TESTIMONY OF

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TO THE

HOUSE SUBCOMMITTEES ON BASIC RESEARCH

AND TECHNOLOGY

JUNE 27, 1995

Thank you for providing me with this opportunity to testify today and share with you some of my thoughts about improving the commercialization of federal R&D by U.S. industry.

I believe that the current laws allowing universities and federal laboratories to partner with U.S. industry are a solid basis for future progress. Legislation like the carefully crafted bill by Representative Morella will greatly enhance this process.

The greatest challenges that I see are: 1. the tendency of bureaucracy to re-centralize authorities through cumbersome processes; and 2. the danger that our impatience and fear of slow movement leads us to make ill-advised fundamental changes in technology management systems when what is really needed is fine tuning.

With the new budget limitations the Government faces and an increasingly competitive world marketplace, now is the time for bold experiments-- not bureaucratic timidity. Congress and the Administration must recognize this means that not every experiment will be successful. We should not punish prudent risk taking. It is the hallmark of our society.

With freedom must come accountability. Universities and federal laboratories alike should have plenty of leeway for putting market-driven principles to work in

creative new ways. Like the proverbial good steward in the Bible, there must also be an accounting for how this investment is managed.

Congress and the agencies have every right -- and indeed, a duty-- to demand accountability in the budget and oversight processes. This does not mean micro-management or undue legal restrictions which dampen the "fuel of interest for the fires of genius" as Abraham Lincoln rightly noted constitute the basis for our intellectual property system. Linking freedom and accountability also allows "best practices" to evolve in locally initiated experiments. These are the best "laboratories" for any market-driven system. Additionally, decentralization insures that experiments that fail do not spread. In a centrally managed system failures in planning are disastrous.

Measuring immediate success is also very difficult in a system which routinely performs research that is usually far removed from immediate commercial application. While not perfect, CRADA and license counting is at least an industry-driven measure. Royalty returns are also a good indication that there is life in the system, although the universities have found that it can easily take 7 years for a good technology to move from the university to the commercial market. We should also look at the investments that companies are making to turn federally-funded R&D into commercial products.

We should consider how national laboratory and university researchers are integrating real-world needs into the design of applied research projects undertaken to meet agency missions.

Much more difficult to measure is the economic value of technical assistance which the National Technology Transfer Center sees as by far the most demanded laboratory product in the calls we receive from U.S. industry.

Unless we devise objective methods for evaluating the economic benefits derived from the spectrum of laboratory- university- industry- state government interactions, it is difficult to make the critical judgments that the Administration and Congress must now face in strategically allocating a shrinking federal budget. Yet we recognize the process of economically linking our public and private sectors is a key to our competitiveness. I cannot pretend to have ready answers to these hard questions.

We are now in the midst of a historic cultural change. The Government process is risk averse. Innovators are usually viewed with suspicion. This is changing, but is very much still with us. Because we have not adequately trained our public sector how to successfully employ the revolutionary tools encouraging cooperative research with our private sector, there can be an over-reliance on process. This can make the negotiating process-- which is always complex-- a nightmare. The need for training is a serious one. Very few of our federal

laboratory or university employees understand the dramatic nature of the changes brought about by the technology transfer legislation this Committee largely authored. The National Technology Transfer Center has made training a central part of our mission. We are working with the U.S. Navy and NASA to make comprehensive training courses available in their facilities.

The Association of Federal Technology Transfer Executives (AFTTE), of which I am honored to be President, seeks to raise professional standards and trade best practices in technology management across agency lines. The Federal Laboratory Consortium has long seen the need for training as an important part of its function and worked hard toward that goal. Such efforts are critical to our success.

It is frankly remarkable to me that we are even doing as well as we are given the few resources that have been invested in teaching the laboratories and universities how to master techniques that up until a few years ago were not innovative, but illegal.

We should now focus on mastering the best practices for using the technology management system that has been painstakingly created over the last 15 years. This decentralized technology management system, largely crafted by your Committee, can quickly respond to a dynamic private sector if it is allowed to function as designed.

Along this line, I would also like to commend Representative Morella for including an amendment to the pending bill re-establishing decentralized management of public sector technology for the Advanced Technology Program. The current decision to take technologies away from universities if they are partners in the ATP program is an example of a Washington solution looking for a problem. Such arbitrary decisions undercut the very foundation that has made our universities the world leaders in finding commercial partners for their R&D.

As I mentioned last year in my testimony, this Committee largely invented the modern federal technology management system . Starting in the mid 1970's when few even recognized this as a serious competitiveness issue, your Committee started examining federal technology management procedures using a revolutionary new yardstick-- that the U.S. taxpayers deserve an economic as well as scientific return on the $35 billion invested annually in our unparalleled federal laboratories and universities. This has been a difficult process, but the passage of the Stevenson-Wydler Act , the Bayh-Dole Act, and the Federal Technology Transfer Act forged a strong chain linking our public and private sectors in economic partnerships.

You designed a system drawing on the American genius for entrepreneurship rather than trying to impose a European or Asian model on us. This was a bold

move at a time when many were wondering if our best years were behind us, suggesting that we might as well settle for second place-- or worse!

Increasing the commercialization of the technologies derived from the funds invested in our federal laboratories and universities has been a bipartisan goal for many years. The principles that your Committee enunciated were embraced by President Reagan as the keystone of the policies established in Executive Order 12591 establishing a clear mandate to the agencies that these laws were to be vigorously implemented.

The policies underpinning the current laws are providing economic returns. Since enactment in the 1980's, we have seen steady increases in successful university and laboratory licenses, royalties and collaborations with U.S. companies. It is now common to see high technology start-up companies forming around our universities. DOE should be commended for its goal of encouraging the same phenomenon around its laboratories.

It is now time to expect this progress to increase even more dramatically. However, we should not forget that this represents a radical change to a system that has been functioning since World War II. You do not change a complex system like the federal R&D structure overnight.

Another measure of our success is that our European and Asian competitors are now studying our models to learn how to make their own public research institutions more effective technology managers.

This is not to imply that the current system is perfect, but that we have come a long way from the 1970's when it was difficult to find any companies willing to testify that our universities or federal laboratories had any real economic benefits to offer.

We are entering a new era of budget austerity combined with the winning of the Cold War that is forcing a re-examination of the federal R&D system. The missions of the agencies, their laboratories, and our research universities are undergoing their most fundamental re-evaluation since Vannevar Bush gave his recommendations to President Roosevelt on the role of Government research in I945. This is obviously a much larger question than just technology transfer, but I suggest that in this review we not lose sight of the principles that were first enunciated in this very room.

These are the maxims underpinning the American technology management system that have held us in good stead and should be kept in mind as we examine what contributions our public research institutions can make in the future. They are the following:

1. Decentralized management of technology by the creating institution is by far the most effective method for prompt commercialization.

This idea ran completely contrary to the conventional wisdom of the 1970's that we needed to imitate the centralized Japanese or European models. Luckily, Congress wisely chose a market driven, decentralized model relying on the creating universities or federal laboratories as the best public stewards rather than Washington. This model is working, but, like any federal system, it needs to be dredged from time to time to keep it from filling up with process that is so dear to the bureaucrat's heart.

Headquarters should set guidelines, clarify policies, and help identify best practices. In other words, serve as an expediter for the system. When Washington tries to micromanage the actual process of technology management, it impedes the ability of the market to function. Similarly lawyers must serve staff functions. They are poorly trained to be entrepreneurs. Systems designed by attorneys have plenty of brakes, but few, if any, accelerators.

The wisdom of the market runs significantly ahead of agency policy making. If agencies determine the missions of their laboratories, give them their budgets, provide training on how to use the laws, and then get out of the way, the entire process would speed up significantly.

2. Real incentives for the institution and its scientists to pursue commercialization must be provided.

At a time when budgets are shrinking and the staff is being asked to do more with less, there must be increased rewards both for the facility and the researchers for success. The laws wisely provide that royalties from successful licensing and Cooperative Research and Development Agreements (CRADAS) are returned to the laboratory, universities and their scientists. Representative Morella's new legislation rightly strengthens this incentive system.

Technology commercialization is hard work. It must be rewarded. This should extend to the agency budget process. Such actions speak much louder than policy proclamations in convincing the laboratories and universities that technology transfer is indeed a priority and not a fad.

We should also look to make sure that our successful federal laboratory deal makers are provided clear career paths. There is a danger since technology managers are neither scientists nor traditional administrators that they can get lost in the federal promotion system. Brokering deals is hard work anywhere. It is especially hard in the public sector.

After 5 years or so of carrying this burden, many of the best technology managers have been beaten down by the system or decided there must be an easier way of making a living. I believe that if you look at the institutions where technology transfer is succeeding you will find a champion who has accepted this burden. There needs to be a light at the end of the tunnel for these unique individuals that is more than an oncoming train!

3. **Sufficient intellectual property protection must be provided so that the industrial partner can take the concept from the laboratory or university to commercialization.**

Again, Representative Morella's bill provides needed assurances to U.S. companies that they will have a guaranteed degree of exclusivity for technologies that arise from collaboration with our laboratories in order to justify taking technologies promptly to market. This provides a needed "floor" so that, regardless of which agency a company is dealing with, the needed degree of intellectual property protection is afforded.

I suggest that you closely monitor the implementation of these amendments when this legislation is enacted as it deserves to be. One of the frustrations that you heard loud and clear from industry last year in the House and Senate hearings is that industry needs a quick decision on whether they have a deal. Too many times the laboratories are spending time negotiating, not with the

company, but with their own headquarters policy office or legal staff. It would seem that if someone is competent enough to run a multi-billion dollar federal facility, they should be able to complete a million dollar CRADA without having to constantly get permission from above.

Similarly, "model agreements" should be just that. The laboratories should be able to modify these to meet the needs of the industry partner without slowing down the entire process.

John Preston, who is appearing on the panel with me, has a brilliant analysis of the need to create "passionate" deal makers in any public institution. John also warns how the prime killers of passion are bureaucracy, lawyers and committees. All of these have places in the federal system, but, if we have decided that the time has come to "put the pedal to the metal" in commercializing our public R&D, these entities cannot be allowed to control the system.

This does not require new laws as much as Congressional oversight to keep the agencies on the straight and narrow.

I would like to close by citing some of the evidence that the National Technology Transfer Center is seeing in our everyday operation that U.S. industry is indeed reaching out to our federal laboratories and universities for assistance. Our

system has received more than 10,000 phone inquiries from all over the country from companies looking for help. Working closely with the Federal Laboratory Consortium (which is ably represented today by its Chair Tina McKinley), and the Regional Technology Transfer Centers, these inquiries are linked with the federal R&D system.

Here is what we are seeing:

- 72% of our clients are small or medium sized companies (having less than 500 employees). These are precisely the kinds of companies that create the most new jobs, yet have historically had the most difficult time accessing the federal system.

- 44% of our clients are manufacturing firms. One of the greatest assets of the federal laboratory system is its expertise in solving technical factory floor problems. With our manufacturing base under continuous assault by foreign competition, having the ability to tap into the know-how of 700 laboratories with one-sixth of all of the United State's R&D scientists and engineers is a great competitive advantage. With modern communications capabilities we routinely find solutions to client problems in federal laboratories or universities thousands of miles away from the client.

- o The technologies being sought cover the complete spectrum of R&D. Most of these also represent the high growth technologies that any industrialized country must master if it hopes to remain prosperous.

A good illustration that the federal laboratory system truly is national is shown by looking at the requests that we refer to laboratories in Maryland and New Mexico. These states obviously receive significant benefits from the world class facilities in their backyards. The degree of assistance that these facilities provide to other states is not so obvious. About 15% of all of the referrals we make to the entire federal laboratory system go to facilities in Maryland or New Mexico. I have attached a map of the U.S. showing the states these companies are calling from. The entire country is deriving real economic benefits from the federal laboratories and universities located in just two states. Such examples can be repeated for virtually every major federal laboratory.

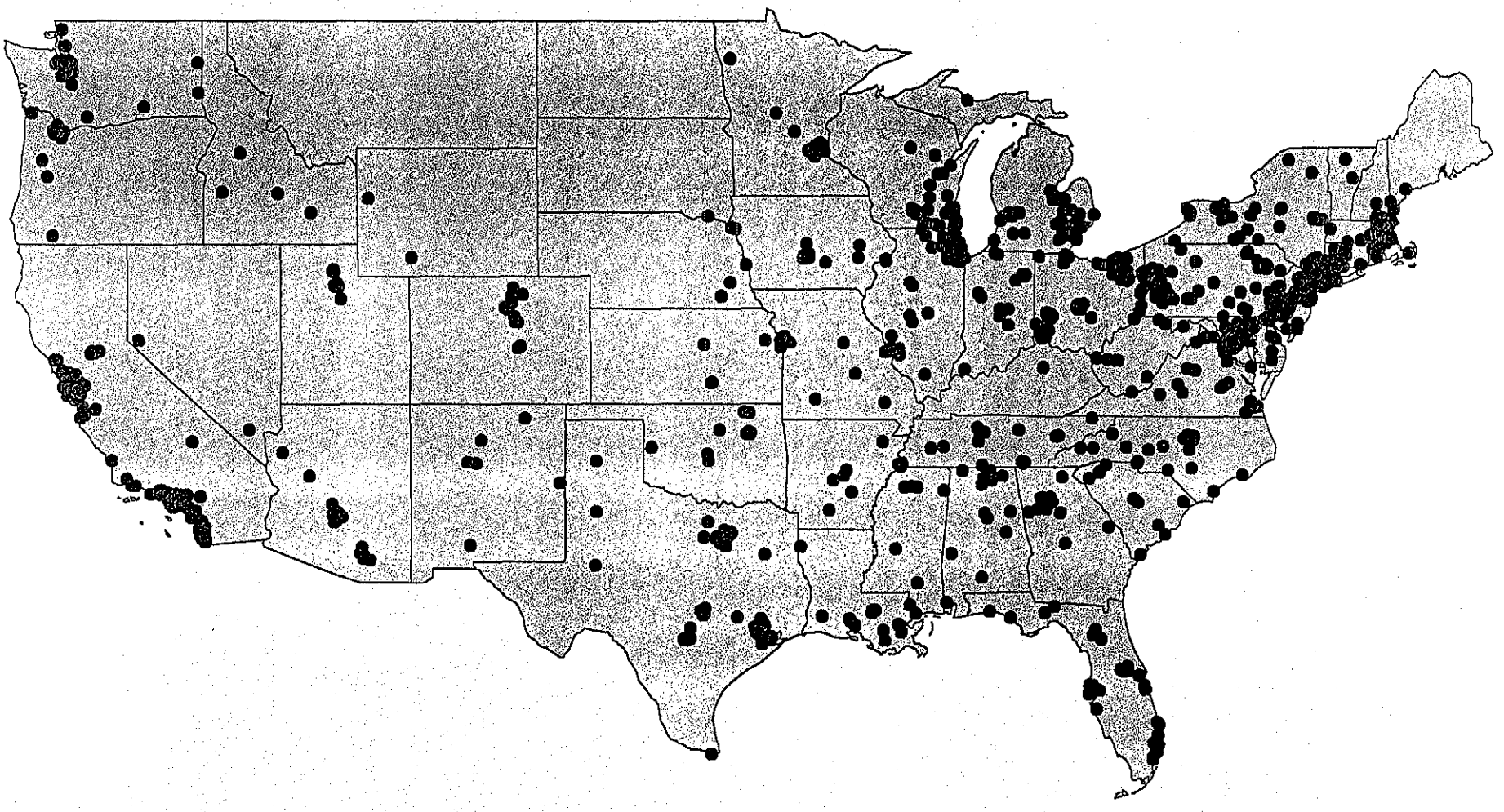
We must continue to improve U.S. industry's ability to instantly tap into the federal R&D system. Our ability to provide information must keep up with America's ability to access it. This Committee is well aware of the proliferation of persons with Internet capabilities. At the NTTC, the volume of log-ons to our electronic services has exploded. Our electronic gateway to federal research information has been accessed to retrieve more than 100,000 documents in just a few short months. That is evidence of the fact that our growing nation of Internet users are looking for electronic data without the red tape attached.

In conclusion, the ultimate goal I envision is the ability to link our federal laboratories, universities, state and local business assistance programs strategically with U.S. industry in locally led initiatives. This is playing to our competitive strength. The task is certainly not easy, but the benefits are enormous.

Thank you again for inviting me to share these observations with you.

Location of Companies Referred to Maryland Labs

Data Through 1st Quarter 1995



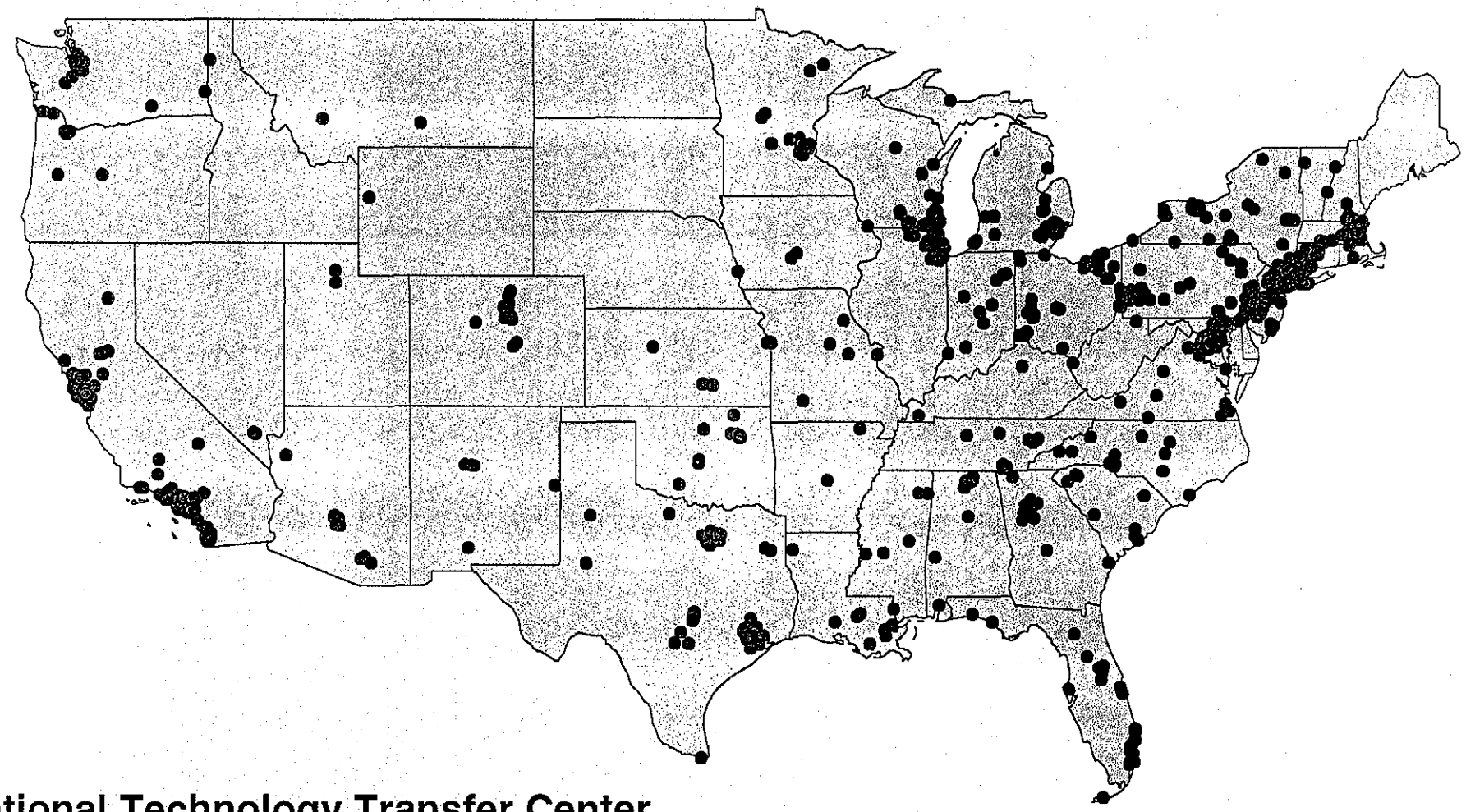
National Technology Transfer Center

Wheeling Jesuit College * Wheeling, West Virginia 26003

Total Referrals to Maryland Labs=1943

Location of Companies Referred to New Mexico Labs

Data Through 1st Quarter 1995



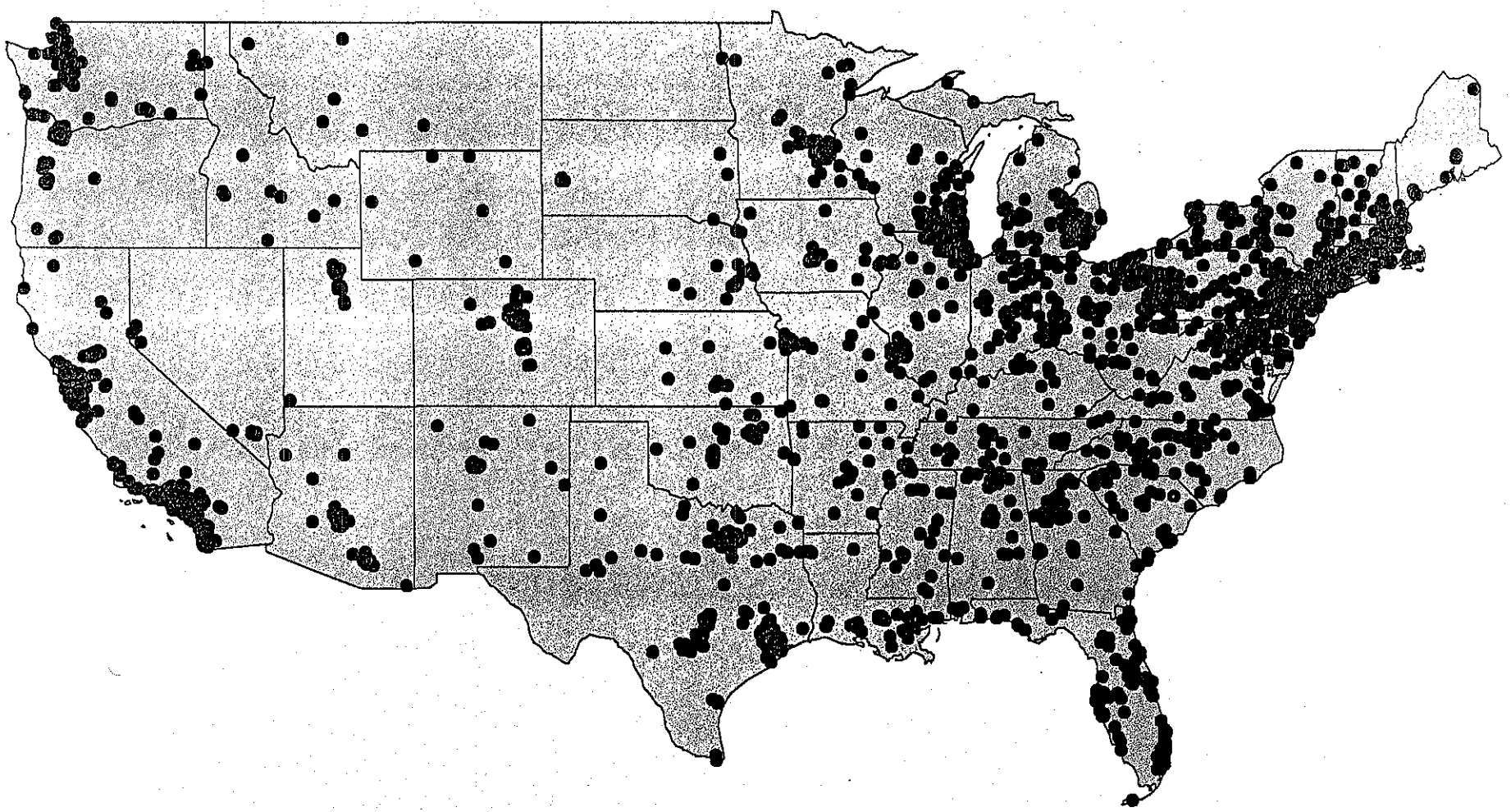
National Technology Transfer Center

Wheeling Jesuit College * Wheeling, West Virginia 26003

Total Referrals to New Mexico Labs=1259

Location of Companies Requesting NTTC Assistance

Data Through 1st Quarter 1995



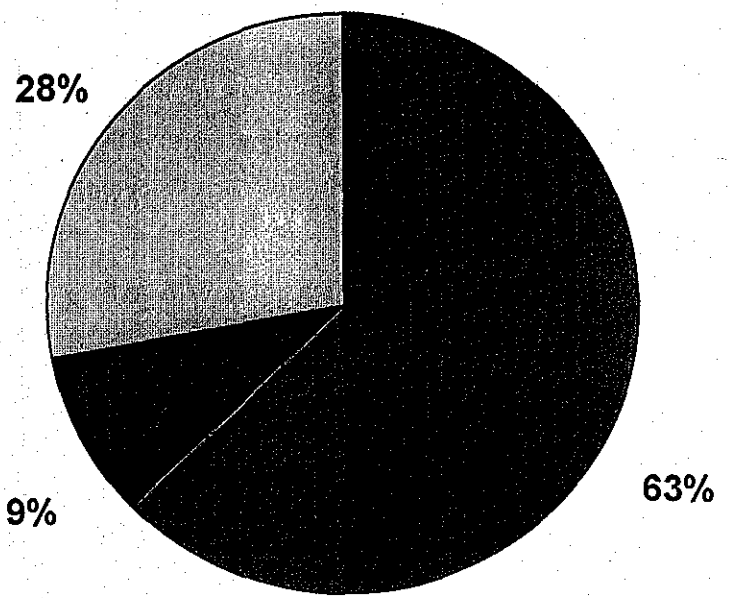
National Technology Transfer Center

Wheeling Jesuit College * Wheeling, West Virginia 26003

Total Requests=9109

NTTC Clients by Number of Employees

Data Through 1st Quarter 1995

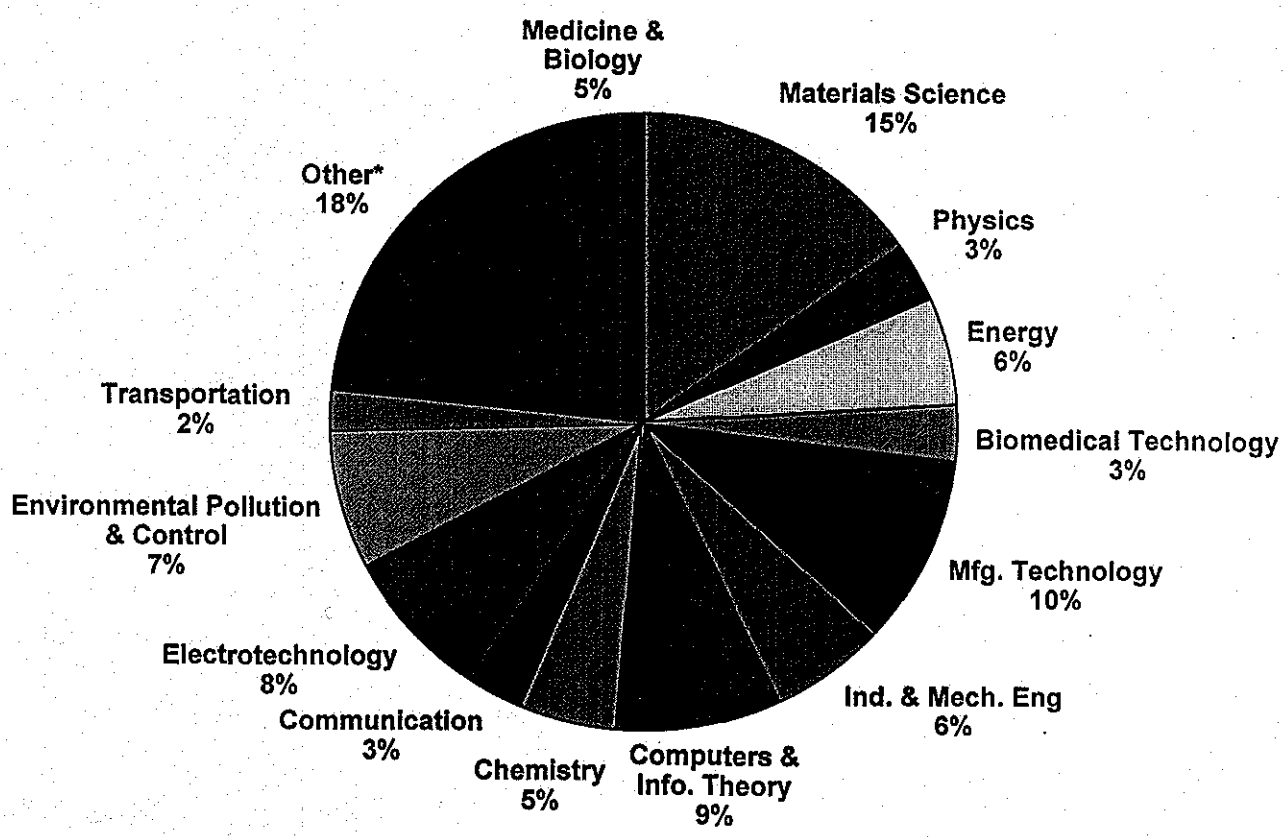


Small	Medium	Large
1-100 Employees	101-500 Employees	Over 500 Employees

Total Clients = 4982

NTTC Requests by Technology Area*

Data Through 1st Quarter 1995



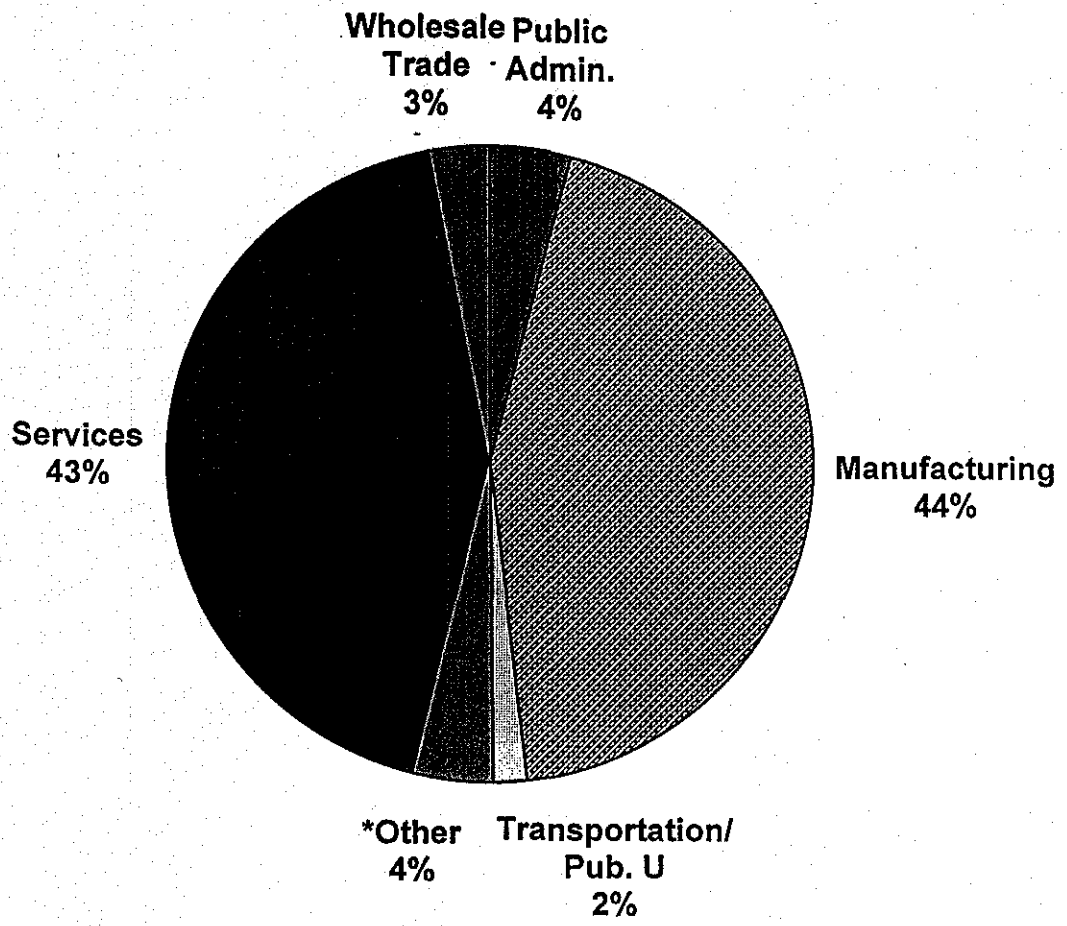
Total Requests = 9109

**Other Includes Categories with < 2% of Total

*Major NTIS Classes

NTTC Clients by SIC Division

Data Through 1st Quarter 1995



Total Clients = 5068

*Other Includes Categories with < 2% of Total