REPORT OF THE LEGISLATIVE COUNCIL TASK FORCE

TO THE

LEGISLATIVE COUNCIL

IN ACCORDANCE WITH INTERIM RESOLUTION 81-67

JANUARY 1983

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LEGISLATIVE COUNCIL TASK FORCE

INTERIM RESOLUTION 81-67

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I. INTRODUCTION

In October 1982, the Legislative Council adopted Interim Resolution 81-67, establishing a task force "to study educational and research resources within the state which would be useful in providing highly technical and scientific instructional and research programs . . . ."

During the approximately three months since its creation, the committee has met in three plenary sessions and has had numerous subcommittee meetings. While the time limitations have not permitted the more exhaustive analysis that members may have preferred, the task force believes that it has been able to make an important beginning to a statewide examination of Arkansas' potential in high technology development.

At the outset, the task force acknowledges that it has taken a broad view of its charge. That is, the committee decided to examine the resources the state has, and those it lacks, and then to consider the role of the National Center for Toxicological Research (NCTR) and other institutions in Arkansas in developing a high technology economic capability. As the task force began to examine the extraordinary potential of the NCTR, it realized that for the state to intelligently consider how best to interact with and benefit from the NCTR, a broader examination of the human and physical resources available to support it was essential.

Now, at the end of its work, the task force is impressed that even the larger question of high technology development should not be considered as an end unto itself. Ultimately the question for the Legislature and the people of Arkansas must be "What kind of state do we want to have?" and "What can we do now to see our hopes realized?"

The magnitude of the work that confronts the state is humbling. Almost all statistics that can be gathered in the bellwether areas of scientific,

governmental, military, and industrial research and development expenditures show that here, as in related educational efforts, Arkansas ranks at the bottom of the national scale.

A few examples highlight the situation starkly. Statistical indicators for the Southwest (i.e., Arkansas, Arizona, New Mexico, Texas, Oklahoma, Louisiana) show total annual industrial research and development expenditures, per capita, for Arkansas amount to $4.57. That compares to $85.11 per person in Arizona, $73.64 in Texas, $49.31 in Oklahoma, and $26.70 in Louisiana. As discouraging as these comparisons are, it is even more disheartening to realize that Arkansas' per capita expenditure of $4.57 compares with a national average of $137.16.

The figures for university research and development, another significant barometer of high technology potential, are no more encouraging. The following table shows the dollars spent per 1,000 population (1979 figures):

New Mexico	$42.66
Arizona	28.56
Texas	24.21
Louisiana	15.96
Arkansas	12.90
Oklahoma	12.18

The sobering statistics could be enumerated at length. Indeed, it has been seriously suggested that the technological resource gap between Arkansas and its sister states is so great that it might be best not to attempt to bridge it, but to find some other goal we might be more likely to achieve.

The task force does not believe, however, that this is a realistic alternative. We may all continue to hope that changing economics will bring about a resurgence of the agricultural economy that has been our mainstay; we may work to assure that Arkansas will become even more attractive as a retirement home for thousands of Americans. We may even console ourselves with the half-comforting notion that if we do not become a wealthy state, at least perhaps we can survive by sharing our abundance of timber and water with our more prosperous neighbors. But the task force does not believe that such a recommendation would be countenanced either by the Legislative Council or by the people of Arkansas.

Time ultimately may convince us all that Arkansas cannot be the national leader in high technology research and development, but the task force is convinced that we will be far better off if we make a determined effort to improve our current situation than if we passively accept it.

The task force has not found that our people are less intelligent, our dedication less sincere, or our material resources less abundant than those of our neighbors. Nor, we note with encouragement, have we found that it is impossible to bring about a statewide resurgence through determined and planned effort by governmental and private leadership. The state of North Carolina, with its excellent educational system, its trailblazing Research Triangle Park, and its aggressive promotional efforts, offers the best but not the only example.

The task force quickly recognized that in the short time, and with the limited resources available to it, it could not map a detailed strategy to recommend to the Legislative Council. We do believe, however, that we can suggest an appropriate means of proceeding.

The recommendation is set forth in the remaining pages of this report. Essentially, it involves the creation of a public development authority, capable of bringing together in one entity resources of both the public and private sectors on a statewide basis.

Although the public authority concept has not been utilized in Arkansas, there is ample precedent in other states. The New York Port Authority, which oversees operations as diverse as ocean ports, international airports, bus terminals, and the World Trade Center, is one recent example of the use of a publicly owned corporation to accomplish broad governmental objectives.

In view of the wide dispersion of our colleges and universities, it may prove that designation of a single development center--along the lines of the Research Triangle Park in North Carolina--may not be the most suitable strategy for Arkansas. The appropriate beginning is not a place, but a state of mind. Creation of a state of mind that encourages high technology, research, and

development, while preserving the natural beauty and quality of life we enjoy in Arkansas, is a goal that can lead to the broader objective of increasing per capita income within our state to at least the national average.

II. ESTABLISHMENT OF GOALS FOR ARKANSAS

If Arkansas is to capitalize on its educational and research resources and opportunities, it will be essential to have a clear concept of where we would like Arkansas to be in the year 2000. With the establishment of long-term goals for the state, specific strategies can be developed to ensure that resources are being allocated in line with identified objectives and that Arkansas can simultaneously conserve and develop its natural resources.

A major consideration in determining these long-term goals is the need to accelerate research, education, and development, while preserving and enhancing the quality of life and the environment. Diversification and improvement of the state industrial mix by the year 2000 will lead to measurable improvement in per capita income. It also will broaden employment options for all age groups, improve the entrepreneurial climate and provide opportunities to retain Arkansas' "best and brightest" human resources. Today, many of our most well-educated minds are leaving the state to pursue opportunities elsewhere.

Goals established for the state must address the need to improve levels of educational attainment for all Arkansans and the need to increase information exchange between agencies and organizations to develop sufficient statewide data for wise future decisions.

Other goals for Arkansas will include the enhancement of a positive state identity and the development of a clear set of objectives that will avoid fragmentation and serve the best interests of the state as a whole.
Arkansas can carve out a unique place for itself in the nation if, in establishing its research and development goals, particular attention is given to the future needs of the country and how Arkansas can combine its own special resources and capabilities to arrive at innovative means of meeting those needs.

III. THE UNITED STATES IN 2000 A.D.

Research by the task force overwhelmingly indicates that by 2000 A.D., global interdependence will have ceased to be a philosophical premise, and the government and populace of the United States will be more aware of and attuned to research serving worldwide needs.

Emerging or developing nations will have become the largest trading partner bloc for the United States, and those same nations will depend upon the institutions of our country to guide them in multiple-use management of their natural resources--farmlands, fisheries, forests, minerals, energy, air and water. States with comparable demographics will be called upon to work with those nations, and an ability to understand mono-cultural development--as well as appropriate and multiple-use development--will place those states at the forefront of national resources for international system development.

There will be increased bilateral collaboration, and the United States foreign aid program will stress attention to common problems, ranging from cleanup of air and water pollution to preservation of soils and development of new crops. Using selective pesticides to protect crops, instead of current broadscale destructive application of chemicals, will be a worldwide phenomenon.

The United States itself will be more crowded, less stable ecologically and more vulnerable to disruption. Special national attention will be focused on historic deterioration of agricultural soils, erosion, loss of organic matter, desertification, salinization, alkalinization, and waterlogging.

The country will derive more than 25 percent of its foods from forest resources, and heterogeneous agroforestry will be a focus of national development. Major biological and genetic research advances in agroforestry will permit higher yields from arable lands. New protein strains will be developed for short-growth species, and year-round fruit and nut tree plantations tied with sustained-yield wood products operations will be developed. Management of forests to enhance noncommerical values such as ecosystem stability, protection of water quality and flow, air purification, recreation opportunities and aesthetic qualities will have national priority.

Nontraditional fisheries will produce ten times the volume of fish products grown and harvested in 1982, challenging the tonnage harvested from the seas. Per capita consumption will rise in developing countries as they move to "developed" status. New processing and storage systems will assure market stability for the producer and maintenance of quality for consumers. Key to this dramatic increase will be sustainability and effective use of previously ill-used resources.

Aquaculture will rival ocean harvests in importance, and fresh research investment will be made in aquatic plants for humans and animals. Potential yields will depend upon high quality, fresh water and new management systems. Harvesting, processing, storage and delivery of these new products will be a major growth industry for the United States.

Increased demands for fresh water, including irrigation, will be more than 175 percent of human use in 1982. Regional water shortages and deterioration of water quality, already serious in 1982, will reward those states and regions that alleviate stresses on quality.

Worldwide and North American climate changes will shift growing patterns in the United States, especially relating to grains. Drought conditions will worsen, especially in the mid-latitude areas of the country. Climate research will be raised in national priority and internal climatic linkages and projections will dictate policy relating to production support and research. Population pressures will continue on the southern states and will be heightened by immigration and increased average life span for United States citizens.

The nation's finest scientific and technical minds will seek career investment opportunities in regions where environmental atmosphere, definable communities, climate, and state institutions and governments are conducive to effective use of their talents. There may be less need for institutional bases than in the 20th century, but access to such resources will be enhanced by telecommunications.

New advances in communications will lead to a shift from seats of power to scattered sites for deliberations and policy research studies. Computer

technology will permit instant translation of data, but there will be an increasingly greater need to deliberate in less stressful environments conducive to thoughtful, less harried investigation. Travel will shift from physical movement to carefully designed and executed consultation via improved satellite communication, and rural or small community living will be enhanced as an option for the finest minds and talents from around the world.

In all of these projections, there is enormous potential for Arkansas to benefit if strategies are developed now that can place the state at the forefront by the year 2000.

For example, Arkansas can lead the nation in training and demonstration of balanced water economy--river basin resources as well as man-made water resources/supply. Storage capacity will have increased 100 percent by 2000 A.D., and the state can be a model of large quantity water distribution execution. New technologies developed around water scarcity and new less water-intensive technology for smaller communities can assure initiation and sustained investment in new businesses.

IV. ARKANSAS' RESEARCH CAPABILITIES AND OPPORTUNITIES

Arkansas is strategically located in the southcentral part of the United States. Thus, it has a transportation advantage to the major population centers of the nation. The state possesses a tremendous wealth and diversity of scenic, natural, and renewable resources. It also has a relatively long growing season, a mild climate, adequate good quality water, a relatively large agricultural and timber industry, and a wealth of mineral resources including bauxite and petroleum resources. The state has a low tax structure and tax effort and, therefore, is an attractive retirement area. The citizens of Arkansas possess a basic native intelligence that complements a high work ethic. The city of Little Rock, centrally located within the borders of the state, represents a banking and investment center, with the eighth largest investment house in the nation.

The economic base of Arkansas focuses on agriculture, natural resources, manufacturing, and tourism. Due to a national decline in agricultural profits, the impact of high production, equipment, and labor costs, the vulnerability of tourism and the extraction of natural resources to national economic forces, and other factors, it is a reasonable assumption that the prospects for jobs and social benefits in the future are less than desirable unless a visionary step is taken at the present time. Historically, by accident or design, other areas facing similar situations have been able to avoid their predicted fate due to either the availability, development or pooling of resources that permitted them to participate in new or developing areas of economic growth.

The next industrial revolution will be based on high technology. Resources that will be important include: (a) close proximity to other research oriented groups; (b) availability and low cost of land for expansion; (c) moderate cost of living; (d) availability of recreational opportunities; (e) environmental quality; (f) a good people-oriented transportation system by rail, car or bus; (g) availability of trained, stable and dependable craftsmen and technicians; (h) proximity to a strong continuing education system; (I) proximity to a strong primary and secondary educational system; and (j) favorable state and local taxes permitting reinvestment of maximum capital during the early phases of growth. Unlike manufacturing companies, logic- or service-based industries are much less dependent upon access to nearby markets, raw materials, water supply, waste treatment facilities, energy, and climate.

Of those resources required to either stimulate or enhance the development of new ideas--the driving force behind high technology and service-based industries--Arkansas has the available land, natural beauty, dependable work force and tax structure needed to attract such industries. Many of Arkansas' strengths cannot be easily duplicated by other regions of the nation. On the other hand, the formal education level in Arkansas is relatively low with respect to the percent of the population who have received technical training, graduated from high school and college, and earned advanced degrees. The state also is weak overall in public transportation and concentrated areas of excellence in high technology (governmental or private). Local exceptions do exist, a fact critical to this study since a primary need of logic-based industries is the clustering of like minds to enhance the exchange of ideas and concepts.

Conclusions reached by the Subcommittee on Facilities and Resources in its preliminary report (Appendix C) indicated that now must be the time for Arkansas to pool its resources for research and development if the state wishes to maintain any of its competitive advantages.

Presently, there are three major areas of the country where high technology industries predominate (see Appendix D). Over the next decade the Southeast, Southwest, Plains and Midwestern regions of the United States are expected to increase their relative share of high technology enterprises. Due to the high cost and availability of labor, high taxes, congestion and inadequate room for expansion in the New England and Far West regions, the advantages once enjoyed by these regions are quickly being outweighed by their disadvantages. The main impediment to economic growth of high technology in the Southeast, Southwest, and Plains states is perceived to be their lack of research-oriented institutes and the quality of their academic institutions.

Localized areas of concentrated excellence in the fields of high technology do exist in Arkansas, as do smaller and more specialized areas. The existing areas of high technology addressed in the state are diverse; thus some individuals might suggest that Arkansas is not dominant in any given area of technology and cannot compete. However, in the area of high technology this is a strength, rather than a weakness, since new ideas are generated by the blending of old ideas and concepts from two or more fields of specilization.

A graphic representation of major financial resources allocated to research in science and technology in Arkansas' governmental, academic, and private institutions is presented in Appendix E. From a preliminary survey, more than 70 percent of our existing technological and research efforts are concentrated in central Arkansas.

V. OPTIONS FOR THE FUTURE

An analysis of national trends indicates two major industries that are growth industries for the future: (1) the service industry and (2) the knowledge-based industry.

In the service area, Arkansas has several major options upon which it could focus. First, Arkansas should develop plans for strengthening its agricultural production sector through further processing of raw agricultural commodities. The additional value added in the processing of agricultural commodities also would create "low technology" job opportunities for its citizens. In addition, such activities would represent an investment in the major industry of Arkansas rather than the exploitation of its agricultural wealth and resources.

Secondly, Arkansas has tremendous potential to build upon its tourism and recreational industries through further investment in recreational facilities. Along these same lines, the state has developed a number of retirement communities in various sections of the state. Development of service programs to support these communities has additional potential in many areas of Arkansas.

A third area that will expand significantly for the remainder of the century is the knowledge industry. This industry generally involves high technology research and development, the communications industry, and the application of computers. Between now and the year 2000, it is estimated that 75 percent of the nation's industrial growth will be in high technology industries. Because of the central location of Arkansas within the nation, it possesses advantages with respect to national communication systems and computer applications. To fully develop the potential of Arkansas in the knowledge industry, significant additional investments will be needed in the research and development areas of high technology.

Industrial development changes have not gone unnoticed. More than half of the states are actively involved in promoting high technology industrial development. Those states which have a formalized effort to promote such high technology development are employing a variety of strategies that include, among others, governor's/legislative task forces; forums and commissions; and tax, real estate, financing, training, and research programs.

In arriving at its recommendations, the Arkansas task force examined the successes and failures of other states' efforts and attempted to adapt identified strengths to Arkansas' unique situation. A description of three successful high technology industrial parks (Silicon Valley in California,

Route 128 and Technology Square in Massachusetts, and the Research Triangle Park in North Carolina) and a brief overview of Tennessee's Technology Corridor project and Kansas' Advanced Technology Project are included as Appendix F.

Arkansas, in selecting its options for future investment, should build upon its current base. To do so, it must attract venture capital and develop an entrepreneurial climate. To fully participate in the national trends and build upon the current resource base of the state, efforts must be made to strengthen the research and development programs in higher education, in the Veteran's Administration facilities, and at the National Center for Toxicological Research.

Developing an interface with the NCTR should be an important component of Arkansas' efforts to develop quality educational and research programs. This Federal center has tens of millions of dollars worth of state-of-the-art facilities and equipment dedicated to toxicological research. Its location, halfway between Little Rock and Pine Bluff, is suitable as one of the focal points for development of Arkansas' scientific and technological resources.

The Task Force recognizes, however, that some changes will be needed to optimize Arkansas' interface with NCTR. Federal legislation should be enacted in the spirit of the initial Presidential charter for NCTR to emphasize cooperation between state and federal governments and the private sector, and to include educational support as a part of its mission. In addition, the members of the Task Force agree that federal support for the quality and quantity of research at NCTR should not be allowed to diminish. For the benefit of all concerned, the toxic research being conducted at NCTR should receive a high priority by Congress. As NCTR expands and serves the public in its defined area of environmental research, Arkansas' efforts in this area can expand as well. Through a well thought out partnership between the State of Arkansas and the federal government (NCTR), research and industrial development in this area can dramatically affect Arkansas' economy in the next twenty plus years.

One option considered by a task force subcommittee was the development of an Arkansas Science and Technology Corridor, concentrating on those resources available in the central area of the state. However, because of its conviction that the major concerns at this time are far more broad than determination of a

"location" for research efforts, the Task Force did not explore this option in greater detail. Related material is included as Appendix G and should be given consideration in the development of an overall plan for Arkansas. Most of the data in Appendix G has been obtained through the Arkansas Advisory Council for Vocational-Technical Education, Arkansas Department of Higher Education, Arkansas Industrial Development Commission, the National Center for Toxicological Research, the University of Arkansas and the Jefferson County Industrial Foundation.

VI. ALTERNATIVES CONSIDERED AND REJECTED

Arkansas ranks either near or at the bottom in many categories. Our per capita income, investment in education, and low family income are just a few examples. One of the causes is the low tax base from which government must obtain revenues to provide needed services. At the same time, Arkansas is fortunate to have an abundance of resources. For an improvement in the quality of life to occur, some actions must take place as quickly as possible. With the goal of moving Arkansas forward into a competitive economic climate by the year 2000, the Task Force considered many alternatives for action.

Arkansas is currently facing fiscal limitations and the outlook for the immediate future is not bright. One course of action open to the leadership would be to do nothing at this time. In the judgment of the Task Force, doing nothing in the 1983 General Assembly should be rejected. It would be an error to allow the fiscal circumstances expected during the next two years to adversely impact on planning for the next 10 to 20 years.

Just as taking no action in the immediate future would be ill-advised, attempting to do too much in these tough economic times also would be counterproductive. While many things need doing, the task force recommends that the 1983 General Assembly consider taking only a "first step" relative to seeking solutions to the state's problems. This first step is to create a mechanism to collect the data, perform the exhaustive research, develop a plan of action, and obtain the ability to put activities in motion that permit the realization of the long-term economic plan. The mechanism chosen should have the

authority, continuity, and resources to begin implementation of a strategy for statewide short- and long-term economic development.

The Task Force considered several alternatives as mechanisms to be used for these purposes. One alternative was designation of an existing state agency to perform the research and data collection, develop the plan, and assign administrative responsibility for implementation. Also considered was the possibility of adding more resources to a consortium of state agencies. Both alternatives were rejected for various reasons.

The Task Force agreed it was desirable to develop a mechanism outside the mainstream of current socio-economic, political, and governmental institutions. It was the concensus that a new combination of governmental, educational, and private sector participants should be charged with reviewing existing resources of all kinds, analyzing future trends, and developing short- and long-term plans that would make Arkansas economically competitive by the year 2000.

There are several ways a mechanism as envisioned by the Task Force could be structured. The two most logical structures would be creation of a private not-for-profit corporation or creation of a public authority. Due to inherent limitations in not-for-profit corporate structures, the Task Force concluded that the most desirable "first step" would be the creation of a public authority devoted to science and technology modeled after the New York Port Authority. Such an authority would have the autonomy desired in a private, not-for-profit corporation, while at the same time having statutory responsibilities, continuity, stability, and accountability.

VII. WHY A PUBLIC AUTHORITY FOR ARKANSAS?

Creation of an Arkansas Science and Technology Authority (ASTA) would give continuity and permanence to Arkansas' commitment to improvement in education, science, technology, and the economy. Initially, it would develop a plan of long-term operation that would be put into effect to help the state reach its stated goals in these specific areas. The authority would be vested with certain powers and obligations, including the right to issue bonds, and other securities, purchase land, issue or request tax incentives for new industries, and other purposes.

The first question must be whether Arkansas, under current state law, can create a public authority. According to Arkansas Attorney General Opinion No. 82-177 issued December 7, 1982, the Arkansas Legislature has the power to create a public authority similar to the Port Authority of New York and New Jersey. (See Appendix H for Attorney General's opinion and Appendix I for an overview of the New York Authority.)

Such an authority would serve a number of essential purposes in Arkansas. Specifically, it could:

1. Determine the kinds of emerging technologies that could take advantage of Arkansas' resources, and make comprehensive recommendations in annual reports to the legislature as to the actions necessary to create the appropriate environment for scientific, economic, educational, and research development.

2. Prepare comprehensive reports on Arkansas with regard to political climate, work force, venture capital sources, and educational resources.

3. Serve as the primary coordinating mechanism for greater ease in entering into contractual or service relationships with state government, the federal government, state-supported and independent educational institutions, and industry.

4. Sponsor conferences in new areas of science and high technology.

5. Analyze the impact of taxes and regulations on high technology development in Arkansas, along with specific recommendation for improving the climate for growth of such industry in the state.

6. Develop contact with government, industry, and foundations to assist in identifying research and development funding sources.

7. Maintain a statewide inventory of major scientific equipment and personnel, as well as research and development activity taking place in the state.

8. Serve as dissemination clearinghouse. In cooperation with the Arkansas Industrial Development Commission, the authority could serve as a centralized contact on scientific research and education activity for industry considering plant site locations in Arkansas.

9. Identify needed research or educational programs through dissemination functions and contact with industry representatives.

10. Provide seed funding for research projects identified as state priorities, utilizing funds received from the state, federal grants, foundation grants, or industry grants and contracts.

VIII. EXPECTATIONS FOR THE FIRST BIENNIUM

The Task Force recommends that the staff of Arkansas Science and Technology Authority be made up of both economic- and science-oriented members working in cooperation toward the single broad goal of state economic development through the improvement of research and education capabilities and the attraction of technology-based industry. The authority's commissioners should be evenly distributed among those involved in government, the private sectors and education. The commissioners should be appointed by the Governor, with confirmation by the Senate, to overlapping six-year terms.

It is further the recommendation that the authority spend its first year considering the agenda addressed by this report, developing and considering other goals and objectives and articulating a strategy for achieving its goals.

To carry out its initial operations, the authority should be established with an initial appropriation of a minimum of $250,000 for each year of the biennium. Goals for the first biennium are relatively simple, but extremely important to its long-range success:

1. To establish an organizational and administrative structure.
2. To develop a detailed role, mission and objectives statement.
3. If possible, to initiate selected programs that have been approved.
4. To develop a strategy for implementation, with a defined timetable.

Organizational and Administrative Structure

The governing board of ASTA will select a full-time director, following an appropriate national and regional search process. The board will obtain suitable office space for the program and will assist the director in recruiting additional staff, furnishing the facilities and developing additional support systems that are deemed necessary for the program.

Legal assistance will be necessary to complete various procedural documents (by-laws, personnel policies, leases, contracts, interinstitutional agreements, etc.) Special consultation with federal and state agencies, foundations, economic planners, and others may be necessary during the first biennium to assist ASTA in many of its tasks.

Role, Mission, and Objectives

The major goal of the first biennium is to complete a detailed course of action. This effort will require a comprehensive dialogue with all appropriate leadership groups in Arkansas, including the legislative and executive branches of government, institutions of higher education, vocational training institutions, and leaders in industry and business. Such an inventory of "needs" is absolutely essential to the long-term success of ASTA.

Initiation of Selected Programs

Although the first biennium will be devoted primarily to planning, the administrative staff should be able to initiate some aspects of the plan during the second year. These should be selected carefully with major emphasis given to items of high visibility and items that help create a long-term base. Initial emphasis should be given to the role of NCTR in this authority, including an examination of the feasibility of some of the specific ideas generated by the task force subcommittee. (Appendix J)

Some utilization of NCTR's facilities and faculty can take place immediately and selected research and educational programs between NCTR and institutions of higher education lend themselves to early completion. However, full development of the NCTR potential cannot be addressed until it is determined how such further utilization coincides with the state's long-term goals.

Strategy for Implementation

A careful strategy for implementation of the objectives of ASTA should be developed during the first biennium. Expectations will be high, and the governing board must be realistic in its approach. Some steps will depend upon successful implementation of prior steps and, therefore, a detailed timetable may be an approximation in some areas. However, it is mandatory that ASTA develop the confidence of the leadership of Arkansas. Once a plan of action is developed, ASTA must be accountable to the public.

In all this process, it is important to remember that Arkansas is not alone in its determination to develop a high technology base. Although the established centers of high technology industry are relatively few, most states have recognized how crucial technology will be to maintaining industrial and commercial competitiveness in the future.

To be successful, Arkansas must move quickly and aggressively, with a vision for the future, and a realistic appraisal of the advantages we have and the resources we have yet to develop.

APPENDICES

APPENDIX A

INTERIM RESOLUTION 81-67

FOR THE ESTABLISHMENT OF A TASK FORCE TO STUDY EXISTING EDUCATIONAL AND RESEARCH RESOURCES WITHIN THE STATE WHICH WOULD BE USEFUL IN PROVIDING HIGHLY TECHNICAL AND SCIENTIFIC INSTRUCTIONAL AND RESEARCH PROGRAMS AND TO MAKE RECOMMENDATIONS TO THE ARKANSAS GENERAL ASSEMBLY AND THE LEGISLATIVE COUNCIL CONCERNING SPECIFIC COURSES OF ACTION WHICH THE TASK FORCE FEELS WILL ENABLE THE STATE TO MAKE MAXIMUM USE OF SUCH EDUCATIONAL AND RESEARCH RESOURCES.

WHEREAS, although Arkansas' resources for supporting education and economic development are limited, if the State can anticipate and utilize emerging technologies, it can become more competitive in attracting high technology industries that will result in a higher standard of living for the people of the State; and

WHEREAS in order for the State to attract such high technology industries, it must make use of the full potential of all educational and training systems available in the State; and

WHEREAS, the National Center for Toxicological Research, located in central Arkansas, has tens of millions of dollars worth of equipment and facilities which could be shared by the State of Arkansas to provide highly technical instructional programs at the associate, baccalaureate, masters and doctor degree level; and

WHEREAS, in the late 1960s and early 1970s, the United States Government undertook a complete phaseout of biological warfare activities which resulted in changing the role of the Pine Bluff Arsenal from a biological warfare and defense installation into an instrument for health research where the Food and Drug Administration, the Environmental Protection Agency, and other government agencies would work with members of academic, scientific and industrial communities to expand their knowledge of the effects of an increasing array of chemical substances found in man's environment; and

WHEREAS, the multi-million dollar facility and equipment at the National Center for Toxicological Research is available for use by the State of Arkansas and the use of such facilities would enable the State to initiate highly technological programs in key areas of the State which

would enable the State to compete for higher paying industries in the health, physical and computer sciences,

NOW THEREFORE,

BE IT RESOLVED BY THE LEGISLATIVE COUNCIL OF THE STATE OF ARKANSAS:

That there is hereby created a special task force which shall make a study of existing educational and research resources within the State that are available for use by the State in providing highly technical research and instructional programs and, shall, on or before January 3, 1983, make recommendations to the Legislative Council and to the 1983 General Assembly for specific courses of action which the task force feels will enable the State to make maximum use of existing educational and research resources in the State.

The special task force shall consist of the following persons or their designees: (1) the President of Arkansas State University, who shall be Chairman; (2) the Director of the National Center for Toxicological Research; (3) the Director of the Department of Higher Education; (4) the Director of the Arkansas Industrial Development Commission; (5) the Director of the Advisory Council for Vocational-Technical Education; (6) the Director of the Division of Vocational Education - Department of Education; (7) the President of the State Chamber of Commerce; (8) the President of the University of Arkansas; (9) the Chancellor of the University of Arkansas Medical Sciences Campus; (10) the Associate Director for Research - Veteran's Hospital; and (11) the Director of the Arkansas Highway and Transportation Department.

Respectfully submitted,

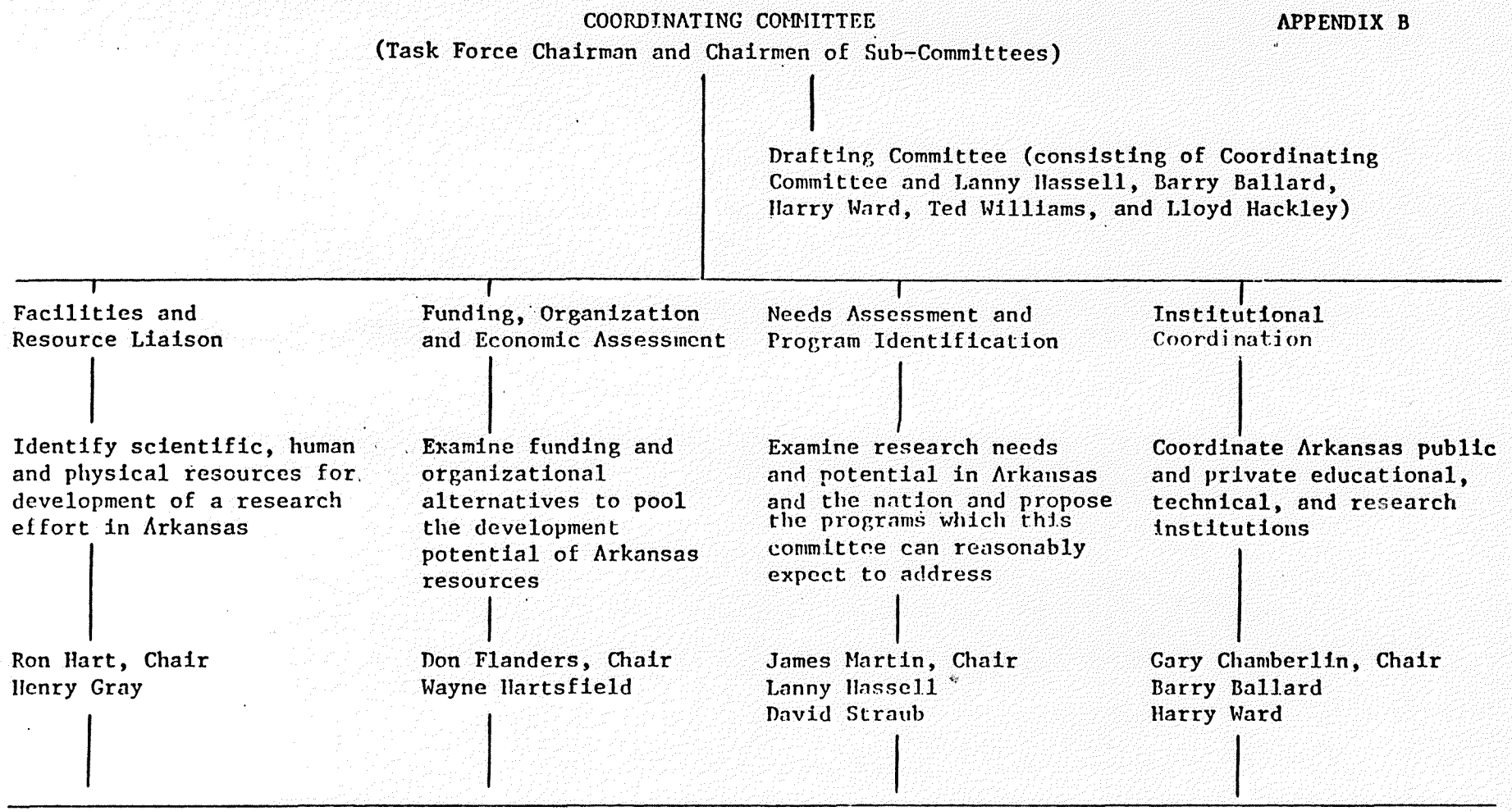
Senator Knox Nelson, District 23 — Rep. W. F. Foster, District 50

Senator Max Howell, District 1 — Rep. John Lipton, District 60

Senator Jack Gibson, District 35 — Rep. Lacy Landers, District 33

Rep. John E. Miller, District 45

Filed: October 14, 1982


COORDINATING COMMITTEE
(Task Force Chairman and Chairmen of Sub-Committees)
Drafting Committee (consisting of Coordinating Committee and Lanny Hassell, Barry Ballard, Harry Ward, Ted Williams, and Lloyd Hackley)
Facilities and Resource Liaison
Funding, Organization and Economic Assessment
Needs Assessment and Program Identification
Institutional Coordination
Identify scientific, human and physical resources for development of a research effort in Arkansas
Examine funding and organizational alternatives to pool the development potential of Arkansas resources
Examine research needs and potential in Arkansas and the nation and propose the programs which this committee can reasonably expect to address
Coordinate Arkansas public and private educational, technical, and research institutions
Ron Hart, Chair
Henry Gray
Don Flanders, Chair
Wayne Hartsfield
James Martin, Chair
Lanny Hassell
David Straub
Gary Chamberlin, Chair
Barry Ballard
Harry Ward
Bill Bowen
Kaneaster Hodges
Tom McRae
Sheffield Nelson
Louis Ramsey
Jim Nichols
Charles Venus
Bart Westerland
Gene Wilbourne
Farris Womack
Robin Anderson
Peggy Barnes
Walter Smiley
Carl Whillock
Bob Franks
Lloyd Hackley
Joe Nix

APPENDIX C
SUMMARY FROM THE PRELIMINARY REPORT OF THE SUBCOMMITTEE ON FACILITIES AND RESOURCES

A. Current Timing

The economy of most western nations is cyclical. Classically, the tendency of government during recessionary times is to protect financial resources rather than invest in wealth generating activities. This is contrary to the investment philosophy of "buy low and sell high" and tends to lead to subsequent and deeper economic recessions (by perpetuating outmoded skills and industries). This is especially the case during periods of economic transition when governments have historically tried to hold together pieces of failing industries rather than generate an environment in which new industries might prosper. We are now in the early stages of a new industrial revolution - one based on high technology and research. Those regions which provide the best home for such ventures in the beginning of this new economic transition period will receive the greatest return on their investment. Already, the competition is fierce. Those regions that wait until economic recovery has taken place will be faced not only with competition from already established areas, but also newly developing ones. Since the capital investment (even for the most aggressive undertaking) is relatively small, consisting of less than a tenth of one percent of the state budget, and the potential returns great during this time of least competition, the risk is correspondingly small (however visionary). As the competition from other areas increases, the investment required to succeed will increase and the potential return decrease. This is especially the case for Arkansas since: (a) the tax

base is proportionally smaller than other states during times of economic recovery; (b) the problems facing the state economy, as listed for the four major economic bases of the state in Section IV of this document, will only be moderately modulated by national economic recovery; (c) the lack of nearby competition cannot be expected to last for more than two to three years longer; and (d) the intrinsic working capital for other surrounding states is greater than for Arkansas. Thus unless the state takes a competitive edge with regard to timing, it will lose one of its greatest competitive advantages. A bold, visionary approach is needed immediately to generate the greatest impact on the national image of the state. Now, when the national economy is weak, is the most opportune time for Arkansas to strike in a coordinated, well-planned fashion, pooling whatever resources it can command.

B. Likelihood of Success

With each passing month the likelihood of success decreases for the reasons listed above. If we try but do not succeed, at least we will have built a solid base for a stronger industrial economy within Arkansas. We will have raised the image of the state nationally and the pride of Arkansans in themselves and their state. Economic competition is increasing on an international scale, and local, state and national investment in wealth-generating activities is necessary to ensure that this state and nation are competitive. Each region will develop differently, as have the already existing research parks and corridors. It is the belief of this subcommittee that a well designed and imaginative

investment in logic based industries will work, because it is a strategy for investment in brains and wits as well as a public-private partnership in support of an innovative economy and wise public policies.

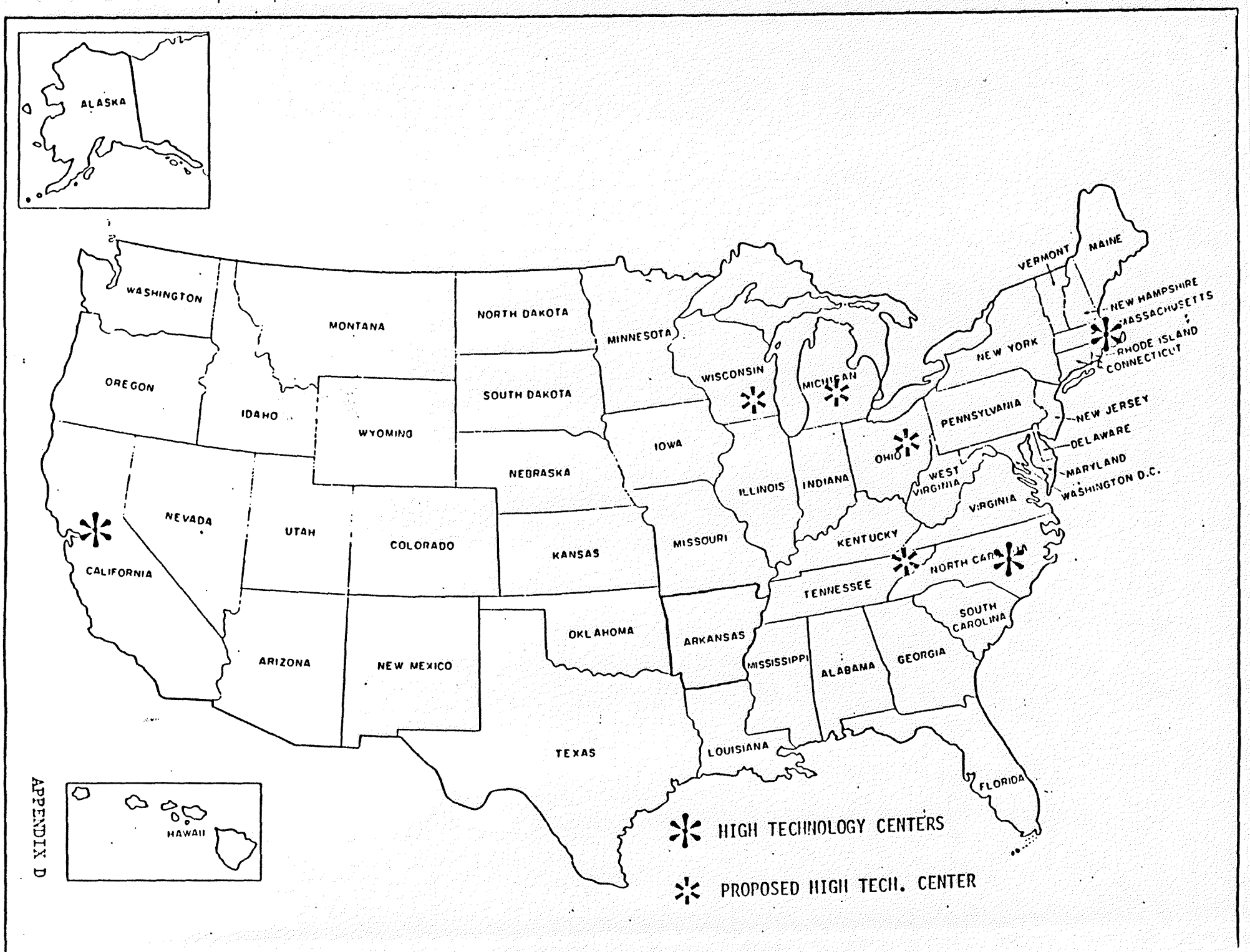
Logic based industries and the development of strategy to attract them have, however, become a fad as was the service-sector strategy of the 1970s when revitalization of metropolitan areas meant the construction of convention centers and hotels with atria. Synonymous with fads is the flooding of the market place with cheap imitations. Such imitations are devoid of either quality or uniqueness of character. The probability of long term success of such products is low. Likewise with research parks, convention centers, shopping malls, or computers, quality and uniqueness of the product is critical for long term success. In order to achieve quality there must be commitment by the developers of any product. Most high technology plans are similar and thus redundant. These plans almost always include: (a) the upgrading of existing university departments; (b) development of a promise of venture capital from local banks or investment organizations; (c) input of managerial skills from existing management pools in non-technologically based industries or corporations; (d) modification of the existing vocational education programs by endowing them with funds for state-of-the-art equipment; and (e) use of unoccupied factory space in metropolitan areas as a suitable home for high technology industries. Such plans are not only unimaginative but also generally undercapitalized and ill-conceived. First, high technology is vague because it is based upon new ideas and concepts, and thus the main goal must be to identify these ideas early on rather than to compete for already established areas of high technology which have already found homes.

Second, at this stage in the development of high technology industries, no local university, foundation or chamber of commerce has the resources to, by itself, stimulate or attract these industries. Third, to count on existing universities, unless they are of the quality of Stanford, MIT or Caltech would be folly since the cost to upgrade universities, which generally have a significant percent of their faculty tenured, is overwhelming and to do less than to bring them up to this level of excellence fails to create a competitive edge. Fourth, if available space is not located in an environment conducive for thought, and if it does not provide either room for growth or portray the right image, it is inconsequential since such space abounds throughout the United States. Finally, developing training programs for potential industries is not a guarantee of success, since as we have already seen in Arkansas, many highly trained individuals migrate to the jobs and not the jobs to them.

These pitfalls can be avoided, but only with strong state leadership and commitment, allied with leadership from the state's academia, labor, business and financial communities. The state already has within its borders a strong, internationally recognized research center employing over six hundred research scientists and skilled technicians. However, by itself and without a real commitment from the leadership of all sectors of the state's economy it is insufficient, in and of itself, to act as the seed crystal for development of high technology in the state. If such a commitment is made by the state as a whole, it will have a competitive edge over other states since such a level of commitment or pooling of resources is seldom observed. Without this commitment, the likelihood

of success would be small and the consequences of continued unemployment and low salaries high. The key to success thus lies with the people and the leadership of the State of Arkansas for in this case they are the masters of their own fate. If they do not share they will not have the resources; if they doubt their ability they will not have the commitment; and if they demand a detailed blueprint for success they will not have the flexibility to succeed. The likelihood of success is thus ultimately based upon the faith of the people and their leaders in themselves and the intrinsic resources of their state. Many people may find reasons why the state cannot succeed, but let us answer these critics with the realization that each of these impediments can be overcome by a strong leadership and a dedicated citizenry. Inaction at this time would be the worst of all possible actions, since the intrinsic resources of the state are strong; only the human resources need to be pooled for success.

APPENDIX D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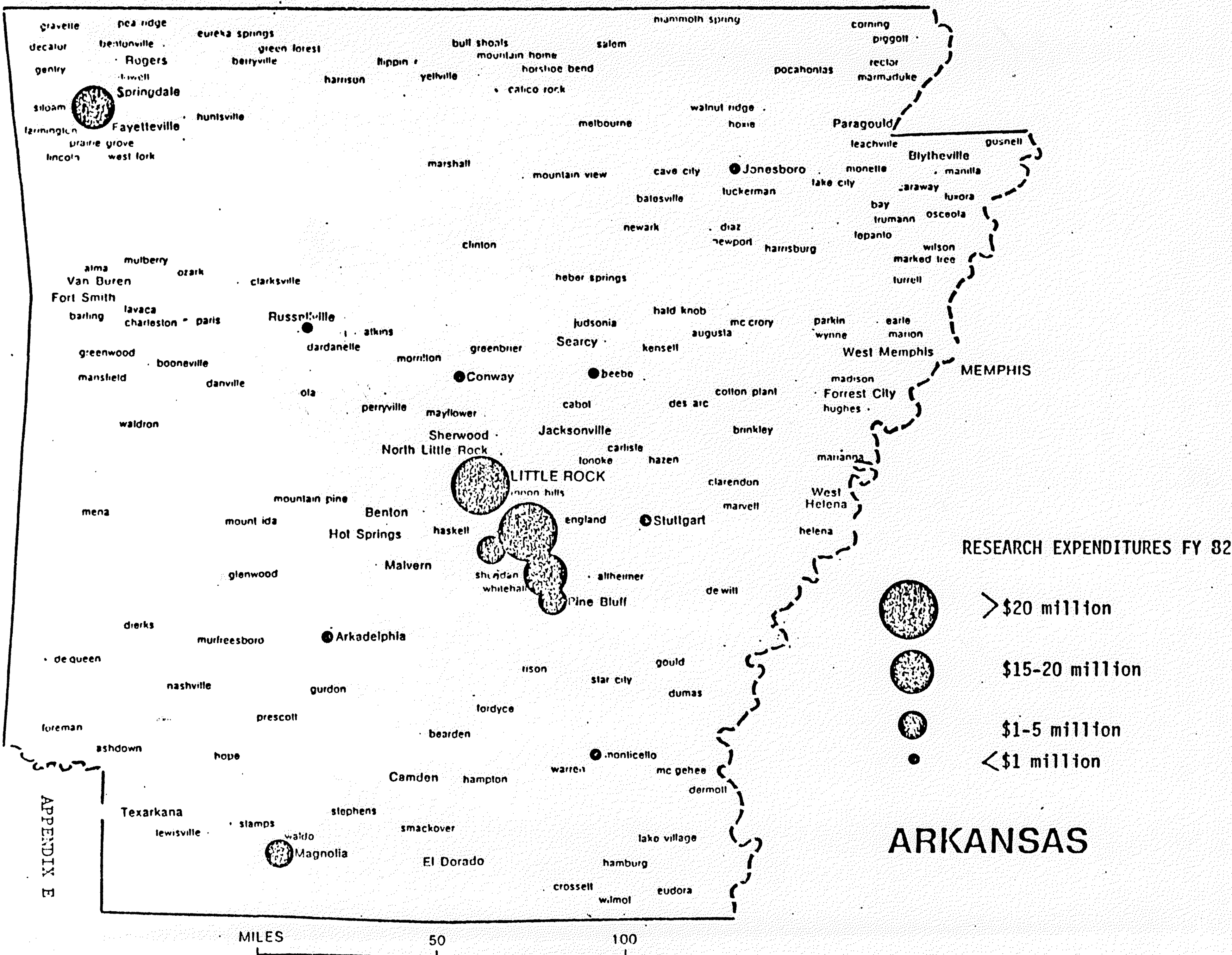
HAWAII
WASHINGTON
OREGON
CALIFORNIA
IDAHO
NEVADA
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
VERMONT
MAINE
NEW HAMPSHIRE
MASSACHUSETTS
RHODE ISLAND
CONNECTICUT
NEW JERSEY
DELAWARE
MARYLAND
WASHINGTON D.C.
HIGH TECHNOLOGY CENTERS
PROPOSED HIGH TECH. CENTER

APPENDIX E



RESEARCH EXPENDITURES FY 82
>$20 million
$15-20 million
$1-5 million
<$1 million
ARKANSAS
MILES
50
100
MEMPHIS
Springdale
Fayetteville
Rogers
LITTLE ROCK
Pine Bluff
Magnolia
Jonesboro
Conway
Stuttgart
Arkadelphia
Russellville
beebe
monticello
Fort Smith
Van Buren
Paragould
Blytheville
West Memphis
Forrest City
West Helena
Searcy
Jacksonville
Sherwood
North Little Rock
Benton
Hot Springs
Malvern
Camden
Texarkana
El Dorado

APPENDIX F
SUMMARY OF RESEARCH ACTIVITIES IN OTHER STATES

It is now very obvious to even the most casual observer that a number of regions in the United States have developed and maintained a high level of economic vitality, even in these times of severe economic depression. In studying what other states are doing in the high technology industry, it is important to note the characteristics of previous successes.

The following information, obtained from a Tennessee Task Force Report, describes three successful high technology industrial parks (Silicon Valley in California, Route 128 and Technology Square in Massachusetts, and the Research Triangle Park in North Carolina). This section also gives a brief overview of projects underway in Tennessee and Kansas.

Silicon Valley

The economic phenomenon referred to as "Silicon Valley" had its beginning in the early 1950s when Stanford University initiated the Stanford Industrial Park as a means of generating revenue needed to expand facilities and programs at the university. Early development and management of the park was performed in collaboration with Stanford University and the Stanford Research Institute.

This 660-acre park is fully occupied with approximately 80 firms that together employ around 23,000 people. Impetus of this early development has long since spread through Santa Clara County, now the focal point of a rapidly expanding microelectronics industry serving

substantial international markets. Silicon Valley covers an expanse of more than 20 square miles in parts of several governmental jurisdictions in Santa Clara County.

Research on the Silicon Valley development suggests that its success was largely circumstantial rather than planned. There was ample room to grow in a pleasant environment near an educational-cultural center when the microelectronics industry simply boomed. The region's tendency to attract and maintain the industry can be attributed to the strong graduate programs and related research conducted at Stanford and to a strong technical community college system, both of which feed a high quality labor pool.

Much of the early funding for research and development came from the defense budget which may be an important impetus for new development elsewhere. In spite of the national acclaim Silicon Valley has achieved, much of the contemporary literature reflects that the region is encountering difficulties that are largely a product of its ability to attract high technology industry. Many of the quality-of-life amenities that lured employees initially have deteriorated. Automobile transportation has become a nightmare in some areas, and levels of some public services such as fire and police protection are declining rapidly. Other public service needs, including housing, are not being fully met.

Route 128 and Technology Square

The Route 128 development consists largely of "high tech" industries that line the highway for some 30 miles from Boston. Almost all the land in the corridor is privately owned. Predating the 128 development is

Technology Square--a research park initiated in 1950 and developed jointly by Massachusetts Institute of Technology and Cabot, Cabot & Forbes, a Boston development firm. The motive of the university in this venture was to generate revenue through real estate development. MIT sold its interest in Technology Square in 1972 to pursue other real estate ventures in the area. The "research park" consists of about 10 acres which are privately owned, with approximately 20 firms located in Technology Square.

Route 128 became a logical extension of the research park because of land availability and relatively easy access to research activities conducted at Harvard, Boston College, and Boston University, as well as MIT. Although land-use controls imposed minimally acceptable development standards, the area grew in a relatively disjointed and incremental fashion without much emphasis placed on the targeting and/or recruitment of high technology industries or long-range planning.

It has been suggested that the successful commercialization of high technology products from the region is more a product of the personal relationships of individuals in both the academic and commercial-industrial communities rather than any preconceived plan to foster regional economic development. Entrepreneurs took advantage of market forces, particularly a growing federal budget, at precisely the right time. Route 128 emerged from the driving force of government-funded R&D coupled with proximity to several outstanding university systems and a long tradition of sophisticated financial management.

World War II-generated technology demands spawned intensified research programs in electronic guidance systems, radar, computers,

communications, and other telemetry related fields requisite to development of a booming space industry. Proximity to these research activities gave the region an unquestionable advantage over other regions competing for a share of the market. The region has had the quality-of-life attributes (a prestigious university with a stimulating intellectual and cultural environment) valued by entrepreneurs (usually faculty members) who could find little reason for moving from the area.

In other words, the apparent basic key to success in this instance was to capture bright students with an acclaimed academic research program and keep them in the regional work force by providing challenging job opportunities. As one source put it, the success of Route 128 rests in "smart people in a closely knit operation, with a major university complex to feed it."

Research Triangle Park

North Carolina's Research Triangle Park (RTP) is substantially different from the Silicon Valley and Route 128 experiences in (1) the underlying reasons for its creation, and (2) the philosophy and approach employed in the management of its land base. RTP was the brainchild of the private sector and the state, which combined efforts to induce regional economic development by systematically targeting and recruiting high technology industry. And unlike the Boston and California experiences of substantial industrial growth occurring in a relatively uncontrolled and unplanned fashion, the RTP approach is based on a comprehensive long-range management plan that ensures compliance with strict developmental quality controls and minimal disruption of the environment through

a decentralization of noncompatible industries.

The RTP, a 4,000-acre tract purchased with private funds, is managed by the Research Triangle Foundation which was established in 1958 as a private, nonprofit trustee, promoter, and developer for the park. (The park has grown to 4,500 acres as contiguous properties are purchased from foundation funds when available.) Government involvement is limited to road building (state), the extension of utilities (county), and to apparently complete cooperation between the foundation and all departments of state and local government, including the educational establishment.

The foundation has been extremely successful in promoting and developing the park. There are currently 31 companies employing more than 20,000 people at an average salary of $20,000 each. In addition, there are a number of firms that first located research or headquarter facilities in the park area and later located their manufacturing plants elsewhere in the state. Although the foundation can now boast of success, it is important to note that the first few years were not rewarding. In fact, the whole idea was close to being considered a failure, and the foundation was facing serious financial problems as late as 1965, seven years after inception. A strenuous, long-term marketing effort is responsible for the present level of success.

One of the first steps taken by the Research Triangle Foundation was to give $500,000 and 157 acres of land to help start a nonprofit research institute. The institute now has about $45 million in contracts, 1,100 full-time staff people, and access to many more on a part-time basis through university consulting contracts. Its board represents a

broad spectrum of interests but control is vested with the three major universities.

Of the foundation's revenues, 95 percent come from federal contracts. It is not surprising to learn that the director has asked for more private-sector sales.

With respect to the state's academic system, the North Carolina Community College system has 58 accredited "technical institutes" and community colleges, all under one post-secondary educational governing body. Students of the latter have automatic rights into the state's four-year university system after graduation, but all offer training varying from the very basic to fairly sophisticated engineering technician programs. In addition, they provide career counseling based on industry needs survey data so that all graduates are almost immediately placed within the state. They do not appear to emphasize liberal arts at the expense of technical education, nor is the importance of these subjects diminished. Under the state's "new and expanding" industry program, any company can get assistance in training employees for very specialized tasks at one of these schools. There also is what was described as a "technology/business industrial park system" around the state that is loosely associated with the technical schools.

In summary, factors contributing to the success of Research Triangle include:

1. The academic strength and technical/scientific resources of Duke, North Carolina University, North Carolina State, and other area institutions.

2. The number of engineering and scientific graduates in North Carolina that would otherwise have to go outside the state for employment.

3. The land availability and its restrictive convenants. (No manufacturing facilities and 85 percent of the land purchased by any firm must be reserved as woodland or used for landscaping.)

4. The "sales ability" of its executive director, his working relationship to the political power structure of the state, and the freedom of a reasonable budget. A related factor has been the ability of the organization to be patient, permitting a long-term investment in generating prospects, calling on some year after year.

5. At this point, certain "agglomeration economies" exist for locators--i.e., the park is more attractive for R&D and headquarter locations because of the number of people already there in those activities and because the associated services are already in place.

Tennessee's Technology Corridor Project

A governor's task force on a technology corridor in Tennessee has recently finished its work with the publication of a final report and recommendations. The task force recommended that the Knoxville-Oak Ridge area, with the land base provided by the existing and proposed segments of State Route 162 (Pellissippi Parkway) should be designated as Tennessee's technology corridor. To implement the concept, it was recommended the 1) a nonprofit, private corporation be chartered to capitalize on the area's technical strengths and other resources, 2) universities receive support to improve research programs and teaching, 3) a high-quality technical institute be developed in the middle of the area, and 4) a major highway connecting the area to the regional airport be completed soon.

On September 9, 1982, two nonprofit corporations were established. The first is the Tennessee Technology Foundation which is organized "to encourage, foster, stimulate and advance the civic, commercial, financial,

and economic interests of the State of Tennessee by the attraction of industrial plants, educational and scientific research facilities and other facilities involving modern technolgies; to acquaint and inform the public governmental entities and private organizations as to its objectives by providing information, technical and financial assistance and such other features as will foster, encourage, stimulate and advance these purposes."

The second nonprofit corporation is the Tennessee Technology Research Institute "to engage exclusively in charitable, scientific, testing... for public safety, and educational activities within the meaning of (IRS nonprofit requirements), and within this limitation, to perform technological research and to disseminate to the public the results of such research and other technological and educational information."

The general objectives for this effort are summarized in the task force report as follows: "...these resources, when packaged with other improvements already planned or herein proposed, can and will create significant economic growth opportunities which will result in more jobs and a higher standard of living for all Tennessee families. By working together, we can in the next two decades make Tennessee one of the nation's centers of high technology."

Kansas' Advanced Technology Project

The Kansas Department of Economic Development has conducted a study to determine the requirements for the achievement of high technology development. The KDED report lists 15 conclusions regarding the prospect of high technology industrial development and 12 recommendations to assist in realizing that development potential. The recommendations

include: 1) the establishment of a governor's task force, 2) changing federal legislation to improve university-industry linkages, 3)target state programs to foster high technology industrial development, 4) develop a vehicle to function as a catalytic role between industry and the universities to foster cooperative research relationships, and 5) increase financial support to university research programs.

The general objective of the effort is summarized in one of the KDED report conclusions. "Kansas has developed the basic ingredients to compete in the area of high technology development and must now create state level programs that show high technology industries a concern or commitment for their development in Kansas."

Common Elements

There are a number of common elements in all existing and planned high technology industrial development projects. These common elements emerge when the projects mentioned above are examined and when the results of a survey of eight university-related research/technology parks conducted by the U. S. Department of Commerce, Economic Development Administration in 1981 are studied. A summary of survey findings is attached. The common elements include:

* Proximity to academic complexes with strong graduate research programs.
* A comprehensive technical institute, strong post-secondary and vocational technical capability that ensures an extensive regional labor pool having relevant technological expertise.
* Substantial land base either previously held by a university or acquired as geographical focal point from which private-sector development evolved.
* Region's renown for "quality-of-life" amenities (cultural, educational, recreational).

* One or more persistent advocates with good relationships with industry leaders and the academic community.

* Ripe technological markets with commercialization efforts usually focused on single or complementary product lines (i.e., microelectronics, data processing systems, telemetry, etc.)

* Presence of a formally chartered research institute (either university or privately sponsored) that contributed to an ongoing commercialization process.

* Easy access to interstate and national commercial air transportation systems.

* Considerable length of time (up to 15-20 years) between inception and general recognition of success on a regional scale.

RESEARCH PARK SURVEY*

Summary

There is no such thing as an "average" university-related research park. Parks range from 10 acres to 5,500 acres; from 5 tenants to 80 tenants; from 250 employees to 23,000 employees; from $5,000 per acre to $200,000 per acre. Most of the parks are actually industrial parks with a research emphasis, rather than "pure" research parks.

The relationships between the research parks and the universities appear to vary widely. For example, Stanford's relationship to the Stanford Industrial Park is primarily an economic (landlord/tenant) one, while certain universities, such as the University of Utah, seem to be stressing the importance of research interaction between park tenants and university faculty and students. Technology Square's principal relationship to M.I.T. appears to be geographic.

The two dominant factors in attracting clients to the research parks are university research achievements and university faculty prominence, which in many ways are synonymous. After moving past those institutions which are popularly regarded as among our Nation's very finest, it would appear that several other factors--such as climate, taxes, desirability of locale, presence of related industry in the area--play a major role in a park's ability to attract industry.

On the whole, it appears that leasing land and buildings is a much more common practice than selling the land outright. The typical lease on land seems to be about 50 years, while the average lease on a "spec" building appears to be about 5 years. One striking exception is the Research Triangle which leases to only 3 percent of its total occupancy.

The consensus would seem to indicate a preference to not provide support services such as janitorial, security, landscape maintenance, etc. A definite preference is shown for keeping the tenants' role in park management an informal one.

One facility whose importance was not addressed in the survey was the availability of an airport. It was apparent from the informational materials provided that an airport either on or adjacent to the park was considered to be of high importance to several of the parks.

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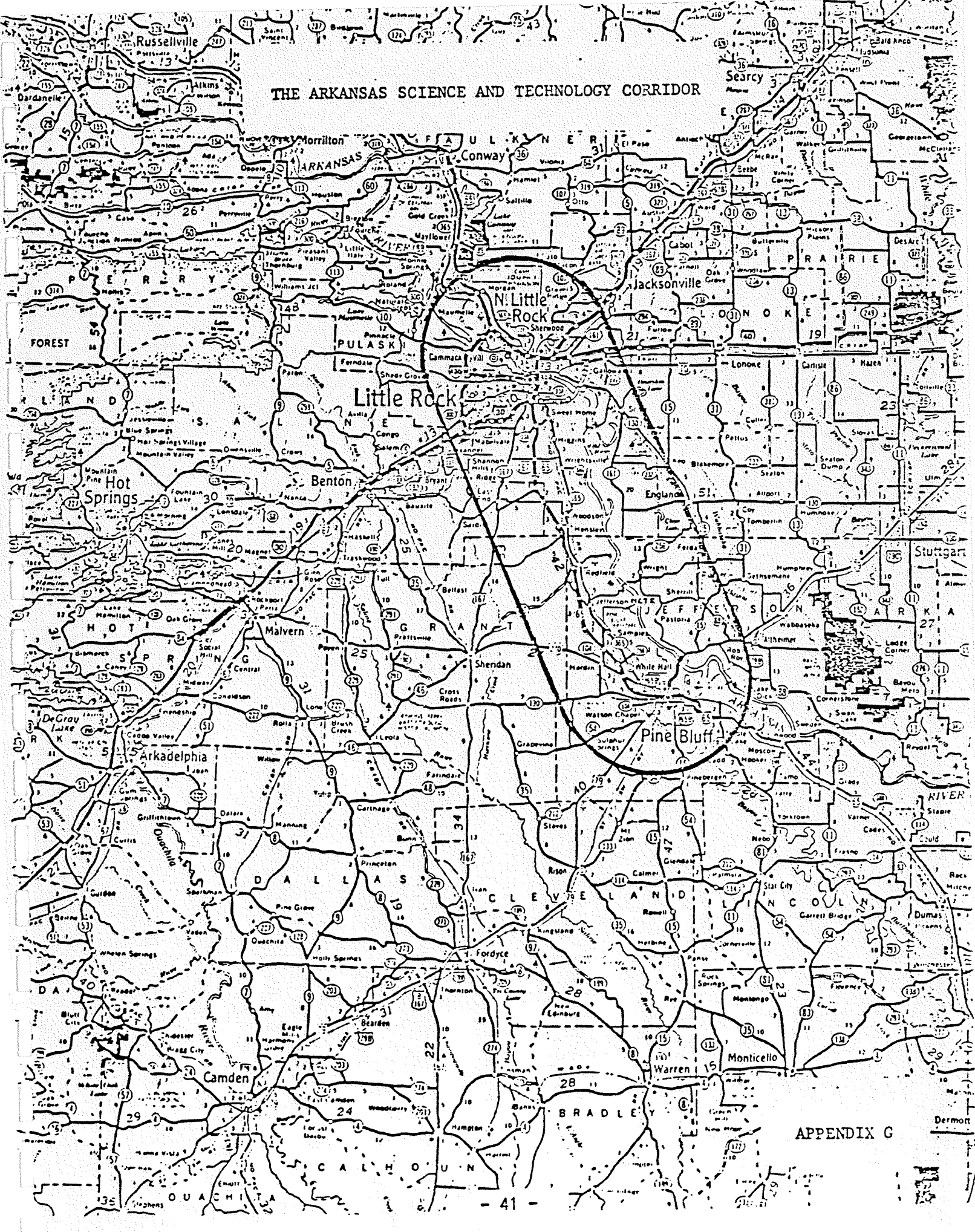
*Source: The data presented herein were obtained from a Progress Report (March 1981) to the U.S. Department of Commerce, Economic Development Administration, by the Orange County Research and Development Authority, Orlando, Florida, in fulfillment of its requirements for receipt of a technical assistance grant.

RESEARCH PARK SURVEY*

	Research Triangle	U. of Utah	Purdue	Princeton	Technology Square	U. of Georgia	Stanford	Cornell
I. Pertinent Statistics								
A. Size of park (acres)	5,500	320	95	1,600	10	500	600	200
B. Number of tenants (firms)	31	25	23	35	20	14	80	5
C. Employment	17,000	1,350	2,300	2,000	-	775	23,000	250
D. Age of park (years)	20	8	19	5	17	17	29	13
E. Distance from university (miles)	13	1	2.5	2	0	1	2	5
II. University Relationships								
A. At inception	Moderate	Very Strong	Very Strong	Moderate	Strong	Nonexistent	Very Strong	Strong
B. Current	Very Strong	Very Strong	Strong	Moderate	Moderate	Strong	Moderate	Strong
III. Attraction Factors: (X - important; 0 - less or not important)								
A. University research	X	X	X	0	X	X	X	X
B. University faculty	0	0	X	X	X	X	X	X
C. Community (taxes, housing, etc.)	X	X	X	X	0	0	X	X
D. Geographic location	X	X	0	X	0	0	0	0
E. Cost of Construction	0	0	0	0	0	0	0	0
F. Presence of related industry	0	0	0	0	X	0	0	0
G. Other	0	0	0	0	0	X	0	0
IV. Development Costs								
How were development costs financed?								
A. Private capital	no	no	yes	no	yes	yes	no	no
B. University	no	yes	no	yes	no	yes	yes	yes
C. Local government	no	yes	no	no	no	yes	no	yes
D. State government	no	yes	no	no	no	yes	no	no
E. Revenue bonds	no	no	no	yes	no	no	no	no
F. Corporate donation	yes	no	no	no	no	no	no	no
V. Leasing Arrangements								
A. Do you lease land and permit tenant finance and construction of facility?	yes	yes	no	yes	no	no	yes	yes
1. Percent tenants who rent	N/A	80	N/A	97	N/A	N/A	100	100
2. Average rent per acre	-	7,500	N/A	2,000	N/A	N/A	-	varies
3. length of lease (years)	-	50	N/A	50	N/A	N/A	51	25
B. Do you finance and construct facility and then lease it to tenant?	no	no	yes	no	yes	no	no	yes
1. Average rent per sq. ft.	N/A	N/A	varies	N/A	10	N/A	N/A	varies
2. Length of lease (years)	N/A	N/A	10-20	N/A	10	N/A	N/A	25
C. Do you own and operate facilities in which space is leased?	yes	no	yes	no	yes	no	no	yes
1. Percent tenants using this arrangement	3	N/A	20	N/A	60	N/A	N/A	75
2. Average rent per sq. ft.	-	N/A	$5	N/A	$6	N/A	N/A	$5
3. Length of lease (years)	5	N/A	2	N/A	10	N/A	N/A	3
VI. Sales Arrangements								
A. Do you sell acreage?	yes	no	yes	yes	no	yes	no	no
B. Average price per acre	$25,000	N/A	$25,000	$40,000+	N/A	$15,000	N/A	N/A
C. Percent of tenants who buy	-	N/A	80	3	N/A	7	N/A	N/A
D. Most expensive acreage	$20,000	N/A	$30,000	$200,000	N/A	$5,000	$350,000	N/A
E. Least expensive acreage	-	N/A	-	$100,000	N/A	$5,000	$260,000	N/A
VII. Site Development								
A. Number of acres per tenant	16	4.5	3.5	10	N/A	20	5.5	3
B. Largest tract occupied	500	20	-	70	N/A	31.5	100	3
C. Smallest tract occupied	8	.2	1	5	N/A	4.5	1	1
D. Land to building ratio	6:1	5:1	4:1	4.5:1	N/A	-	4:1	-
VIII. Park Management								
A. What part do tenants play in park management?								
1. None	no	no	yes	no	yes	yes	no	no
2. Tenants Association	yes	no	no	no	no	no	no	no
3. Informal meetings w/mgmt.	no	yes	no	yes	no	no	yes	yes
B. Does management provide support services?								
1. Janitorial service	no	no	yes	no	yes	no	no	yes
2. Security	no	no	-	-	yes	no	no	yes
3. Onsite transportation	no	no	-	-	N/A	no	no	no
4. Landscape maintenance	no	no	-	yes	yes	no	no	yes

Key: - = no response
N/A = not applicable

*Source: The data presented herein were obtained from a Progress Report (March 1981) to the U.S. Department of Commerce, Economic Development Administration, by the Orange County Research and Development Authority, Orlando, Florida, in fulfillment of its requirements for receipt of a technical assistance grant.


THE ARKANSAS SCIENCE AND TECHNOLOGY CORRIDOR
Russellville
Searcy
Morrilton
Conway
Jacksonville
N. Little Rock
Little Rock
Hot Springs
Benton
Malvern
Shendan
Pine Bluff
Arkadelphia
Camden
Fordyce
Warren
Monticello
Stuttgart
England
Lonoke
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GARLAND
SALINE
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GRANT
JEFFERSON
ARKANSAS
DALLAS
CLEVELAND
LINCOLN
BRADLEY
CALHOUN
OUACHITA
DESHA
PRAIRIE
LONOKE
WHITE
Dermott
APPENDIX G

APPENDIX G

The Arkansas Science and Technology Corridor

DEVELOPMENT ADVANTAGES

* Proximity to and potential for interaction with other research oriented groups and logic based industry -

  The National Center for Toxicological Research, University of Arkansas for Medical Sciences, University of Arkansas at Little Rock and University of Arkansas at Pine Bluff are but minutes away.

  Other colleges and universities such as Hendrix, University of Central Arkansas and University of Arkansas at Monticello are nearby. The ASTEC is centrally located with respect to two major institutions, the University of Arkansas at Fayetteville and Arkansas State University at Jonesboro.

  Numerous important manufacturing firms with research activities are in or near the ASTEC.

* Versatile and dependable work force with great pride in workmanship -

  Twenty-three percent of the state's population, some 538,000 persons reside in the ASTEC area which consists of the Little Rock and Pine Bluff metropolitan areas and adjoining counties.

* Labor - management harmony -

  A strong working relationship exists between management and labor in Arkansas who work together to solve mutual problems rather than creating counterproductive situations.

* Educational opportunities -

  The ASTEC area has good schools - from pre-school to medical school, vocational or technical, higher learning or special purpose - with most having accreditation by The North Central Association of Secondary Schools and Colleges.

* A moderate cost of living -

  Good living as part of the dynamic sunbelt. Costs for land, housing, health care, services and transportation are below those found in other comparable areas.

* A variety of housing in beautiful metropolitan or rural settings -

  Easy living with no traffic jams, smog or staggering crime rates normally associated with larger urban areas.

* Excellent health care facilities and services -
  Major hospitals, regional hospitals, a major pediatric hospital, medical and nursing schools, clinics, physicians and specialists provide a full range of care including open heart surgery.

* A natural environment conducive to enhancing creativity for scientists -
  Pleasant wooded rolling hills, fertile delt farmland, great rivers and lakes and scenic mountains make Arkansas' geography diverse.

* Pleasant year-round climate with four identifiable seasons -
  Short winters, beautiful springs, flower-filled summers and colorful autumns. An average annual temperature of 63.5°.

* A variety of cultural activities -
  A calendar of events for the ASTEC area include symphony, opera, theatre, ballet, fine arts and children's theatre.

* Tolerance of religious expression -
  Virtually every principal religion found in the United States is represented in the ASTEC area.

* Easy access -
  The ASTEC is convenient to Little Rock's major air terminal and to Interstate 30 and Interstate 40 via U.S. 65 constructed to interstate standards. Executive jet airport is located at Pine Bluff.

* Pro-business climate -
  Among this nation's 48 contiguous states, Arkansas' business climate was ranked sixth best in a recent study conducted by Alexander Grant & Company, an international firm of certified public accountants.

* Year-round recreation -
  Moderate temperatures throughout most of the year make it possible for residents to spend much of their leisure time outdoors - hunting, fishing, swimming, hiking, canoeing, playing tennis or ball, or just watching. Indoors or outdoors, recreation is plentiful in the ASTEC, or nearby.

* Entertainment -
  Fine restaurants, parks, zoos, night life, amusements, festivals, Arkansas Razorback football and basketball are among the activities available for leisure-time entertainment.

GOVERNMENT FACILITIES AND SERVICES

WITH RESEARCH CAPABILITIES

Many state and federal agencies reside within, or are adjacent to, the ASTEC area. Prominent among these are The National Center for Toxicological Research, the Pine Bluff Arsenal and the Veterans Administration Medical Center at Little Rock.

The National Center for Toxicological Research.

Established in 1971, the NCTR's purpose is to expand scientific knowledge in all areas of toxicology through basic research and problem solving as needed by government and industry in order to better protect public health.

With some 100 highly-trained scientists and a staff of 500, the NCTR offers:

- scientific expertise in all areas of toxicology, producing high quality basic research on the adverse health effects of economically or socially important substances;

- laboratories equipped with the most sophisticated equipment including Nuclear Magnetic Resonance Spectrometers, Inductively Coupled Argon Plasma Emission Spectrometer, Mass, Infrared, Ultraviolet, Visible and Atomic Absorption Spectrometers, Scanning and Transmission Electron Microscopes, and other state-of-the-art instrumentation;

- a cooperative education program with the University of Arkansas System leading to Ph.D. degrees;

- international workshops on high interest subjects of major social and economic importance where industry, academia and government come together to attain consensus on the scientific facts on which regulatory decisions are based;

- complete on-site research library facility;

- a focal point for toxicological research and toxicity testing of products and chemicals for other government agencies which have a responsibility for protecting the health and well-being of the public;

- an unequaled toxicology and management information processing capability, utilized by several other government agencies and research centers, centered in an on-site 4341 IBM computer facility; and

- a visiting scientist program for collaborative research with internationally renowned scientists in the fields of toxicology and chemistry.

Pine Bluff Arsenal.

The Pine Bluff Arsenal is a 14,500-acre installation, located approximately six miles northwest of Pine Bluff and adjacent to The National Center for Toxicological Research. The primary missions of the Arsenal are to produce and store chemical and pyrotechnic munitions and protective equipment and to develop and prove out new and unique manufacturing processes and equipment utilizing state-of-the-art technology.

The Pine Bluff Arsenal represents a substantial repository of manufacturing technology and environmental pollution abatement expertise. The Arsenal's engineering and scientific staff of over 100 personnel is supplemented with various contractors engaged in the design, testing and fabrication of equipment for manufacturing and disposal of pyrotechnic and chemical munitions, and for environmental and ecological projects.

In addition to the Arsenal's procurement activities, other Army agencies such as the Armament Research and Development Command, the Corps of Engineers and the Toxic and Hazardous Materials Agency also support and contract for work at the Arsenal. During 1982, more than $20 million of research and development contracts were awarded by the Army for performance at the Pine Bluff Arsenal. These contracts do not include some $16-18 million of supply, service and construction contracts awarded by the Arsenal in 1982.

The Veterans Administration Medical Center.

The Veterans Administration Medical Center is currently undergoing a major rebuilding program. At North Little Rock, a 1,000-bed hospital of approximately 562,000 square feet, and costing over $46 million, will be available for occupancy in March 1983. Another new 500-bed facility is being constructed in Little Rock consisting of 760,000 square feet at a cost of some $74 million.

The major mission of the VA Medical Center is to provide medical care to veterans with service-connected injuries and to other eligible veterans in the State of Arkansas and surrounding states. In addition to its major mission, the VA Medical Center maintains a vigorous research program in Geriatrics, Pulmonary Physiology and other medically-related activities.

The governmental facilities discussed above and others located within the ASTEC area, with their specific technical or scientific research capabilities, follow.

FACILITIES	RESEARCH CAPABILITIES
Arkansas Geological Commission 3815 West Rossevelt Road Little Rock, Arkansas 72204 (telephone: 371-1646)	(Earth Sciences, Environmental Engineering, Paleontology)
Arkansas Dept. of Health 4815 West Markham Little Rock, Arkansas 72201 (telephone: 661-2000)	(Biological Sciences, Virology, Immunology, Ecology, Water Pollution Control, Hydraulics, Waste Water Treatment, Radiation Physics, Biochemistry)
Arkansas Dept. of Pollution Control & Ecology 8001 National Drive Little Rock, Arkansas 72209 (telephone: 562-7444)	(Testing of Environmental Parameters, Air, Water, Solid Waste, Hazardous Waste)
U.S. Geological Survey 700 West Capitol Little Rock, Arkansas 72201 (telephone: 378-6391)	(Geohydrology, Ecology, Aquatic Biology, Micro-biology, Hydraulic Analysis, Engineering Sciences)
Fish Farming Experimental Station U.S. Fish & Wildlife Service P.O. Box 860 Stuttgart, Arkansas 72160 (telephone: 673-8761)	(Nutrition and Feeds Development, Selective Breeding of Catfish, Parasites and Diseases of Warm Water Fish, Water Quality and Reuse)
U.S. Army, Pine Bluff Arsenal Pine Bluff, Arkansas 71611 (telephone: 541-3000)	(Mechanical & Industrial Engineering, Chemicals, Machine and Equipment Design, Pollution Abatement, Electronic and Pneumatic Instrumentation, Thermodynamics)
National Center for Toxicological Research Jefferson, Arkansas 72079 (telephone: 541-4517)	(Analytical, Clinical, Physiological, Biophysical and Organic Chemistry; Genetics; Systemetic and Developmental, Cell, Molecular, Metabolic and Regulatory Biology; Immunology; Neurotoxicology; Pathology; Microbiology; Hazardous Waste Research; Environmental and Mechanical Engineering)
Arkansas Highway and Transportation Department Materials & Research Division 9500 New Benton Highway Little Rock, Arkansas (telephone: 569-2367)	(Research and testing of construction materials and equipment; evaluation of new products; soil evaluations)

U.S. Department of Agriculture
Forest Services
Southern Forest Experimental
Station
Monticello, Arkansas
(telephone: 367-3464)

(Silvaculture, Herbicide Research, Experimental Growth and Yield Studies)

Veterans Administration
Medical Center
Research Service
300 E. Roosevelt Road
Little Rock, Arkansas 72206
(telephone: 372-8361)

(Biochemistry, Neurochemistry, Pharmacology, Internal Medicine, Medical Microbiology, Endocrinology, Cardiovascular, Molecular Biology, Biochemical Genetics, Clinical Mycology, Hematology, Oncology, Protein Chemistry, Virology, Radiation Biophysics, Psychophysiology, Biomedical Engineering, Pathology)

EDUCATIONAL INSTITUTIONS

A variety of institutions of higher learning and vocational education are situated within the ASTEC area. These universities and vocational-technical schools offer a variety of degree and certificate programs related to scientific endeavors. Research in the general fields of science and technology by these institutions, and relevant degree or certificate programs, are identified in this section. In addition, those degree and certificate programs that have been identified by NCTR and SACVE as potentially available at the NCTR are presented.

RESEARCH

INSTITUTION	RESEARCH AREAS
University of Arkansas At Little Rock	Water Pollution, Agricultural Chemistry, Clean Lakes, Wetlands, Solar Ponds, Marginal Aggregates
University of Arkansas For Medical Sciences	Anatomy, Biochemistry, Family and Community Medicine, Biometry, Medicine, Area Health Education, Microbiology and Immunology, Orthopedic Surgery, Pathology, Pediatrics, Pharmacology, Physiology/Biology
University of Arkansas At Pine Bluff	Agriculture, Aquaculture, Chemistry, Foods & Nutrition, Mathematics/Engineering, Plant Genetics, Robotics, Textile Chemistry, Trace Element Analysis and Wildlife Biology
University of Arkansas Graduate Institute of Technology	Biomedical Engineering, Aerosol Technology, Air Pollution, Process Control, Stress Measurement, Optical Science and Engineering, Vibration Measurement and Control, Laser Applications, Micro-Processors, Transducers, Instrumentation, Inhalation Toxicology

DEGREE OR CERTIFICATION

INSTITUTION	DEGREE PROGRAMS OR CERTIFICATIONS	
University of Arkansas At Little Rock	Graduate:	Chemistry
	Baccalaureate:	Biology, Chemistry, Computer Science, Engineering Technology, Environmental Health, Mathematics, Physics
	Associate:	Engineering, Engineering Technology
University of Arkansas For Medical Sciences	Graduate:	Anatomy, Biochemistry, Biometry, Interdisciplinary Toxicology, Microbiology, Pathology, Physiology, Pharmacology, Medicinal Chemistry, Pharmacognosy Communicative Disorders
	Baccalaureate:	Dental Hygiene, Medical Technology, Radiologic Technology
	Associate:	Biomedical Instrumentation Technology, Emergency Medical Technology, Respiratory Therapy, Surgical Technology
	Certificate:	Cytotechnology, Dental Hygiene, Emergency Medical Technology, Radiologic Technology, Surgical Technology, Dietetic Internship
University of Arkansas At Pine Bluff	Baccalaureate:	Biology, Agriculture, Animal Science, Chemistry, Computer Science, Industrial Arts, Mathematics
	Associate:	Industrial Technology
University of Arkansas Graduate Institute of Technology	Graduate:	Instrumental Sciences Engineering
Pines Vocational-Technical School	Certificate:	Electronics Technology, Heating and Air Conditioning, Industrial Electricity and Plant

		Maintenance, Machine Shop, Welding
Pulaski Vocational-Technical School	Certificate:	Data Processing, Electro-Mechanical, Heating & Air Conditioning, Industrial Maintenance, Machine Shop, Sheet Metal, Tool & Die, Welding, Industrial Instrumentation
The National Center For Toxicological Research	Graduate:	Analytical Chemistry, Toxicology, Computer Science, Biometry, Molecular Biology/Genetics, Inorganic/Organic Chemistry, Environmental Engineering, Instrumentation
	Baccalaureate:	Computer Programmers, Para-pathologists, Laboratory Technicians in Immunology/Clinical Chemistry/Physical Science/Microbiology/ Developmental Technologist
	Associate:	Engineering Technicians, Histology Technicians, Animal Husbandry Technicians, Electronic Instrumentation
	Trades and Crafts:	AC/Refrigeration/Heating, Metal Fabrication, Welding-Stainless Steel, Welding-Non-ferrous Metal, Instrument Repair, Machine Shop

EXPENDITURES FOR RESEARCH

GOVERNMENTAL

Expenditures for research by state and federal governments within Arkansas are significant but clustered within a small geographical area of the state. Expenditures by the federal research operations represent over 90% of governmental research funds within the State of Arkansas with approximately 97% of those dollars being controlled by the National Center for Toxicological Research and its adjacent sister facility, the Pine Bluff Arsenal - Department of the Army.

Expenditures for Research
Fiscal Year 1981-1982
State and Federal

Institution	Dollar Value
State	
Arkansas Geological Commission	$ 615,000
Arkansas Dept. of Health	-
Arkansas Dept. Pollution Control	3,663,578
Arkansas Highway & Transp. Dept.	490,000
Federal	
U.S. Fish Farm Experimental Station	511,000
U.S. Army, Pine Bluff Arsenal	20,000,000
National Center for Toxicological Res.	25,895,000 *
V. A. Medical Center	1,200,000
U.S.D.A. Forest Service	80,000

* Includes research reimbursible agreements with USDA, DOD, USEPA, CPSC, NIH, NTP, NIOSH and various other federal agencies.

EXPENDITURES FOR RESEARCH

EDUCATIONAL

Expenditures for research by Arkansas public institutions of higher learning as identified by the Arkansas Department of Higher Education in its report "General Revenue Recommendations For Arkansas Higher Education, 1983-1985 Biennium", are presented below. Total research activity at various institutions may be understated because dollar amounts may not account for amounts received (but not yet expended) through various types of grants or through multiple-year federal obligations.

Approximately thirty-five percent of expenditures for research by Arkansas public institutions of higher learning (excluding the Agricultural Experiment Station at Fayetteville) are expended by institutions situated in or adjacent to the ASTEC.

Expenditures for Research
Fiscal Year 1981-1982
Arkansas Public Institutions of Higher Education

Institution	Educational and General Funds* Unrestricted	Restricted	Total
ASU	$ 87,713	$ 296,769	$ 384,482
ASU-B	-	96,187	96,187
ATU	800	51,365	52,165
HSU	8,546	24,024	32,570
SAU	1,338	2,200	3,538
SAU-TB	-	53,427	53,427
UAF	2,493,913	7,932,151	10,426,064
UALR	6,181	431,402	437,583
UAMS	7,008	3,059,729	3,066,737
UAM	-	6,343	6,343
UAPB	-	838,702	838,702
UCA	5,949	55,034	60,983
Other Known University Affiliated Programs			
Agri. Experiment St.	11,130,110	7,139,244	18,269,354
Cooperative Extension Svce		12,386	12,386
GIT	231,955	236,618	468,573
IREC	372,601	1,406,043	1,778,644
Archeological Survey	532,161	594,575	1,126,736

* Unrestricted funds are from tuition and state general revenue.
Restricted funds represent grants from federal, state or foundations.

EXISTING RESEARCH AND TESTING LABORABORIES

Preliminary investigation reveals numerous analytical, bacteriological, clinical, medical, pathological, research and development and testing laboratories now operating within the ASTEC area. Scientific expertise, where known, is identified in parentheses.

TYPE AND NAME	SCIENTIFIC EXPERTISE
ANALYTICAL LABORATORIES	
American Interplex Corporation 3400 Asher Avenue Little Rock, Arkansas 72204 (telephone: 664-5060)	(Metallurgy, Microbiology, Chemistry, Pollution)
Escomlab 801 North Street Little Rock, Arkansas 72201 (telephone: 378-7808)	(Domestic, industrial, and waste water sampling analysis & Process Design)
Environmental Services Co., Inc. 4021 West Capitol Rock, Arkansas 72205 (telephone: 666-7191)	(Plant Surveys, Water & Air Analysis, Product Analysis, Spectroscopy, Little Chromatography)
Holman-Pyle Co., Inc. 5616 Patterson Rd. Little Rock, Arkansas 72204 (telephone: 568-1354)	(Full Service, Independent Laboratory)
Intox Laboratories, Inc. Barber St. Little Rock, Arkansas 72201 (telephone: 374-1296)	(Hazardous Waste Analysis, Chemical 914 Analysis, Microbiology, Mutagenesis, Toxicological Assessment, Pathology Services, Photomicrography) Note: Intox Laboratories has a new Eight million dollar research and testing facility under construction at Redfield, Arkansas, which is projected to employ more than two hundred persons.

Sorrells Research Associates, Inc. (Chemistry, Ecology)
8002 Stanton Road
Little Rock, Arkansas 72209
(telephone: 562-8139)

Woodson-Tenent Laboratories (Agricultural Laboratory)
1805 E. 5th St.
North Little Rock, Arkansas 72114

BACTERIOLOGICAL LABORATORIES

American Interplex Corporation (Food Testing,- Veterinary Diagnostics, Forensic Microbiology)
3400 Asher Ave.
Little Rock, Arkansas 72204
(telephone: 664-5060)

CLINICAL LABORATORIES

Clinical Laboratory - Div. of National Health Laboratories
1221 Westpark Dr.
Little Rock, Arkansas 72205
(telephone: 666-0381)

International Clinical Laboratories, Inc.
500 S. University Ave.
Little Rock, Arkansas 72205
(telephone: 661-9706)

Southwest Medical Laboratories, Inc.
610 Rock St.
Little Rock, Arkansas 72201
(telephone: 225-7819)

MEDICAL LABORATORIES

Biomedical Reference Laboratories, Inc.
2020 West 3rd
Little Rock, Arkansas 72205
(telephone: 376-7291)

Clinical Laboratory - Div. of National Health Labs
1221 Westpark Dr. (and Doctors Bldg., 500 S. University)
Little Rock, Arkansas 72205
(telephone: 666-0381 and 664-3043)

The Diagnostic Center
11215 Hermitage Rd.
Little Rock, Arkansas

International Clinical
Laboratories, Inc. (See Clinical Laboratories)

Laboratories Procedures - South (Subs. of the Upjohn Co.)
5018 Club Road
Little Rock, Arkansas 72205
(telephone: 664-6264)

Little Rock Diagnostic Clinic PA
10001 Lile Drive
Little Rock, Arkansas 72205
(telephone: 227-8000)

Nichols Institute Regional Office
#2 Financial Center
Little Rock, Arkansas 72211
(telephone: 225-6942)

North Little Rock Medical Laboratory
200 Fendley Dr.
North Little Rock, Arkansas 72114
(telephone: 753-5245)

Southwest Medical Laboratories (See Clinical Laboratories)

PATHOLOGICAL LABORATORIES

Pathology Associates PA
One St. Vincent Circle
Little Rock, Arkansas 72205
(telephone: 663-4116)

Pathology Laboratories of Arkansas, PA
Suite 1120
Medical Towers Building
Little Rock, Arkansas 72205
(telephone: 225-7711)

RESEARCH & DEVELOPMENT LABORATORIES

American Interplex Corporation (See Analytical and Bacteriological Laboratories)

Sorrells Research Associates, Inc. (See Analytical Laboratories)
8002 Stanton Road
Little Rock, Arkansas 72209
(telephone: 562-8139)

TESTING LABORATORIES

American Interplex Corp. (Gov't testing, GSA, Military, Coal & Fuel, etc.)
(See Analytical and Bacteriological Laboratories)

Anderson Engineering & Testing Co.
676 West Rockwood Road
Little Rock, Arkansas 72204
(telephone: 455-4545)

Arkansas Seed Laboratory, Inc.
13008 West Markham
Little Rock, Arkansas 72205
(telephone: 376-9754)

Davis X-Ray Laboratories
13008 West Markham
Little Rock, Arkansas 72205
(telephone: 225-1384)

Developers International Services, Inc.
805 West 29th
North Little Rock, Arkansas 72114
(telephone: 372-2519)
(Geotechnical, Materials, Soils, Chemicals)

DISC Arkansas
(See above listing - Developers Int'l Services, Inc.)

Escomlab
(See Analytical Laboratories)

Environmental Services Co.
(See Analytical Laboratories)

Geomechanics Laboratories, Inc.
Wallace Building
Little Rock, Arkansas 72201
(telephone: 378-0606)

Holman-Pyle Co., Inc.
(See Analytical Laboratories)

Magnaflux Quality Services
700 E. 4th St.
North Little Rock, Arkansas 72114
(telephone: 374-6447)
(Nondestructive Testing, Lab and Field)

McClellan Engineers, Inc.
10501 Stagecoach Road
P.O. Box 5239
Little Rock, Arkansas 72115
(telephone: 455-2536)
(Soil, Concrete, Asphalt, Structural Steel)

Sorrells Research Associates, Inc.
(See Analytical Laboratories)

Southwestern Laboratories, Inc.
4515 West 61st St.
Little Rock, Arkansas 72209
(telephone: 562-8354)

Woodson-Tenent Laboratories
(See Analytical Laboratories)

MANUFACTURING FIRMS AND ORGANIZATIONS
WITH RESEARCH CAPABILITY

Numerous firms in, or immediately adjacent to, the ASTEC are engaged in research activities in connection with new product design development, testing and production -- including development of manufacturing processes and equipment. Firms identified through recent preliminary surveys are included, with their areas of research in parentheses.

NAME	RESEARCH
PRIVATE FIRMS - MANUFACTURING	
AGL Corporation P.O. Box 189 Jacksonville, Arkansas 72076 (telephone: 782-4433)	(Applied & Development Research in Low Power Laser Systems)
Aluminum Co. of America P.O. Box 300 Bauxite, Arkansas 72011 (telephone: 778-3644)	(Chemical and Mechanical Engineering, Combustion Engineering, & Solid State Electronics)
Ameron-Enmar Finishes Division P.O. Box 9610 Little Rock, Arkansas 72119 (telephone: 455-4500)	(Organic, Inorganic, & Physical Chemistry)
A. O. Smith-Inland Corp. 2700 West 65th St. Little Rock, Arkansas 72116 (telephone: 568-4010)	(Environmental Sciences, Toxicology, Physical Sciences)
BEI Electronics, Inc. 1101 McAlmont St. Little Rock, Arkansas 72202 (New facility under construction in Maumelle New City) (telephone: 372-7351)	(Missle Guidance Systems, Electrical & Optical Systems, Digital Logic, Little Electromagnetics, & other engineering sciences)
Ben Pearson Mfg. Co. P.O. Box 6516 Pine Bluff, Arkansas 71611 (telephone: 534-6411)	(Manufacturing, Mechanical, Hydraulic and Electronics Engineering and Testing)

Central Moloney
P.O. Box 6608
Pine Bluff, Arkansas 71611
(telephone: 534-5332)

(Electrical Insulations, Conductivity, Magnetics and Corrosion Research and Development)

Central Moloney Components
5500 Jefferson Parkway
Pine Bluff, Arkansas 71602
(telephone: 247-5320)

(Research and Testing of Thermoset and Thermoplastic Materials and Processes)

International Paper Company
P.O. Box 7069
Pine Bluff, Arkansas 71611
(telephone: 541-5600)

(Chemical, Mechanical, Process and Environmental Sciences Engineering)

Orbit Valve Co.
P.O. Box 9070
Little Rock, Arkansas 72209
(telephone: 568-6000)

(Mechanical Engineering)

Reynolds Metals Co.
P.O. Box 97
Bauxite, Arkansas 72011
(telephone: 557-5421)

(Chemical Engineering, Hazardous materials)

Valmac Industries, Inc.
P.O. Box 5040
Pine Bluff, AR 71611
(telephone: .536-4864)

(Poultry Nutrition, Drug Usage and Disease Prevention, Field Testing and Applied Research in Animal Genetics)

Weyerhaeuser Company, Inc.
P.O. Box 7857
Pine Bluff, Arkansas 71611
(telephone: 541-5000)

(Manufacturing and New Product Development & Evaluation, Process Sampling, and Environmental Testing)

PRIVATE FIRMS - NON-MANUFACTURING (SERVICE OR CONSULTING INSTITUTIONS)

Oakleaf Institute
510 East 8th St.
Little Rock, Arkansas 72202
(telephone: 372-3779)

(Natural Systems)

Systematics, Inc.
4001 Rodney Parham Road
Little Rock, AR 72212
(telephone: 223-5110)

(Computer service and soft ware programs for financial institutions)

SITES

Potential sites for a science and technology park of 2,000 or more acres, in the ASTEC area and in close proximity to The National Center for Toxicological Research, offer combinations of the following characteristics:

Load Bearing — Soil characteristics in the general area are considered satisfactory for medium to heavy type industrial construction.

Property Tax

	1982 Tax Rate/100	Assessment Ratio	Effective Tax Rate/$100
County	$ .90	20%	$ .18
School District #27	5.10	20%	1.02
	$6.00		$1.20

Terrain — Substantial wooded areas of gently rolling land to steep inclines. Potential for river frontage and/or lake sites.

TRANSPORTATION

Air — Little Rock Municipal Airport-30 miles (American, Continental, Delta, Frontier, TWA and commuter airlines)
Grider Field, Pine Bluff's executive jet airport-24 miles.

Highway — U.S. 65 constructed to interstate standards bisects area. Access to I 30 and I 40, plus other federal and state highways.

Rail — Missouri Pacific

River — Port of Little Rock and Port of Pine Bluff on Arkansas River Navigation System - public terminal services available.

UTILITIES

Electric — Arkansas Power and Light Company
13 KV circuit along Arkansas 365
115,000 volt transmission line bisects area

Natural Gas — Arkansas Louisiana Gas Company
12" transmission line with 300 psi between and paralleling U.S. 65 and Arkansas 365

Water — Surface and ground water are abundant in the area. High quality ground water may be obtained from wells with a depth of approximately 1,000 feet.

Sewer — None at present

ZONING — None, but county governing bodies in Arkansas are empowered to adopt such codes. Protective covenants can also be by deed.

APPENDIX H

STATE OF ARKANSAS

OFFICE OF THE ATTORNEY GENERAL

JUSTICE BUILDING, LITTLE ROCK 72201

STEVE CLARK
ATTORNEY GENERAL

(501) 371-2007

OPINION NO. 82-177

December 7, 1982

The Honorable Ray Thornton, President
Arkansas State University
P. O. Box 2169
State University, Arkansas 72467

Re: The Creation of a Public Authority in Arkansas

Dear Mr. Thornton:

On November 16, 1982, you submitted the following inquiry:

> Can the State of Arkansas create a public authority, having the power to borrow money secured by tax-exempt bonds to help attract educational and scientific research facilities involving modern technology?

Although it would take the passage of a complete statutory scheme, such an authority could be established under Arkansas law. The Constitution of Arkansas is a restriction upon the otherwise supreme power of the Legislature, not a grant of power. McArthur v. Smallwood, 225 Ark. 328, 281 S.W.2d 428 (1955). Since there is no such restriction in this instance, the Legislature has the power to create such an authority.

In addition, the Legislature could give this public authority the power to issue bonds. However, care must be taken to keep from violating the State Constitution. Article 16, §1 prohibits the State from lending its credit for any purpose whatsoever. If the bonds constitute an indebtedness for which the full faith and credit of the State, or any of its revenues are pledged, then such provision would be constitutionally invalid. Any problem in this area can be avoided by expressly stating in the legislation that the bonds to be issued are not obligations of the State but shall be solely and exclusively the obligation of the authority in its corporate and representative capacity. Language such as this has removed this type of financing from the Constitutional questions of Article 16, §1. Brown v. Arkansas Centennial Commission, 194 Ark. 479, 107 S.W.2d 537 (1937) and McArthur v. Smallwood, supra. Care should be taken in drafting the language authorizing the bond to determine how the bonds are to be retired. Amendment 20 to the State

Constitution authorizes the issuance of bonds by the State when approved by a majority vote of the electors. As stated above, one of the methods which has been used in the past to bring a bond issue out of this prohibition is to make it an obligation of the issuing agency. Many times, the issuing agency has relied on the revenues of the agency or of the improvements made possible by the issuance of the bonds to retire them. Such bonds have usually been found not to violate Amendment No. 20. However, in the latest case on the subject, Purvis v. Hubbell, 273 Ark. 330, 620 S.W.2d 282 (1981) the Supreme Court stated their intention to prospectively reconsider their past cases on the concept of revenue producing bonds which require no popular voter approval. In Purvis, the dissenting justices were concerned that general taxes of the State and issuing city would be used to pay the bonds. Although Purvis concerns bonds issued by a municipality, Amendment 49 of the Constitution prohibits the issuance of bonds by a municipality without voter approval, similar to Amendment 20. This is not to say that the created authority could not issue a type of revenue bond, but extreme care must be taken so that it cannot be construed that the full faith and credit of the state as opposed to the issuing authority is used to pay for the bond, in light of the Supreme Court's warning to take a closer look at such financing.

The Legislature has the power to exempt the bonds from State income taxation. Ward v. Bailey, 198 Ark. 27, 127 S.W.2d 272 (1939) and McArthur v. Smallwood, supra. This will have to be set out in the provisions creating the authority to issue bonds. Article 16 §5 of the Constitution of Arkansas states that all real and tangible personal property shall be subject to taxation and except for the exemptions in subsection (b) of §5 all other tax exemptions are forbidden, Art. 16, §6. In McArthur v. Smallwood, an attempt was made to exempt the bonds from all state, county and municipal taxes, including income and inheritance taxation. However, the Supreme Court held that insofar as property taxation is concerned, such a provision would violate Article 16, §§5 and 6 at least where the bonds are held by any person or agency whose property is not otherwise exempt from taxation. However, the exemption from State income and inheritance tax was valid since it was not a tax on property.

Whether the bonds would be free from Federal income taxation raises another issue. 26 U.S.C. §103(a) states the general rule that interest on the obligations of a State or any of its political subdivisions is not included in gross

income for the computation of Federal income tax. However, subsection(c) states that the general rule does not apply to industrial development bonds. Industrial development bonds are defined as any obligation, ". . . (A) which is issued as part of an issue all or a major portion of the proceeds of which are to be used directly or indirectly in any trade or business carried on by any person who is not an exempt person . . . and (B) the payment of the principal or interest on which (under the terms of such obligation or any underlying arrangment) is, in whole or in major part - (i) secured by any interest and property used or to be used in a trade or business or in payment in respect of such property, or (ii) to be derived from payments in respect of property, or borrowed money, used or to be used in a trade or business." For purposes of the above subsection, an exempt person includes a governmental unit, and corporations, funds or foundations, organized and operated exclusively for religious, charitable, scientific, testing, for public safety, literary, or educational purposes and no part of the net earnings benefits any private shareholder or individual. There is also an exemption for small issues of industrial development bonds where the face amount is less than one million dollars or ten million in certain limited cases. Therefore, if these bonds would come within the definition of an industrial development bond, interest would be taxable by the federal government.

The above opinion was prepared in light of your general inquiry. However, other issues may arise which cannot be anticipated until there is a review of the final legislative scheme. However, such a public authority can be created and tax free bonds issued in certain circumstances.

The foregoing opinion, which I hereby approve, was prepared by Assistant Attorney General Curtis L. Nebben.

Sincerely,

STEVE CLARK
Attorney General

SC/CN/pa

APPENDIX I
OVERVIEW OF THE NEW YORK PORT AUTHORITY

The New York Port Authority, now the Port Authority of New York and New Jersey, was modeled after the Port Authority of London, created in 1909 to develop shipping on the Thames Estuary through the sale of its own bonds and without cost to the English people. Largely due to the work of Governors Alfred E. Smith of New York and Walter E. Edge of New Jersey, the New York (New Jersey) Port Authority was established in 1921. It was the first such institution in the United States and came about as a result of the people of New York and New Jersey overcoming their parochialism and their determination to work together in the development of transportation in the area.

In an honest effort to overcome their self-interests, the legislatures of New York and New Jersey adopted the concept of a public authority, which can be defined as a government business corporation set up outside the normal structure of traditional government to give continuity, business efficiency and elastic management to the operation of self-supporting or revenue-producing enterprises.

The legislation passed in 1921 by both the New York and New Jersey legislatures gave the newly created New York Port Authority a lofty purpose --"to handle planning and development relative tc transportation in the area"--but no funds beyond a small administrative grant from the two states and no credit base upon which to borrow. While the Port Authority had the power to sell bonds, it was not successful in doing so until the legislatures of both states advanced 25 percent of the cost as loans with a junior claim on revenues. The Authority was thereby able

to sell revenue bonds against its first structure. Since that time, the Authority has always been able to finance its new projects on private money markets.

Over the years the Port Authority of New York and New Jersey has spent great sums of money on construction, as well as conducting studies of airports, waterways, docks and mass transportation. The Authority also has opened offices in Cleveland, Chicago, and Washington, D.C. to promote business in the New York port area.

Since its beginning, the Port Authority has been nonpolitical. Its employees are not civil servants. It is not financed with tax money, but by the sale of its own bonds, covered by its own revenues. Because the Port Authority seldom asks the legislatures for money, it normally gets favorable action on its non-monetary requests.

Specific Powers, Responsibilities, Characteristics and Structure

According to Title 17 of the Unconsolidated Law of New York Section 6405: "The port authority shall consist of twelve commissioners... [selected]...in the manner and for the terms fixed and determined...by the legislature....Each commissioner may be removed or suspended from office as provided by...law...."

The Port Authority, composed of six commissioners from New York and six from New Jersey, has many statutory powers. Probably the major power-granting statute is Section 6407 which states in part:

> The port authority...[has the]...full power and authority to purchase, construct, leave and/or operate any...transportation facility within said district; and to make charges for the use thereof; and such purposes to

> own, hold, lease and/or operate real or personal property, to borrow money and secure the same by bonds or by mortgages upon any property held or to be held by it.

Section 6407 is by no means the only power-granting section; Section 6459 gives the Authority "all necessary and appropriate powers [to reach its objective] not inconsistent with the constitution of the United States or of either state...except the power to levy taxes or assessments." The Authority is also prohibited from pledging the credit of either state (Section 6408). Furthermore, the Authority has been granted the power to make enforceable rules and regulations consistent with its charge (Section 6419). The power also has been granted to conduct investigations and hearings (Section 6462) and to make witnesses appear at those proceedings (Section 6463).

Significantly the Authority has been granted the power to acquire land by the exercise of the right of eminent domain (Section 6516), and to dispose of land (Section 6951). The Authority also has the power to enter upon land in connection with its mission (Section 6518). In connection with property acquired by the Authority, the legislatures have determined that no state taxes will be due (Section 6635).

All bonds or other securities issued by the Authority shall be free from state tax (Section 6459).

The qualifications and duties of employees of the Authority are to be determined by the Commissioners (Section 6415).

There can be no question that the Port Authority of New York and New Jersey has many powers; it also has some obligations. It must "...make an annual report to the legislatures of both states, setting forth in

detail the operations and transactions conducted by it..." (Section 6408). In addition to this yearly report the Authority's books are open to the state. This is spelled out in Section 7071 wherein it states in part:

> [T]he comptroller of the State of New York and the comptroller of the State of New Jersey... are hereby authorized and empowered...to examine the accounts and books of the...authority, including their receipts, disbursements, contracts leases, sinking fund, investments and such other items referring to their financial standing... as...comptroller may deem proper.

After such examination is made, the results are to be sent to the governors of the respective states (Section 7072).

A right that has been exercised only a handful of times during the life of the authority is the power of either governor to veto action voted upon by the commissioners (Section 7151).

Lastly, the law requires that the Port Authority file with each state (New York and New Jersey) legislature a copy of the minutes of any action taken at a Port Authority meeting. Ten days after the minutes are filed with the legislatures, they may be sent to the governors.

APPENDIX J

USE OF NCTR TO SUPPORT STATE EDUCATIONAL AND VOCATIONS PROGRAMS
(Recommendations from the Subcommittee
on Facilities and Resources)

To avoid the further dilution of our financial and manpower resources in training personnel to support scientific research and high technology, the Subcommittee on Facilities and Resources recommends that the state develop graduate and vocational programs at the National Center for Toxicological Research. Such programs would allow the State of Arkansas to utilize the quite substantial, state-of-the-art equipment at the center, thus circumventing one of the major obstacles facing the state --the tens of millions of dollars required for equipment and new construction to support high technology training and research.

Programs leading to a Masters or Ph.D. degree could be established at NCTR in Analytical Chemistry, Computer Science, Biometry, Molecular Biology, Genetics, Inorganic/Organic Chemistry, Environmental Engineering and Toxicology.

In addition to the above, vocational education programs may be offered for Computer Programming, Para-pathologists, Laboratory Technicians in Immunology, Clinical Chemistry, Physical Sciences, Microbiology, Cell Culture, Chemistry, Histology, Teratology, Animal Husbandry and Biomedical Instrumentation; and for various trades and crafts --AC/refrigeration/heating, metal fabrication, instrument repair and machine shop.

Staffing for such programs would be provided by the state with collaborative support from NCTR personnel. Special authorization for conducting research and educational programs, including assignment of staff to NCTR, has been granted in the current special language of the

Appropriation Acts for University of Arkansas-Fayetteville, University of Arkansas-Little Rock and University of Arkansas for Medical Sciences. It is anticipated that staff for vocational education will be recruited from current vocational programs.

Funds would be required from the State of Arkansas for dormitories, renovation of existing space for classrooms, staff salaries (excluding NCTR personnel), and for general administration of the various programs.

Major limitations to conducting research in many academic institutions are the lack of sufficient time to do research and inadequate facilities or equipment. NCTR has the physical facilities, instrumentation and often the funding to embark on major research efforts, but with certain research problems lacks sufficient expertise. It is recommended by the Subcommittee on Facilities and Resources that joint research programs be developed between NCTR scientists and Arkansas colleges and universities.

Many of these programs can be conducted in stages with portions of the work conducted at the academic institution and not requiring the physical presence of academic personnel at the NCTR. However, some may require on-site participation, and in these instances, time must be granted by the academic institutions away from administrative or teaching responsibilities. Such collaborative efforts would allow the college or university scientific personnel to actively participate in a major research effort that could not be accomplished at their respective institution and thereby enhance their standing in the scientific community. NCTR would benefit from the scientific and technical input from the academicians and deliver a completed project to a government agency, possibly resulting in future funding for other research projects.

NOTE: It has been further suggested by task force members that at least four technical training programs could be started immediately in concert with NCTR: one in biomedical, one in livestock nutrition or agriculture, one in environmental and one in industrial computer training. In addition, at least one advanced degree program should be set up immediately utilizing NCTR resources.