successful that it is being studied by other nations to see if they can emulate the results.

The SBIR concept was a totally new way for government to conduct research. It was really the first attempt to reinvent government and, in my opinion, is the best change in Federal procurement policy in recent history. It brought some amazing changes to the process that have been the keys to its success:

It is highly competitive--with over a 10:1 ratio of proposals to awards

Small business has been proven to be the best vehicle for commercialization of laboratory technologies

The commercialization component is fundamental to the program.

You have been provided with examples of successful products and services resulting from the SBIR program in past testimony and reports. I'd like to add some new ones that are making significant positive changes in our nation's well being--both economically and socially:

From NIH: The new cholesterol test advertised on the television by Johnson & Johnson was licensed from an NIH SBIR company.

From NSF: A Texas firm, DTM, Inc. has developed a new concept for manufacturing called "Desk Top Manufacturing" that allows companies to design a component on the computer workstation and go directly to a dual-laser tool without paper drawings. This was so revolutionary that the product, initiated in a SBIR Phase I at NSF in 1988, was licensed to, and the company later purchased by, B.F. Goodrich and it now has 100 employees.

From NSF: One of the first NSF grants, and one of the first

SBIR Phase II winners was Symantec, which produces natural language software. Their "Q & A" database products developed under the NSF/SBIR program were innovative breakthroughs that permitted computer users to use standard English language queries to gather information. This company now has over 1200 employees, with revenues of over $346 million.

We will soon be providing you with similar examples from each of the SBIR program managers in a compilation of SBIR successes that the SBA and the program managers are preparing.

One important fact that is sometimes overlooked or clouded by the SBIR program opponents is that IT INVOLVES NO SPECIAL NEW FUNDS AND IS ONE TAX EXPENDITURE THAT GENERATES A HIGH RETURN TO THE ECONOMY! The funds are part of the research appropriations of the various funding agencies. The program directs that a small percentage of those funds be allocated to small businesses. The reports by the General Accounting Office (GAO) have conclusively shown that the program's commercialization efforts have resulted in commercial sales that are about the same level as the initial SBIR funding within a few years of the Phase II awards. This means that the taxpayers are receiving a very high return on their investment. Not only is our national research agenda being fulfilled efficiently; but we are also creating new products that are generating jobs and taxes. I expect that future GAO and SBA reports on commercialization will show dramatic increases in the

product revenue, job creation and taxes as these products mature in the marketplace.

The area of technology has always been important to me and we are refocusing this priority at the Office of Advocacy. You may recall that Phil Lader, SBA Administrator, has testified that the yearly taxes from just three companies that were helped by SBA (Staples, Apple and Intel) are more than the total annual budget of the SBA. It is especially significant to me that two of these companies are global technology leaders.

The SBIR program is now in its thirteenth year and has grown from the initial funding of 686 Phase I awards to small business innovators in 1983 for a total of $44.5 million, to the preliminary FY-94 program numbers with over 4100 awardees for a total of more than $700 million. It is one of the most heavily analyzed government programs, with seven full GAO reports, ten annual SBA reports, commercialization studies by SBA, GAO and the funding Agencies, and countless reports by various other federal, state and local governments. The summary conclusion of all of these reports is that the program is a model of success, and has many elements that are being highlighted as exemplary tools for other programs.

First, the perspective of the funding Agencies is important. There are currently eleven federal Agencies that are required to

participate in the SBIR program because their extramural Research and R&D budget is over $100 million per year. I am pleased that the SBIR program managers and management representing these eleven agencies are here today:

DOD	Bob Wrenn
HHS-NIH	Veri Zanders and Sonny Kreitman
NASA	Dr. Robert Norwood and Mike Battaglia
DOE	Dr. Sam Barish
NSF	John Meyer and Roland Tibbetts
DOAg	Dr. Mark R. Bailey
EPA	Donald Carey
DOT	Dr. George Kovatch
DOEd	John Christensen
DOC	Dr. Joseph Bishop
NRC	Marianne Riggs

I'd like to compliment them on the high quality of their management of the program, often with limited resources. They clearly are communicating their program well to industry as evidenced by the high ratios of proposals to awards.

The quality of the research funded under the SBIR program has consistently met the high standards of the funding agencies as reported by GAO.[5] As stated in its March 1995 report, GAO found

---

[5] Federal Research: Assessment of Small Business Innovation Research Programs (GAO/RCED-89-39, Jan. 23, 1989), Federal Research: Small Business Innovation Research Shows Success but Can Be Strengthened (GAO/RCED-92-37, Mar. 30, 1992), and Federal (continued...)

that:[5]

> "Although it is too early to make a conclusive judgment about the effect of funding increases on the quality of SBIR research proposals that received awards, the high level of competition and the large numbers of worthy but unfunded projects suggest that quality research proposals kept pace with the program's initial expansion. In addition, SBIR officials in the five major agencies stated that in their view, the quality of research proposals is being maintained."

One of the best indicators of the overall success and positive impact of the SBIR program is the number of support activities developed at the state and local level to encourage companies to participate in the program and to provide assistance. As reported recently by Battelle:[7]

> "Just before the start of the NSF centers programs, and with little anticipated state role, the SBIR program was established in 1982. Not long afterward, recognizing that SBIR funds could help meet states' technology priorities by strengthening their technology community, the states created

---

[5](...continued)
Research: Interim Report on the Small Business Research Program (GAO/RCED-95-59).

[6] GAO/RCED-95-59

[7] Coburn, C.M., Partnerships: A Compendium of State and Federal Cooperative Technology Programs (Columbus, Ohio: Battelle Memorial Institute, 1995) ISBN 0-935470-78-6.

initiatives to help their companies secure SBIR funds, with 30 states currently sponsoring such programs."

These states have independently validated the value of the SBIR program by placing their funds and support behind their local companies pursuing the awards.

The validation of the small business community is perhaps the best indicator of the commercial value of the SBIR program. Small companies are well known for "voting with their proposal funds." If they do not see a reasonable return to them on even the best intentioned program, they don't submit proposals. In the case of the SBIR program, the number of proposals submitted versus the number of awards has consistently been on the order of a 10 to 1 ratio (ranging from 3:1 to 20:1 according to the various GAO and SBA reports) over the thirteen years of the program. The streamlined proposal format (maximum of 25 pages) allows companies to propose quality solutions with a minimum of proposal expense. This high ratio of proposals to awards also permits the funding agencies to select the highest quality proposals--ensuring that only the best ideas are funded.

One of the valuable aspects of the SBIR program from the standpoint of the entrepreneur is the ability to retain the commercial rights to the intellectual property generated in the course of the conduct of the research. As mandated by Congress in the legislation, the SBIR program provides for "retention of

rights in data generated in the performance of the contract by the small business concern."[8] One view of the entrepreneurs is that the SBIR program provides the best, and in many cases the only, source of seed capital to commercialize high risk technologies. This synergy of meeting both the research mission needs of the funding agencies and the seed capital needs of entrepreneurs is the fundamental genius of the SBIR program. Only the best proposals are funded and few entrepreneurs expect to become wealthy on the SBIR awards; but the potential of future commercial success encourages many companies to engage in technological stretches that they could not fund from any other source. If they succeed in developing a viable commercial product they are rewarded in the marketplace.

The commercialization success of the SBIR program has been well documented by both GAO and SBA using relatively conservative standards.[9] The general range of successful commercialization of products and services developed under the SBIR program is on the order of 25% to 30%, which compares favorably with industry experience for commercially developed new products.[10] With the

---

[8] Policy Directive: Small Business Innovation Research (SBIR) Program--1993, SBA Office of Innovation Research and Technology, January 26, 1993.

[9] Federal Research: Small Business Innovation Research Shows Success but Can Be Strengthened, GAO/RCED-92-37, and Results of Three-Year Commercialization Study of the SBIR Program, SBA Office of Innovation Research and Technology, 90-00.147

[10] Internal memorandum on Commercialization, SBA Office of Advocacy, February 17, 1995.

additional Congressionally mandated commercialization initiatives now in place and/or being implemented by the funding Agencies, we expect additional commercialization success.

We have been particularly impressed with the DOE initiatives to support commercialization by providing business plan mentoring for their successful Phase II contractors. This project, managed by the DOE contractor, Dawnbreaker, provides intensive training in the development of a business plan targeted to commercial partners or venture investors. It culminates in a two-day seminar with presentations by the mentored companies to large commercial potential partners and institutional investors. Our experience has been that technology entrepreneurs typically have not developed the skills to communicate the excitement of their product in commercial terms. They tend to explain the elegance of the technology; not the excitement of the commercial opportunities and the potential return on investment. The DOE program successfully teaches them this skill. We also support the other initiatives of the funding agencies in the commercialization effort, and are pleased that almost all of them have included a commercialization factor in the proposal evaluation criteria.

The Office of Advocacy is very supportive of the SBIR program. We share the pride that NSF and this Committee have in the formation of this concept and in bringing it to fruition with Congressional

action in 1982, 1986 and 1992. We have analyzed all of the reports by GAO in depth and concur with their findings and their recommendations for areas of improvement. We stand ready to provide support, guidance, and where required, constructive criticism, to ensure that it continues to be a hallmark of success in the national research community.

In conclusion, the SBIR program has proven over thirteen years to even its most severe critics that it is based on fundamentally sound policy. It is the most cost-effective research program in the world, and has been studied by other nation's research organizations to try to emulate it. It has proven its ability to commercialize technology, generate jobs and taxes, and further the research need of the funding agencies with the highest caliber of work. It stimulates the innovation of the private sector without government intervention. It has created a unique public/private partnership between the federal research community and the business sector. In the process, it has also created a closer working relationship between the various research agencies' staffs to share the results of their funded programs.

It works well, and deserves continued support.

Statement of

ROGER G. LITTLE

President
Spire Corporation
Bedford, Massachusetts

before the

UNITED STATES HOUSE OF REPRESENTATIVES

COMMITTEE ON SMALL BUSINESS

SUBCOMMITTEE ON GOVERNMENT PROGRAMS

Statement of Roger G. Little
President
Spire Corporation

before the
United States House of Representatives
Committee on Small Business
Subcommittee on Government Programs
April 6, 1995

Mr. Chairman, members of the Committee, ladies and gentlemen, my name is Roger Little. The statements I wish to make before the Committee are as President of Spire Corporation, a high technology business I founded in 1969.

The Small Business Innovation Research (SBIR) program has been instrumental in Spire's growth. Spire has participated in the SBIR program since its inception. When the program first began we were a $6M, 120 person company. Over the dozen years since then, SBIR funding has contributed to development of our underlying technology base as well as specific commercial products and services and helped us grow to our present size of approximately $18M in revenue and 150 people.

Spire has commercialized a number of optoelectronic components and biomaterials processing services supported by SBIR. I will comment briefly on two examples. One of Spire's principal business areas is the sale of photovoltaic manufacturing equipment and turn-key production lines. This equipment is the result of commercializing research and development on terrestrial solar cells and modules funded mostly by the Department of Energy (DOE) from the late 1970's into the early 1980's. At the very beginning of the SBIR program, DOE supported Spire work on Advanced Cell Designs for High-Efficiency Flat-Plate Applications. This work investigated the use of a number of different types of substrate materials in combination with various solar cell processes to achieve cheaper, more efficient cells manufactured in large quantities The SBIR results provided important support for the equipment and process technology that make up Spire's low cost solar cell manufacturing lines. Today, Spire is the world's largest producer of photovoltaic manufacturing equipment for terrestrial applications and has supplied equipment to 104 customers in 33 countries all over the world.

Another example of commercial activity resulting from SBIR is in the biomedical device area. In the mid-1980's, Spire was funded under SBIR to apply processes originally developed at Oak Ridge National Laboratory to Ti-alloy orthopaedic devices to reduce wear. Spire's activities consisted of applying high current ion beams to artificial hips and knees. Over the years Spire has expanded this business, including adaptation of the process to other significant orthopaedic materials such as Co-Cr alloys, and currently is the largest provider of such services (Spire's IONGUARD® processes) in the U.S.

The recent addition of the Small business Technology TRansfer (STTR) program is a positive step toward transferring technology from federally funded research institutions to small businesses and

eventually to commercial applications. The program thus far, however, has been handicapped by lack of sufficient funds to fully justify the proposal efforts which small businesses have put forth to capture these funds. Although the program is expanding on a year to year basis, it still represents less funding than is warranted; it may be taking more resources out of small business than it puts in.

An improvement to SBIR would be a reassessment of and reconciliation between the high degree of innovation sought in proposals and rewarded with funding (particularly at some agencies) and the simultaneous requirement for rapid commercialization. Although many of the very innovative concepts will eventually result in or contribute to important commercial products, the difficulties involved in bringing these technologies to market make these programs almost "unsuccessful" by definition in the eyes of SBIR because of demands for very near term commercialization.

The SBIR program has always been somewhat fragmented by different agency approaches to, for example, proposal review, contract monitoring, and continuity between Phase I and Phase II. The SBIR program could benefit from standard procedures used by all agencies which incorporate the best aspects of current approaches. NIH, for example, provides the most comprehensive reviews of proposals, and allows for resubmission of proposals with revisions reflecting the previous review. This process is very constructive for the proposing firm and encourages very high quality proposals. Most other agencies, on the other hand, do not allow and/or are generally unreceptive to, resubmissions of any Phase II proposals without going back through the Phase I activity. Timely reviews, particularly of Phase II proposals, are also of benefit to the program since they allow for better performance by the proposing firm, both for technical continuation of Phase I work into Phase II, and for financial planning. Some agencies, for example, can go as long as two years before they award a Phase II from a Phase I effort. The Department of Energy's option for early submission of Phase II proposals to allow near continuous funding is useful for firms able to get results early on in the Phase I program. Another issue is that government program managers often attempt to spread the funding around such that it only comes to the small business in dribs and drabs which makes it very difficult for the firm to get any product momentum or to plan for availability of personnel. Finally, I recommend consideration of a Phase III SBIR program, which would address such things as marketing the product and would be cost-shared fifty percent by small business, to bring more SBIR concepts to commercialization.

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

TESTIMONY OF

ROBERT L. NEAL

ASSOCIATE DEPUTY ADMINISTRATOR

FOR GOVERNMENT CONTRACTING AND

MINORITY ENTERPRISE DEVELOPMENT

BEFORE

THE SUBCOMMITTEE ON GOVERNMENT PROGRAMS

COMMITTEE ON SMALL BUSINESS

U.S. HOUSE OF REPRESENTATIVES

ON THE

SMALL BUSINESS INNOVATION RESEARCH PROGRAM AND

SMALL BUSINESS TECHNOLOGY TRANSFER PILOT PROGRAM

Mr. Chairman and distinguished members of the Committee, it is my pleasure to testify before you today concerning the successful high technology programs administered by the Small Business Administration (SBA): The Small Business Innovation Research (SBIR) program and the Small Business Technology Transfer (STTR) Pilot program. I am Robert L. Neal, Associate Deputy Administrator for Government Contracting and Minority Enterprise Development.

Small Business Innovation Research Program

In 1982 Congress passed and the President signed into law the Small Business Innovation Act which directed the SBA to establish the SBIR program within the Federal Government. The purpose of the program is to involve the small business entrepreneur in the federal research and development (R&D) agenda and to promote commercialization of new technologies.

The Act accomplished the purpose of setting aside a fixed percentage of extramural R&D funds for small business. Each Federal agency with an extramural R&D budget greater than $100 million for any fiscal year must establish a SBIR program. Currently, there are 11 participating agencies. Under the original 1982 law, the set aside was 0.5%. Over the subsequent years, the program has slowly grown such that with the second reauthorization, P.L. 102-564, signed October 28, 1992, the set-aside is currently at 2.0% with an increase to 2.5% scheduled in FY 1997.

The small businesses win SBIR awards (grants or contracts) through a competitive process in response to solicitations from each participating agency. SBA is not a participating agency and does not make R&D awards to businesses, but serves as the coordinator of the program.

Under the Act the SBIR Program is a three-phase process which must be followed. The three phases are:

Phase I: Awards of approximately 6 months and up to $100,000 are made for research projects to evaluate the scientific and technical merit and feasibility of an idea.

Phase II: As a result of Phase I, those projects with the most potential are funded for one or two years up to $750,000, to further develop the proposed ideas to meet the agency's needs.

Phase III: Private sector investment and support will bring an innovation to the marketplace. No SBIR funds are expended in Phase III.

There are no additional appropriations to fund this work. All SBIR funding is set-aside from existing R & D budgets of the participating agencies.

In its thirteen years of performance the SBIR Program has met and surpassed all its objectives. The program has grown at a steady rate, in an orderly manner, with impressive accomplishments.

In the history of the SBIR program, in response to 158 solicitations, the 11 federal agencies participating in the Program have received nearly 250,000 proposals from small high technology firms, resulting in over 37,000 competitive awards worth more than $5.3 billion.

In Fiscal Year 1994, based on preliminary results from reports just received, over 3,000 awards were made, worth $700 million.

The most satisfying accomplishment of the SBIR program however, is its success at developing and commercializing innovations derived from Federal research. From preliminary results from an ongoing study of SBIR commercialization performed by an independent consultant, we have found that the number of SBIR projects resulting in new high technology products and services has been successful beyond our expectations. These preliminary results focused on a random sample of 732, or 49.4% of the Phase II awards made in FY 1987 and FY 1988. These projects would have entered Phase III, the commercialization stage, in FY 1989 and FY 1990. The surveys of these projects were done in FY 1993 and FY 1994, giving the firms about 3 or 4 years to begin actual sales of the innovative product or service. Preliminary results indicate that

fully 38.9% of these projects were considered to be commercialized. Thus of the 732 projects entering the research and development phase in FY 1987 and FY 1988, 285 are now high technology products or services commercialized in the marketplace.

It is not only the numbers that are so gratifying, but the range of technological innovations developed. The list of accomplishments is a long one including: environmental projects to improve our water and air; medical projects with a demonstrated ability to improve our wellbeing; educational projects that help the handicapped learn; transportation projects that help us travel efficiently and safely; and many projects to improve our supply and use of energy, to help us communicate, to assure our national safety, and to improve our food supply.

In summary, the success of the SBIR program is unqualified. This attests to the strength of the small business entrepreneur. Furthermore, a recent GAO report has found no decrease in the quality of research performed by SBIR firms. Thus the program and the small business entrepreneur has been able to successfully balance commercialization needs of our economy with the R & D and mission needs of each agency participating in the program.

Small Business Technology Transfer Pilot Program

Title II of P. L. 102-564 established a new program, the Small

Business Technology Transfer Pilot program (STTR). This program also involves small business in the Federal R & D effort. The essential difference between SBIR and STTR is that the small business must have a research institution as a partner. The partner must be either a non-profit research institution such as a university or a Federally Funded Research and Development Center (FFRDC).

Duplicating many of the features that made SBIR so successful, the STTR program has three phases. It consists of Phase I which is basically a feasibility study, Phase II which is the actual R & D effort, and Phase III, the commercialization phase. It's funding is based on a set aside of the extramural R & D budgets of those agencies with annual extramural budgets of $1 billion or more. There are five agencies that met this criterion and all were directed to set aside not less than .05% of extramural R & D obligations in FY 1994, and will set aside .1% in FY 1995, and .15% in FY 1996. The authorization for STTR expires at the end of FY 1996 unless reauthorized by Congress. As with SBIR the funding for this program is a set-aside from existing expenditures. There are no additional funding obligations for this program.

The legislation directed that SBA undertake numerous actions to assure the successful implementation of the STTR program. Working with the five participating agencies we have successfully completed all those actions in a timely manner.

It is much too soon to determine the success or failure of the program based on completed projects because the program has just completed its first year and is only partially through its second year. The activity of the first year indicates that the program has been well received by small business and by the research institutions.

In the first year of operations small firms submitted 1,950 proposals for Phase I awards. Participating agencies actually made 183 Phase I awards for $17,932,916. These firms collaborated with major universities, FFRDCs and other non-profit research institutions across the country.

SBA's Role and Administrative Improvements

SBA's role in the SBIR and STTR programs is one of policy, oversight, coordination, evaluation and reporting. SBA has the authority to issue and amend policy directives which participating agencies must follow. In addition, SBA is responsible for data collection and issuing an annual report to Congress. SBA also is responsible for monitoring compliance and program evaluation by participating agencies. And finally, SBA represents the SBIR program and small business interests in national R&D and technology forums.

As the committee has learned over the course of the past six

weeks, SBA is working to improve its programs and to be more responsive to its small business customers. These improvements to the SBIR program, based partly on observed need and partly on GAO recommendations, include:

- Maximum use of computerized communications of program information to the public. For example, the Pre-Solicitation Announcement previously printed and distributed through the mails is now available to the public through posting it on the SBA computerized bulletin board.

- Development of an interagency computerized award information system is now underway. This process was initiated about a year ago but recently was among the recommendations of the GAO to provide interagency access to current information regarding SBIR awards. This effort, with the development of improved definitions regarding "duplicate" research, should further foreclose opportunities for possible fraud in the program.

- Review, at the recommendation of the GAO as to whether the certification form that accompanies SBIR proposals needs to be improved. This review is being made with the cooperation of participating agencies.

- Efforts with the participating agencies to reduce the gap

in funding between phase I and phase II.

- Integration of all SBA's programs to assist SBIR program participants with financial assistance and training. SBA is especially focusing on bring SBIR award winners together with our finance programs, in particular the Small Business Investment Company program which helps channel investment capital to high technology small firms.

Conclusion

In conclusion, the SBIR program continues to grow and to deliver a wide spectrum of high technology innovations to improve the lives of all Americans. The STTR program, while still very new, has been implemented efficiently and timely. I will be pleased to answer any questions you may care to ask.

Fiscal Year 1993 Agency Obligations

Agency	Dollars Obligated in Thousands
Department of Agriculture	$ 7,017
Department of Commerce	2,255
Department of Defense	384,821
Department of Education	2,993
Department of Energy	49,815
Department of Health and Human Services	125,602
Department of Transportation	4,371
Environmental Protection Agency	4,848
NASA	86,008
National Science Foundation	28,653
Nuclear Regulatory Commission	1,581

Small Business Administration
Office of Innovation, Research and Technology

Total SBIR Awards Awarded for Fiscal Year 93

State	Phase 1 Awards	Phase 1 $	Phase 2 Awards	Phase 2 $	Total Awards	Total $
Alabama	47	2,389	14	5,869	61	8,258
Alaska	0	0	0	0	0	0
Arizona	43	2,285	20	8,088	63	10,373
Arkansas	4	251	0	0	4	251
California	637	34,563	231	102,054	868	136,617
Colorado	120	6,657	51	24,048	171	30,705
Connecticut	89	5,163	37	17,193	126	22,356
Delaware	8	446	4	1,445	12	1,891
District of Columbia	9	447	4	1,309	13	1,756
Florida	64	3,397	27	12.400	91	15,797
Georgia	26	1,335	5	1,614	31	2,949
Hawaii	12	601	2	700	14	1,301
Idaho	3	134	1	150	4	284
Illinois	47	2,509	14	7.104	61	9,613
Indiana	13	650	3	1,489	16	2,139
Iowa	5	250	0	0	5	250
Kansas	6	323	3	1,098	9	1,421
Kentucky	5	258	2	944	7	1,202
Louisiana	10	574	3	1,403	13	1,977
Maine	8	386	5	2,743	13	3,129
Maryland	172	9,358	53	24,591	225	33,949
Massachusetts	486	27,320	203	92.078	689	119,398
Michigan	46	2,405	13	5,484	59	7,889
Minnesota	37	1,909	13	5,310	50	7,219
Mississippi	2	104	1	150	3	254
Missouri	15	750	3	1,321	18	2,071
Montana	6	325	2	747	8	1,072
Nebraska	5	264	5	1,625	10	1,889
Nevada	4	257	2	1,095	6	1,352
New Hampshire	42	2,392	13	4,941	55	7,333
New Jersey	94	5,232	39	17,604	133	22,836
New Mexico	61	3,430	23	10,733	84	14,163
New York	130	6,768	55	27,585	185	34,353
North Carolina	26	1,338	10	4,656	36	5,994
North Dakota	1	50	2	631	3	681
Ohio	85	3,387	29	12,685	114	18,072
Oklahoma	6	327	3	1,167	9	1,494
Oregon	30	1,537	11	4,442	41	5,979
Pennsylvania	86	4,561	37	19,038	123	23,599
Puerto Rico	0	0	0	0	0	0
Rhode Island	7	383	4	1,833	11	2,216
South Carolina	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0
Tennessee	30	1,669	10	4,291	40	5,960
Texas	103	5,621	39	16,832	142	22,453
Utah	29	1,542	23	9,720	52	11,262
Vermont	9	475	2	1,153	11	1,628
Virginia	142	7,492	65	25,985	207	33,477
Washington	69	3,699	23	10,449	92	14,148
West Virginia	0	0	0	0	0	0
Wisconsin	21	1,147	6	2,400	27	3,547
Wyoming	0	0	0	0	0	0

Note: All $ amounts in thousands

Statement of
Dr. Robert L. Norwood
Director
Commercial Development and Technology Transfer Division
Office of Space Access and Technology
National Aeronautics and Space Administration

before the

Subcommittee on Government Programs
Committee on Small Business
House of Representatives

It is a pleasure to appear before the Committee to discuss NASA's Small Business Innovation Research (SBIR) program and Small Business Technology Transfer (STTR) program. NASA has over 10 years of experience with the SBIR program and during that period has made nearly 3000 Phase I awards and nearly 1300 Phase II awards. Our assessments of the SBIR program have shown benefit to NASA as well as to the U.S. economy, and recently we have taken steps to improve the program effectiveness.

NASA's mission responsibility focuses on both civil aeronautics and space research and technology. Over the years, small businesses have become an important contributor to NASA's research and development program. Energetic and high-quality small businesses introduce new and innovative technology concepts and contribute to the NASA enterprises. To nurture that contribution, NASA's Office of Small and Disadvantaged Business Utilization seeks to fully integrate small businesses into the competitive base of contractors from which NASA purchases goods and services and we urge our prime contractors to do so in their subcontracting activities. In contracting with small businesses, NASA encourages our prime contractors to mentor, nurture, and develop such firms so as to forge permanent, mutually beneficial business relationships with them, particularly in high technology areas.

When the SBIR program began in FY 1983, in the normal course of business, NASA awarded $5.585 billion to businesses; $482.3 million was awarded to small businesses directly, and an additional $664.9 million was awarded to small businesses under subcontracts. In FY 1994, **excluding SBIR**, NASA awarded $9.766 billion to businesses; $1.011 billion was awarded to small businesses directly, and an additional $1.519 billion was awarded in subcontracts. In other words, external to the SBIR program, small business participation in NASA has grown from 8.6% of direct awards in FY 1983 to 10.3% of direct awards in FY 1994. Including the amounts awarded under subcontract, the NASA contribution to the small business community has grown from 20.5% in FY 1983 to 25.9% in FY 1994. We are proud of that achievement.

The SBIR program is an important component of NASA's small business activities. As we seek to streamline the Agency, we have undertaken a new approach to the SBIR program to improve program performance. We are establishing stronger links to NASA mission needs. We have worked to develop subtopics with greater commercial potential and to develop an evaluation system that places stronger emphasis on the proposer's intent to commercialize. We also have taken steps to improve the process of soliciting and contracting SBIR awardees to streamline management and reduce small firm impediments.

While the *sine qua non* for SBIR is the contribution made to the Agency's technology needs, complementary NASA objectives have consistently emphasized the advancement of U.S. aerospace and non-aerospace capabilities through our many R&D programs. Therefore, we are keenly interested in improving U.S. economic competitiveness through SBIR. NASA has increased efforts to insure that our small business R&D partners act to obtain commercial benefit from the SBIR and STTR awards which will strengthen not only U.S. competitiveness, but increase the quantity and quality of technology available for future NASA use.

For the future, NASA is taking steps to increase the probability of direct application of SBIR technology into NASA projects, to establish a peer review process to increase the commercialization rate of SBIR activities and to institute an electronic network-based management system for the SBIR process.

On June 23, 1992, NASA presented testimony before the Committee on Science, Space and Technology regarding the Small Business Development Act of 1994 (P.L. 102-564). I would like to read from that statement:

> The scope of NASA's programs and its associated budget are determined through a very rigorous process in order to achieve a balanced set of objectives, programs, and missions. Recent years have imposed severe limitations on our budget and have forced the elimination of some major initiatives as well as the stretchout of some ongoing programs. An increase in the magnitude of the SBIR program, coupled with the proposed STTR program, would significantly modify the balance that has been created. NASA does not, therefore, support an increase in the program because it would require reductions in other areas.

That statement made in 1992 can be made more emphatically today. Since that testimony, the SBIR budget has grown from $79.4 million to $123.9 million in FY 1995, including STTR. When the statutory set-aside percentage increases to 2.5% in FY 1997, the NASA SBIR budget is estimated to be $150 million. That is an increase of nearly 90% since FY 1992.

NASA has challenged itself to expand opportunities with the small business community within a shrinking budget. Since 1993, NASA has reduced the Agency's five-

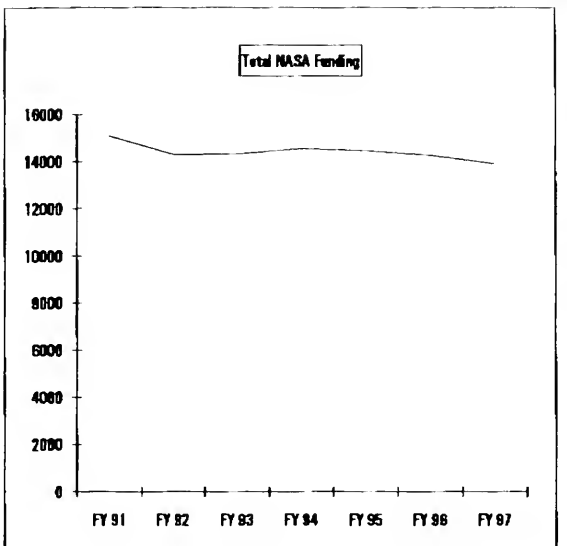
year budget plan by over 30%. We have reduced support contracts and downsized our workforce. We have eliminated programs. We are in the midst of a total agency workforce review which will result in profound changes at NASA, in response to the President's challenge in the FY 1996 budget to find an additional $5 billion in NASA reductions between FY 1997 and FY 2000. These reductions will call for sweeping changes at NASA. We are taking aggressive steps to reinvent NASA while maintaining a balanced space and aeronautics program. We have made great strides in bringing the small business community into ongoing Agency activities. The restructuring of NASA will bring even more opportunities for small businesses to participate in NASA programs.

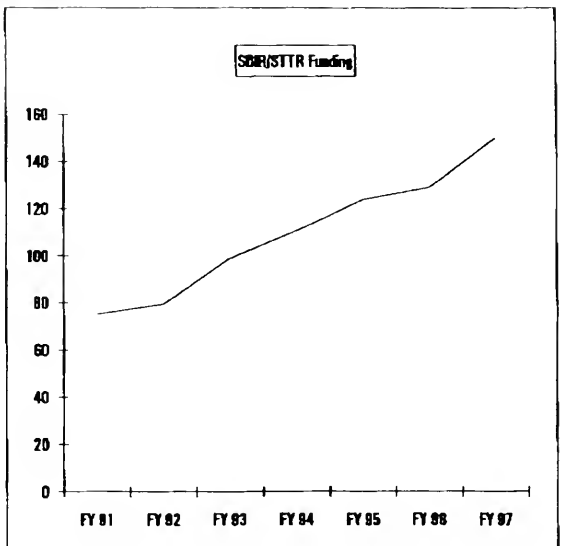
NASA supports the SBIR program, and applauds its success. However, we are concerned that, in the current environment of diminishing budgets, NASA does not have the flexibility in terms of total resources to continue to balance the magnitude of the resource demands of the SBIR program while maintaining the effectiveness and vitality of ongoing NASA programs. Consequently, NASA suggests that it may be in order to reexamine the current and planned statutory target levels for the SBIR program as a percentage of ongoing Federal R&D efforts. We would be happy to discuss NASA's experience and achievements in the SBIR program, and our concerns about resource limitations if you wish.

SBIR and STT otal NASA Funding

FY 1996 President's Budget

(In Millions of Real Year Dollars)





	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97
Total NASA Funding	**15879**	**14382**	**14313**	**14559**	**14484**	**14280**	**13898**
Total SBIR/STTR Funding	**75.3**	**78.4**	**98.8**	**110.9**	**123.9**	**129.1**	**150.1**
SBIR	75.3	79.4	98.8	107.3	118.0	120.1	150.1
% of R&D	1.25%	1.25%	1.50%	1.50%	2.80%	2.09%	2.50%
STTR				3.6	5.9	9.0	
% of R&D				0.05%	0.10%	0.15%	

United States General Accounting Office

GAO

Testimony

Before the Subcommittee on Government Programs,
Committee on Small Business,
House of Representatives

For Release on Delivery
Expected at
10 a.m. EDT
Thursday,
April 6, 1995

FEDERAL RESEARCH

Interim Report on the Small Business Innovation Research Program

Statement of Victor S. Rezendes,
Director, Energy and Science Issues,
Resources, Community, and Economic
Development Division

GAO/T-RCED-95-154

Mr. Chairman and Members of the Subcommittee:

We are pleased to discuss the results of our review of the Small Business Innovation Research (SBIR) Program.[1] The Small Business Innovation Development Act of 1982, which authorized the SBIR Program, emphasized the benefits of technological innovation and the ability of small businesses to transform research and development results into new products. Reflecting its view of the program's success, the Congress reauthorized the program in 1992 and provided for a doubling of program funding to approximately $1 billion by fiscal year 1997. Last month, we issued a report that assesses (1) whether quality research proposals have kept pace with the program's expansion, (2) the implementation of a provision for technical assistance to SBIR companies, and (3) the duplicate funding of similar research.

My discussion today highlights the message of our report:

-- To date, the quality of research proposals appears to have kept pace with the program's expansion. Our view is based on the (1) high level of competition, (2) large numbers of proposals that agencies deemed worthy of funding but that received no award, and (3) views expressed by program officials that quality is being maintained. However, it is too early to make a conclusive judgment about the long-term quality of research proposals because the major increases in program funding have not yet occurred.

-- None of the 5 federal agencies that provide over 90 percent of the SBIR funding have taken steps to implement the discretionary technical assistance provision, and future implementation remains uncertain. Program officials saw no

---

[1]Federal Research: Interim Report on the Small Business Innovation Research Program (GAO/RCED-95-59, Mar. 8, 1995)

need for technical assistance because projects are selected primarily for their technical merit. However, they have taken steps, independent of the provision, to provide assistance with commercialization of research results.

-- The duplicate funding of similar research has become a problem, especially with the increasing numbers of research proposals submitted to the SBIR program. According to agency officials, a few companies received funding for the same proposals twice, three times, and even five times before agencies became aware of the duplication. Several factors are contributing to this problem, including (1) the evasion of certification procedures whereby companies fail to identify similar proposals to other agencies, (2) the lack of a consensus on what constitutes a duplicate proposal, and (3) the general lack of interagency access to and exchange of current information about recent awards by other agencies.

BACKGROUND

The Congress established the SBIR program in 1982 to stimulate technological innovation, to use small business to meet federal R&D needs, to foster and encourage participation by minority and disadvantaged persons in technological innovation, and to increase private sector commercialization of innovations derived from federal R&D.

Eleven federal agencies participate in the SBIR program. Five of them--the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), the Department of Health and Human Services and particularly its National Institutes of Health (NIH), the Department of Energy (DOE), and the National Science Foundation

(NSF)--provide over 90 percent of SBIR funds.[2] Each agency manages its own program while the Small Business Administration (SBA) plays a central administrative role, including issuance of policy directives and annual reports for the program.

The legislation establishing the program required each agency with an extramural (or external) R&D budget in excess of $100 million to set aside a certain percentage of this amount for the program. The percentage was increased incrementally until it reached 1.25 percent in 1986. The reauthorization legislation[3] increased program funding to not less than 1.5 percent for fiscal years 1993 and 1994, not less than 2 percent for fiscal years 1995 and 1996, and not less than 2.5 percent for fiscal year 1997 and thereafter.

SBIR funding is provided in two phases. Phase I is intended to determine the scientific and technical merit and feasibility of ideas; it generally lasts about 6 months. Phase II further develops the proposed ideas and generally lasts about 2 years. The size of awards in phases I and II was generally limited under an SBA directive to $50,000 and $500,000, respectively. However, the 1992 reauthorization directed SBA to raise the general limits on the size of phase I and II awards to $100,000 and $750,000, respectively, although awards may be for less than these amounts.

The 1992 reauthorization also included a discretionary technical assistance provision that authorized the use of SBIR program money to assist award recipients in achieving the technical and commercial goals of SBIR projects. The provision permits

---

[2]The other 6 agencies include the United States Department of Agriculture, the Department of Commerce, the Department of Education, the Department of Transportation, the Environmental Protection Agency, and the Nuclear Regulatory Commission.

[3]Public Law 102-564, Oct. 28, 1992

agencies to enter into an agreement with a vendor to provide this assistance. In funding this arrangement, the provision authorizes not more than $4,000 for phase I and $4,000 annually for phase II award recipients.

QUALITY RESEARCH PROPOSALS KEPT PACE WITH INITIAL PROGRAM EXPANSION

Although it is too early to make a conclusive judgment about the effect of funding increases on the quality of SBIR research proposals receiving awards, the quality of research proposals appears to have kept pace with the program's initial expansion.

First, the level of competition for awards remained high following the initial increase in funding in fiscal year 1993. In all five major agencies during fiscal year 1993, the number of proposals rose between 9 and 30 percent. These increases were important in maintaining the competitiveness of the program during the first year that the program's funding percentage grew to 1.5 percent. In addition, the ratio of awards to proposals within each agency remained fairly constant, ranging from 8 percent (for DOE) to 28 percent (for NIH). Among all five agencies, the data for fiscal year 1993 showed virtually no change in the ratio from the previous 2 years, suggesting that the funding increase exerted no adverse effect on the competitiveness of the program.

Second, agencies deemed many more proposals worthy of award than they were able to fund. In some agencies, the large number of worthy but unfunded projects greatly exceeded the number of projects receiving awards; for example, the Air Force deemed 1,174 proposals worthy of award in fiscal year 1993 but funded only 470. In general, the data showed substantial reserves of projects deemed worthy of funding but receiving no award. In addition, SBIR program officials in the five major agencies stated that, in their view, the quality of research proposals was being maintained or

even improved. They cited the level of competitiveness and the large reserves of unfunded but worthy projects as the principal reasons for their view.

Among the five major agencies, NIH was the only one in which we found some cause for concern about the expansion of the program in fiscal year 1993. We found that the National Cancer Institute (NCI), which accounted for about 18 percent of the program at NIH, funded nearly all of the projects deemed worthy during fiscal year 1993. Top NCI officials expressed concern about the quality of research proposals in relation to the funds available in fiscal year 1993 but concluded that all of the projects selected should have been funded. NCI data for fiscal year 1994 showed a lower ratio of awards to proposals and a large number of unfunded but worthy proposals, suggesting that the difficulty experienced in fiscal year 1993 was not recurring.

THE TECHNICAL ASSISTANCE PROVISION IS NOT BEING IMPLEMENTED

No agency has implemented the technical assistance provision, and future implementation remains uncertain. Agency officials were critical of the provision for several reasons. First, they noted that it calls for the use of program funds, thereby reducing the number of awards they can make. In this respect, they view the provision as competing for the same funds that could be used in making additional awards.

Second, they see little need for technical assistance when projects are selected primarily for their technical merit. NASA's SBIR director, for example, pointed out that the largest single portion (40 percent) of a company's score in the selection process is based on technical merit. In his view, a company would be eliminated from the competition if any indications of technical inadequacies appeared.

Third, they believe implementation would impose a significant administrative burden arising from case-by-case considerations of company requests for support. SBA officials told us that implementation would lead to difficulties because there would be a need for review and approval of each small award ($4,000 or less) to each awardee that requested funding.

Fourth, they feel that specific proposed technical assistance requirements, such as a single vendor of technical assistance for each agency, are unrealistic because one vendor could not respond adequately to potentially hundreds of requests.

Program officials, however, have taken steps, independent of the provision, to provide assistance with commercialization. For example, DOE has provided special training sessions and conferences on commercialization for its awardees. DOE's SBIR manager told us that the second training session, conducted in 1991, has proven very successful. He noted that 43 percent of the companies participating in the session have received additional, non-SBIR funding, which has totaled $14 million as of July 1994 with a further $24 million expected over the next 3 to 5 years. He also believes that the sessions in 1993 and 1994 will prove successful but indicated that more time is needed for results to emerge.

In DOD's commercialization efforts, we found several new initiatives. The most striking was the special strategy adopted by the Navy's program manager for emphasizing the importance of commercialization. Starting in 1994, a company must have a plan for commercialization in order to receive the last 20 percent of each phase II award. Because funding for Navy SBIR phase II awards is set at about $750,000, the 20 percent holdback amounts to $150,000 and is encouraging companies to take commercialization seriously.

DUPLICATE FUNDING HAS BECOME A PROBLEM

Duplicate funding of similar proposals submitted to more than one agency has become a problem. Agency officials informed us that they are investigating some companies that allegedly received duplicate funding by multiple federal agencies for substantially identical proposals. A few cases are under review by the Department of Justice for possible criminal and civil prosecution. In one case, the Department of Justice has filed an action for trebled damages of $4.2 million under the False Claims Act. The complaint alleges that the SBIR company had fraudulently obtained approximately $1.4 million in duplicate funding from NSF, NASA, and various DOD agencies. The complaint also alleges that the company "recycled" 11 research ideas 40 times in duplicate submissions.

In further work on this problem during 1994, agency officials found evidence of other companies receiving duplicate funding. According to agency officials, a few companies received funding for the same proposals twice, three times, and even five times before agencies became aware of the duplication. In these cases, the companies also submitted equivalent reports at the end of their Phase I work without informing agencies of the duplicative research.

Several factors are contributing to the problem of duplicate funding. First, companies proposing projects have not identified identical proposals they have made to other agencies, thereby fraudulently evading the certification procedure that requires them to provide such information. SBA's 1993 policy directive and individual SBIR agencies require proposers to indicate the name and address of the agencies to which duplicate or similar proposals were made and to identify by subject the projects for which the proposal was submitted and the dates submitted.

In response to this evasion of the certification requirement, officials in NSF's Office of Inspector General told us that they were concerned about the need for more complete certification procedures. Such procedures would require applicants to certify, under criminal penalties for perjury, exactly what, if any, applications for similar research were pending in other agencies. These officials also recommended that the existing NSF certification form should be revised and strengthened. The agency agreed and implemented this recommendation. SBA's Assistant Administrator told us that the forms in use in other agencies could also be reviewed and, if necessary, revised and strengthened to address potential problems with certification.

Second, the lack of definitions and guidelines regarding key terms such as "similar" research has resulted in disagreement about what constitutes duplicate research. SBA's policy directive and individual agency solicitations do not define key terms and thus provide no guidance in avoiding the risk of duplicate funding. According to an SBA official, certain key terms--such as "duplicate," "similar," "equivalent," "overlapping," "substantially similar," and "proposals of similar content"--occur in the solicitations. However, little effort has been made to bring them into the context of scientific research and give them a more specific meaning.

In fact, the vagueness of key terms can lead to differences of opinion by federal and company officials. In one case, NASA officials became concerned that a company, which received Phase I and II awards from NASA and the Army for potentially similar research, did not inform NASA of the Army awards. The company contended that it did not inform NASA of the Army awards because, in its view, the research was not duplicative. NASA disagreed and rescinded the company's Phase II award.

Third, agencies have lacked interagency access to and exchange of current information about recent awards that might help to prevent or detect duplicate awards. At present, SBA maintains an SBIR program database that it uses primarily to produce its annual report to the Congress regarding the program. However, the information has a "time lag" of about 9 months because it is first processed by each agency and then forwarded to SBA. Individual agencies maintain records of recent awards, but this information is generally not available to other agencies. If an official in one agency wants to obtain information from another agency about a specific proposal or company, such information is available only through personal contacts and conversations.

Some program officials believe that the present methods may not be adequate for detecting duplication when dealing with 20,000 proposals annually. Officials at NASA and SBA have led the initial efforts to improve interagency access to and exchange of current information. An SBA official told us that the new approach will overcome the time lag regarding information on current awards and help in avoiding duplicate funding. In general, however, efforts to provide interagency access to current information were at an early stage of planning at the time of our review. Minimal documentation existed to describe the proposed approach.

Nevertheless, officials in several agencies told us that, in the context of the 20,000 or more proposals now being submitted annually, the problem is limited to relatively few cases of fraud while the instances of genuine confusion about what constitutes duplication may be somewhat more frequent. However, they agreed that the problem should be addressed and that recommendations would be helpful in resolving it.

Accordingly, our March 1995 report recommended that the Administrator, SBA, take steps to (1) determine whether the certification form that accompanies SBIR proposals needs to be

improved and, if so, take the necessary steps to revise it, (2) develop substantive definitions and guidelines for agencies and companies regarding "duplicate" research, and (3) provide interagency access to current information regarding recent SBIR awards.

In summary, to date, the quality of research proposals appears to have kept pace with the program's expansion. However, it is somewhat early to make a conclusive judgment about the long-term quality of research proposals because the major increases in program funding have not yet occurred. None of the five major agencies has implemented the technical assistance provision, and future implementation remains uncertain. Duplicate funding has become a problem. We have made three recommendations to SBA that would help in addressing this issue.

We will conduct a final review of the program in a report mandated by the reauthorization legislation. That report is scheduled for completion in October 1997.

- - - - -

This concludes my statement. I would be happy to respond to any questions you or Members of the Subcommittee may have.

○

ISBN 0-16-052018-5