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GAO

Fact Sheet for the Honorable
Max Baucus, United States Senate

August 1987

FEDERAL RESEARCH PROJECTS

Concerns About DOE's Super Collider Site Selection Process

GAO/RCED-87-175FS

GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

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August 6, 1987

The Honorable Max Baucus
United States Senate

Dear Senator Baucus:

This fact sheet responds to your April 10, 1987, request concerning bidding requirements for the Department of Energy's (DOE's) proposed Superconducting Super Collider (SSC)--a high energy physics project. You asked us to review specific issues related to selecting a site for the SSC and for other major federal research facilities. In particular, you asked us to examine whether precedents exist for selecting sites for multimillion dollar research projects on the basis of competitive bidding, with states providing land and other incentives.

Related to this concern about the geographic location of projects, you asked whether federal research and development (R&D) funds are becoming more concentrated and whether federal agencies try to distribute their R&D funds among as many states and regions as possible.

In April 1987, DOE issued an invitation for site proposals for the SSC inviting states and others to provide land to the government on which to build and operate the SSC and seeking other contributions to defray the construction and operating cost. Proposals were due August 3, 1987. In May 1987, Senator Domenici offered an amendment to a 1987 supplemental appropriations bill, which was signed by the President on July 11, 1987, prohibiting DOE from expending funds to review the contributions other than land that a proposer might offer. DOE subsequently changed the due date for proposals to September 2, 1987.

We found one precedent for awarding major research projects using a competitive selection process based so heavily on proposer's offers of land and other incentives: Fermilab,

another DOE high energy physics award. A $244-million particle accelerator, Fermilab was located in a suburb of Chicago after the Atomic Energy Commission conducted a site selection competition in 1965. Unlike the SSC solicitation, however, Fermilab competitors were asked only to make land available, although the state of Illinois offered additional inducements, including a reduction in electrical power rates. (See section 1.)

We did find instances in DOE and in other agencies where those seeking federal research awards had to provide matching funds or other contributions. These differ from the current DOE solicitation, however, in two important ways. First, the other research projects were far smaller. Second, in those cases agencies were evaluating proposals primarily for scientific merit, rather than the nature or amount of proposed contributions of land, money, or other items of value. In the case of the SSC, the proposals will be evaluated solely on the merits of the land and the various resources available at each proposed site. The scientific merits of the SSC are not being evaluated since DOE has already decided that this project should be funded, and the design of the facility is DOE's responsibility.

In regard to geographic distribution of federal R&D funds, according to National Science Foundation (NSF) data, funds have not become more concentrated in a few states over the past 20 years. The concentration has remained steady over the period, with 10 states accounting for about 70 percent of all federal R&D funds; however, the states making up the top 10 have changed over the years. About 40 percent of the U.S. population resided in the top 10 states for 1985.

We also found that NSF has a dedicated program for increasing geographic distribution of its research funds, the National Institutes of Health considers geographic distribution when choosing peer reviewers, and approximately half of the Department of Agriculture's extramural research budget is allocated to states on a legislatively based formula. (See section 2.) Section 3 describes our objectives, scope, and methodology.

We are sending copies of this fact sheet to the Secretary of Energy and other interested parties. Copies will also be made available to others upon request. If you have any further questions or if we can be of further assistance, please contact me at (202) 275-1000.

Major contributors are listed in appendix II.

Sincerely yours,

Sarah P. Frazier

Sarah P. Frazier
Associate Director

Contents

ABBREVIATIONS

AEC	Atomic Energy Commission
ASCC	Advanced Scientific Computing Centers
CEBAF	Continuous Electron Beam Accelerator Facility
DOD	Department of Defense
DOE	Department of Energy
EERC	Earthquake Engineering Research Center
EPSCOR	Experimental Program to Stimulate Competitive Research
ERC	Engineering Research Center
GAO	General Accounting Office
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NIH	National Institutes of Health
NSF	National Science Foundation
R&D	research and development
SERI	Solar Energy Research Institute
SSC	Superconducting Super Collider
URI	University Research Initiative
USDA	Department of Agriculture

SECTION 1

A PRECEDENT FOR SELECTING RESEARCH SITES THROUGH A COMPETITIVE PROCESS

In April 1987 DOE issued an invitation for site proposals[1] for its proposed $4.375 billion Superconducting Super Collider (SSC), soliciting states and others to provide land to the U.S. government on or under which to build and operate the SSC. The invitation provides technical evaluation criteria and cost considerations that are to be used in evaluating the proposals. This section discusses the precedent for states and others to compete for major federal research projects by offering land and other incentives.

FERMILAB AND THE SSC

We found only one example to serve as a precedent for DOE's issuing a competitive invitation for siting the SSC--a DOE high energy physics facility, Fermi National Laboratory (Fermilab), in Batavia, Illinois. Fermilab is a 200-Bev (billion electron volt) accelerator completed in 1972 at a construction cost of $243.5 million and upgraded in 1985 to a 1-trillion electron volt accelerator using superconducting magnets at a construction cost of $184.6 million. The site selection process was similar to that for the proposed SSC in several respects.

Preproposal Design Concept

For both Fermilab and the SSC, designs were established before the site was determined. Fermilab was proposed in the mid-1960s. The basic design for it was established before the Atomic Energy Commission (AEC) issued the April 1965 press release soliciting siting proposals. The design of the proposed accelerator was contained in the press release. The design for the SSC was also established before DOE issued the invitation for site proposals and was part of the invitation package.

Site Criteria

Similar to Fermilab, technical criteria have been established for the SSC. The Fermilab release stated that the desirable site would (1) contain at least 3,000 acres owned by, or reasonably available to, the U.S. government; (2) have potential of delivering a firm electric power load of several hundred megawatts and a minimum of 2,000 gallons a minute of high quality water; (3) be reasonably close to a commercial and industrial center which includes research and development activities; (4) be reasonably

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[1]Invitation for Site Proposals for the Superconducting Super Collider (SSC), U.S. Department of Energy, Office of Energy Research, SSC Site Task Force, April 1987, DOE/ER-0315.

close to communities having adequate housing, cultural, and educational facilities for some 2,000 scientific and technical personnel and their families; and (5) be close to adequate surface transportation systems and a major airport with frequent service to major U.S. cities.

DOE's invitation for SSC site proposals contains similar technical criteria: (1) geology and tunneling, including suitability of the land for efficient and timely construction of the SSC's underground structures; (2) regional resources, including proximity and adequacy of community resources (housing, medical services, etc.) and major airports, railroads, and highways; (3) environment, including the significance of the environmental impact from the SSC; (4) setting, including ability of proposer to deliver defendable title for land and estates; (5) regional conditions, including presence of man-made disturbances and climatic conditions; and (6) utilities, including reliability of electric power and water and availability of waste disposal.

Cost Considerations

The two proposal solicitations differ in their treatment of costs. Although the Fermilab press release discussed trade-offs between technical and other factors in order that overall efficiencies and economies could be obtained, cost considerations were not explicitly mentioned. The release also did not explicitly ask for any financial or in-kind contributions, although those submitting proposals offered to arrange for power rate reductions and to pay for infrastructure improvements. Cost analyses were done only for the six finalist sites.

Cost considerations are explicitly mentioned in the SSC invitation for site proposals. The invitation states that cost considerations are important to the selection process and will be used in conjunction with the technical evaluation criteria in selecting the most desirable site and that primary emphasis will be placed on the technical evaluation criteria. In addition, the invitation states that proposals clearly itemize any financial and other incentives offered to defray the cost of construction and operation of the SSC and states that:

-- Substantial savings could be achieved through preferential treatment, such as reductions in utility rates, use and other taxes, and road maintenance costs.

-- For each proposal meeting the qualification criteria, a life cycle cost estimate will be prepared for the construction phase plus a 25-year operating phase. Any financial or in-kind contributions offered by the proposer, other than the cost of the land, will be considered, as appropriate, in the life cycle cost estimate.

According to DOE officials, total life cycle cost would be used in the evaluation process leading to selection of the final site. (See app. I for a more detailed comparison of Fermilab and SSC site selection criteria.)

In May 1987 Senator Domenici submitted an amendment to the proposed supplemental appropriations bill for fiscal year 1987 that stated:

> "None of the funds appropriated by this or any other Act to the Department of Energy shall be used by the Department to implement Section 2.2.2.2. of DOE/ER 0315 (financial and other incentives) in its review of Superconducting Super Collider proposals, in order to ensure that the Department of Energy bases its final decisions on where to site the facility solely on the overall suitability of the site."

The amendment prohibits DOE from expending funds to review that portion of SSC site proposals pertaining to financial and other incentives. It does not preclude offerors from including in their proposals promises of financial incentives or the use of their own resources to improve the suitability of any proposed site. The President signed the bill (Public Law 100-71) on July 11, 1987.

As a result of the appropriations bill amendment, DOE issued an amendment to the invitation for site proposals that deletes sections of the invitation which encourage proposers to offer financial incentives and states that such incentives will not be considered in the evaluation of proposals; that is, they will not be included in the life cycle cost estimate. Because the appropriations bill amendment does not prohibit DOE from considering a proposer's proposal for infrastructure improvements, such as land acquisition and rights of way, access roads, sewer systems, water transportation lines, and power transmission lines, DOE may consider proposals for the use of the proposer's resources to improve the suitability of the proposed site.

Review Panels

The Fermilab competition used and the SSC competition plans to use expert review panels. For Fermilab, a National Academy of Sciences (NAS) panel reviewed 85 proposals relating to 148 sites. AEC staff visited all 148 sites, and AEC commissioners visited the six finalist sites. For the SSC, DOE plans to have site proposals reviewed by a panel of experts from NAS and the National Academy of Engineering and plans to visit only the finalist sites on the best qualified list.

In summary, although the Fermilab invitation for site proposals was less detailed than that for the SSC, it is similar in that the design of the accelerator was completed before the site

was located, the invitations for site proposals requested that land be made available or be donated, and the site proposals were reviewed by a panel of experts. A major difference in the two invitations for proposals was that the SSC invitation explicitly stated that any financial or in-kind contributions offered, other than the cost of the land, would be considered in the life cycle cost estimate. However, because of the appropriations bill amendment, this difference has been eliminated.

MATCHING REQUIREMENTS

Because we found only one case as a precedent for DOE's selection procedures, we sought to determine what matching requirements agencies generally use for selecting major research centers and facilities.

Other DOE Facilities

Of the major DOE facilities established in the past 20 years, one other required a donation of land--the Solar Energy Research Institute (SERI). DOE established SERI in Golden, Colorado, in 1976. The center was competitively advertised, and the solicitation asked for 300 acres to be provided to the U.S. government with title and for personnel to operate the institute and carry out the research. Nineteen companies and 12 states, some in conjunction with one another, requested this facility. If the proposals met site requirements, they were then evaluated on management plans and key personnel qualifications. Colorado and Midwest Research Associates were the successful team. Colorado provided the land. Funding for the center has ranged from a high of $100 million to a low of $30 million per year.

Another facility that involved the donation of land was the Continuous Electron Beam Accelerator Facility (CEBAF) in Virginia. This was an unsolicited proposal and land donation was not required.[2] However, the city of Newport News donated a total of 300 acres as a site for the project.

In other cases, DOE has tried unsuccessfully to interest others in cost sharing. The Confinement Physics Research Facility, a nuclear fusion test center, was let out to bid in 1986, after a number of oil companies expressed considerable interest in the project. Instead, DOE received only one proposal from the private sector, which it considered inadequate, and accordingly proceeded alone to construct a facility at Los Alamos National Laboratory in New Mexico.

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[2]See Nuclear Science: DOE Should Provide More Control in Its Accelerator Selection Process (GAO/RCED-86-108, April 4, 1986) for more information on the procurement process used for CEBAF.

Other Agencies

Of the other five agencies examined, only NSF has required contributions when making research facility location decisions. NSF is increasingly looking for financial or in-kind commitments when awarding research facilities. Although the National Institutes of Health (NIH) had cost-sharing requirements, they have been discontinued.

National Science Foundation

Over the past 20 years, NSF has initiated several large research center projects involving cost sharing or matching requirements to some extent. However, the centers were awarded through the competitive award process and scientific merit was the most important criterion. Among the largest research center awards were for the Earthquake Engineering Research Center (EERC), the Advanced Scientific Computing Centers (ASCCs), and the Engineering Research Centers (ERCs):

-- The 1985 solicitation for the EERC contained a specific requirement for matching funds from state, industry, or other nonfederal source. The requirement was for up to $5 million per year for 5 years which NSF would match dollar for dollar.[3]

-- The solicitation for the ASCCs, which were established in 1985, included a statement that matching funds were a consideration. However, scientific impact was the most important evaluative criterion. The five universities that received awards provided about 40 percent in funds and equipment from state, industry, and institutional sources. The percentage of cost sharing was not stated in the solicitation. NSF was looking for the cost sharing when it evaluated the proposals. The centers receive an average of $9.5 million a year from NSF.

-- The ERCs grants, first awarded in 1985, stressed cooperation between universities and industry. The commitment of industry could be in money and/or personnel. In the solicitation for the first centers, the degree or type of industry involvement was not specified. Subsequent solicitations asked that anticipated industrial and institutional support be stated. No formulas or percentages of support were stated in the solicitation.

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[3]See National Science Foundation: Problems Found in Decision Process for Awarding Earthquake Center (GAO/RCED-87-146, June 24, 1987) for information on the center award process.

For other past NSF center projects, cost sharing was generally in the form of providing a building or faculty participation. For example, the universities provided buildings and/or faculty for the two Mathematics Research Institutes and the Institute for Theoretical Physics. These were established in the late 1970s through competitive solicitations. They each receive about $2 million a year.

For its federally funded research and development centers (FFRDCs), NSF set criteria for the site and purchased the land. For example, Kitt Peak National Observatory in Arizona was located there because of the requirements for excellent atmospheric observing conditions and lack of interference for optical astronomy observation. The National Radio Astronomy Lab was located in West Virginia because the Federal Communication Commission agreed to establish a no-radio interference area there.

National Institutes of Health

NIH directs research center funding toward institutions of higher education, hospitals, and commercial and nonprofit laboratories. Research center funding decisions are made through the peer review process; that is, proposals are reviewed by peer review panels and then by the national advisory committee. The Institute director makes the final award decision. The largest grants in the period 1970 to 1986 were in the $1 million to $3 million per-year range and are for core research center grants and for cancer and other specialized research centers, such as for primate research.

NIH has no matching requirements. Cost-sharing requirements ended in 1985. Previously, it was 3 to 5 percent of the grant and applied to all grants.

National Aeronautics and Space Administration

The National Aeronautics and Space Administration (NASA) established two major facilities during the 1960s--the Johnson Space Center in Houston, Texas, and the Kennedy Space Center at Cape Canaveral, Florida. The original appropriation for the Johnson Space Center was $60 million. According to a NASA official there was no formal competition for the center, NASA site criteria included the need for 1,000 acres, and land donation was not required. About 40 localities expressed interest in the center. Rice University donated 1,020 acres and NASA purchased 600 acres more. The location decision was made by the NASA Administrator. The decision to locate the Kennedy Space Center at its present site was limited by the few number of locations that are appropriate for launching rockets. NASA acquired about 82,000 acres and Florida dedicated about 56,000 acres to NASA's use. Not all the land is usable; some of it serves as a buffer zone. NASA does not reimburse Florida for the use of the land.

Generally, other NASA facilities were established on federal land, usually co-located with military bases. Three research centers--Ames, Lewis, and Langley--were established between 1910 and 1941 by the National Advisory Committee on Aeronautics, predecessor to NASA. Goddard Space Flight Center in Greenbelt, Maryland, was established in 1959 on land that was part of the Beltsville Agricultural Research Center.

Department of Defense

Department of Defense (DOD) research can be done at DOD laboratories or can be contracted out to universities or private firms.

DOD has set up no new laboratories in the past 20 years. In general, when DOD moves or establishes laboratories, military bases are the preferred location. For example, an Army research facility, Harry Diamond Laboratory, was established in the mid-1960s on a portion of a Navy base doing similar ordnance work. Another example is the Tri-Service High Energy Laser Systems Test Facility which was established as a tri-service (Army-Navy-Air Force) effort in 1978 at the Army base in White Sands, New Mexico. The Air Force has located all its research facilities on Air Force bases.

In another example, when Strategic Defense Initiative Organization officials were looking for a location for the national test facility, they examined a variety of locations. No proposals were solicited or matching contributions proposed or received. The final selection made in 1986 was Falcon Air Force Station near Colorado Springs, Colorado.

Branches of the Armed Forces use varying approaches to funding research centers. Officials of the Defense Advanced Research Projects Agency (DARPA) employ two criteria in examining research proposals: quality and cost. In evaluating cost, it examines the total amount a given project will cost the federal government. Any in-kind contributions are included in the calculations. On the other hand, to Navy and Air Force officials, the crucial consideration in funding research facilities is the quality of scientific personnel. Existing programs have required researchers to build ties to military laboratories but have not required any matching contributions. These officials foresee scientific talent remaining the paramount consideration.

DOD has set up a number of research centers in recent years. For example, through the University Research Initiative (URI) established in 1986, DOD made 86 awards to 70 institutions. Matching funds were not required. The 11 centers funded by the Army under the URI are typical of the Army's approach to matching contributions. The Army uses a detailed review process to evaluate the strengths and weaknesses of each proposal. While matching

contributions are not formally considered, they may predispose reviewers in a project's favor.

Department of Agriculture

The Congress has been the key actor in determining where the Department of Agriculture (USDA) has located its 137 research laboratories. Appropriations for both feasibility studies and laboratory construction specify where the laboratory will be built and what it will examine. According to USDA officials, while the agency may protest if the location is totally inappropriate or the facility would duplicate an existing laboratory, USDA generally follows the wishes of the Congress.

SUMMARY

Fermilab, established some 20 years ago, is the only example we found of a precedent for DOE's invitation for site proposals for the SSC. Research centers and facilities are usually located where the scientists proposing the research are located. Even in cases including matching funds or cost sharing, agencies are primarily looking for scientific merit. In contrast, the site for Fermilab was chosen and for the SSC is being chosen to fit a previously designed concept; site proposals stress the merits of the particular site as a location for the SSC. In other words, for most research and development, the location of the science is based on the scientists making the proposal and the scientific merit of the proposal; for the SSC, the basic decisions about scientific merits and design have already been made and the competition concerns geographic location and cost considerations only.

SECTION 2

GEOGRAPHIC DISTRIBUTION OF FEDERAL R&D FUNDS

This section discusses past and current level of geographic concentration of federal research and development funds, and efforts to distribute these funds among as many states and research centers as possible.

CONCENTRATION OF FEDERAL R&D FUNDS

Federal research funds in total are not becoming more geographically concentrated.[1] We examined NSF data by state on total federal research and development funds, including funds for R&D plant[2] over a 20-year period, from 1965 to 1985. The data showed that although the states included in the top 10 changed slightly over the years, the percentage of funds to the top 10 states has remained stable at about 70 percent. (See table 2.1.) To put the current concentration in some perspective, we also analyzed it in terms of general population and the number of scientists and engineers per state. For 1984 these top 10 states included about 40 percent of the population and about 50 percent of the employed scientists and engineers.

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[1]Our previous report, University Funding: Patterns of Distribution of Federal Research Funds to Universities (GAO/RCED-87-67BR, February 5, 1987), discusses the distribution of federal R&D funds to universities and colleges.

[2]R&D plant includes acquisition of, construction of, major repairs to, or alterations in structures, works, equipment, facilities, or land, for use in R&D activities at federal or nonfederal installations.

Table 2.1

Top 10 States[a] Receiving Federal Research and Development and R&D Plant Funds, Fiscal Years 1965, 1975, 1985

	1965	1975	1985
1.	California	California	California
2.	New York	Maryland	Maryland
3.	Maryland	Massachusetts	Massachusetts
4.	Texas	New York	New York
5.	Massachusetts	Florida	New Mexico
6.	Florida	Washington	Virginia
7.	Pennsylvania	Pennsylvania	District of Columbia
8.	New Mexico	Virginia	New Jersey
9.	New Jersey	Texas	Texas
10.	Alabama	New Mexico	Ohio

Percentage of total federal R&D to top 10 states

1965: 72% 1975: 70% 1985: 71%

[a]Includes the District of Columbia.

Source: NSF Federal Support for Research and Development.

Over the 20-year period, some regions and states have gained or lost percentage share of the funds. Using NSF's regional definitions, the data showed that New England, the West North Central, the South Atlantic, and the Mountain regions gained in percentage of total federal R&D funds. The Middle Atlantic, the East South Central, the West South Central, and the Pacific regions lost in percentage. The major shift was the Pacific region losing 7 points and the South Atlantic gaining 8 points. This shift is the result of California's reduced share of the total funds from 31 percent in 1965 to 23 percent in 1985. (See table 2.2.)

Table 2.2

Regional Percentage of Total Federal R&D and R&D Plant Funds, Fiscal Years 1965, 1975, and 1985

Region	Percentage of total			Percentage change,
	1965	1975	1985	1965-85
New England	6.7	8.7	9.5	2.8
Middle Atlantic	15.2	12.2	13.0	-2.2
East North Central	6.5	7.4	6.9	0.4
West North Central	2.8	3.0	3.7	0.9
South Atlantic	15.5	21.5	23.5	8.0
East South Central	5.0	4.1	3.6	-1.4
West South Central	8.0	4.6	3.9	-4.1
Mountain	7.2	7.2	10.1	2.9
Pacific	32.8	31.0	25.6	-7.2
Outlying Areas	0.2	0.2	0.1	-0.1
Offices Abroad	0.2	0.2	0.1	-0.1

Source: NSF.

AGENCY PROGRAMS FOR GEOGRAPHIC DISTRIBUTION OF FUNDS

As we stated in our recent report on the role of peer review in the NSF and NIH funding of university research,[3] we found several kinds of efforts within NIH and NSF to distribute research funds geographically. In the other four agencies, however, the geographic distribution of research dollars is addressed by a mandated formula or is negligable.

National Science Foundation

NSF's program called the Experimental Program to Stimulate Competitive Research (EPSCOR) makes awards competitively to planning committees within states that have received the least federal research support over a period of time. In the two rounds of awards that have been made, in 1980 and 1986, NSF has awarded 13 grants ranging from $2.4 million to $3 million each over a 5-year grant period, for a total of $36.9 million.[4] The goal of EPSCOR is to increase the ability of scientists and engineers in participating states to compete successfully for federal R&D funds by fostering long-term improvements in the research environments. NSF also addresses geographic distribution of awards through its regular research program by permitting the program officers to consider geographic distribution when recommending awards for funding. Figures are not available on what percentage of NSF's extramural research budget is affected in this manner.

National Institutes of Health

NIH has no separately budgeted programs to distribute awards on a geographic basis. It does, however, consider geographic distribution very carefully when choosing the peer reviewers who review research proposals. NIH also, for technical reasons, considers geography in some of its control and prevention initiatives, which may look at, for example, the relationship between specific regions and certain incidences of cancer. We do not have any figures that show what percentage of NIH's research budget is affected in any of the above ways.

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[3]University Funding: Information on the Role of Peer Review at NSF and NIH (GAO/RCED-87-87FS, March 26, 1987).

[4]The states receiving these awards are Arkansas, Maine, Montana, South Carolina, West Virginia (1980 awards); Alabama, Kentucky, Nevada, North Dakota, Oklahoma, Puerto Rico, Vermont, and Wyoming (1986 awards).

Department of Agriculture

Approximately half of USDA's extramural research budget is allocated to each state's agricultural experiment stations by a formula set forth in the Hatch Act of 1887, as amended. The formula includes 20 percent divided equally among the states, 26 percent based on the ratio of the state's rural population to the nation's rural population, 26 percent based on the ratio of the state's farm population to the nation's farm population, 25 percent for cooperative projects between states, and 3 percent for administration.

Other Agencies

The remaining three agencies that we examined did not have explicit mechanisms to assure geographically balanced research spending. DOE officials said that scientific quality is their sole consideration; they do not consider the geographic implications of the award. DOD and NASA officials told us they do not consider geographic distribution in making competitive R&D awards.

SUMMARY

Geographic concentration of federal R&D funds has remained fairly constant over a 20-year period. The top 10 states' percentage share of federal R&D funds remained about the same throughout the period at about 70 percent. Federal agencies have limited mechanisms for ensuring geographic distribution of funds, with scientific quality generally the major criterion in funding decisions.

SECTION 3

OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

Our objective was to determine whether a precedent exists for competitive bidding by states for major federally funded research centers and facilities with states providing land and other incentives. We further sought to determine whether federal research and development funds have become more concentrated over the past 20 years and whether federal agencies have made any efforts to distribute these funds among as many states as possible.

SCOPE AND METHODOLOGY

To determine the existence of a precedent for competitive bidding by states, we interviewed cognizant agency officials at DOE, DOD, NASA, NIH, NSF, and USDA concerning their agencies' major research centers and projects awarded with the last 20 years. We examined documentation only for projects that agency officials identified as possibly being precedent setting. Our criterion for a major research center or project was one that had a total cost to the federal government of at least $10 million.

To determine the geographic concentration of total federal research and development funds to states for the past 20 years, we obtained data on federal support for research and development, including research and development plant from NSF's Division of Science Resources Studies for fiscal years 1965, 1975, and 1985. NSF maintains a data base on federal support for research and development using data submitted from federal agencies. We did not verify NSF data. We also interviewed cognizant agency officials to determine what effort their agencies had made to distribute federal research and development funding on a geographic basis.

COMPARISON OF SITING CRITERIA FOR FERMILAB AND SSC

FERMILAB	SSC
Land and geology:	Land:
Sufficient acreage should be available to meet both initial and long range expansion requirements. Tentatively estimated at a minimum of 3,000 acres.	Approximately 16,000 acres.
	Absence of cost to the government for land acquisition.
Land should be owned or be reasonably available to federal government.	Geology and tunneling:
Terrain and substructure should have load-bearing capacity adequate to ensure stable foundations.	Suitable topography, geology, and associated geohydrology for efficient and timely construction of underground structures.
Site should be reasonably level to minimize excavations.	Stability against settlement and seismicity.
Sites with serious seismic activity, faults, or loose joints in bedrock are to be avoided.	Installation and operational efficiency resulting from minimal depths for the accelerator complex and experimental halls.
Utilities:	Utilities:
Ready availability of electric power at the site sufficient for a demand load of several hundred megawatts.	Reliability and stability of electric power generation and transmission grid systems. At least 250 megawatts of electrical power.
Ready availability at site of adequate supply of cool, clean water.	Reliability, quality, and quantity of water to meet the needs of the facility. At least 500 gpm of industrial water.
Economics of power and water acquisition and especially subsequent operational costs will be a factor.	Availability of fuel, waste disposal, and sewage disposal.

APPENDIX I

FERMILAB	SSC
Environment:	Regional Resources:
Proximity to a major airport having frequent service to major U.S. cities.	Proximity of communities within commuting distance of the facility capable of supporting the SSC staff, their families, and visitors. Adequacy of community resources.
Adequate surface transportation facilities.	Accessibility to the site, e.g., major airport(s), railroads, and highway system serving the vicinity and site.
Proximity to a commercial industrial center which includes adequate coverage of special needs in electronics, electrical and precision mechanical equipment to ease problems of recruiting technical support and to obtain specialized supplies.	Availability of a regional industrial base and skilled labor pool to support construction and operation of the facility.
Proximity to other broadly based research and development activities to provide opportunities for desirable interaction of scientific and engineering personnel.	Extent and type of state, regional, and local administrative and institutional support that will be provided, e.g., assistance in obtaining permits and unifying codes and standards.
Sufficient housing and community facilities to accommodate the permanent operating and research staff of several thousand people and the transient staff of several hundred.	
Proximity to a cultural center that includes a large university to provide intellectual and cultural opportunities attractive for staff and families.	
Regional wage and cost variations as well as labor surplus.	
Environmental Impact:	Environmental Impact:
No comparable criteria.	Significance of environmental impacts from siting, constructing, operating, and decommissioning the SSC.

APPENDIX I

FERMILAB	SSC
	Environmental Impact (cont'd):
	Projected ability to comply with all applicable, relevant, and appropriate federal, state, and local environmental/safety requirements within reasonable bounds of time, cost, and litigation risk.
	Ability of proposer, DOE, or both to reasonably mitigate adverse impacts to minimal levels.
Setting:	Setting:
No comparable criteria.	Ability of the proposer to deliver defendable title for land and estates in land that will adequately protect the government's interest and the integrity of the SSC during construction and operation.
	Flexibility to adjust the position of the SSC in the nearby vicinity of the proposed location.
	Presence of natural and man-made features of the region that could adversely affect the siting, construction, and operation of the SSC.
Regional Conditions:	Regional Conditions:
No comparable criteria.	Presence of man-made disturbances, such as vibration and noise, that could adversely impact the operation of the SSC.
	Presence of climatic condition that could adversely impact construction and operation of the SSC.

APPENDIX I

FERMILAB	SSC
Cost:	Cost:
Not specifically mentioned in press release requesting site proposals.	Cost considerations will be used in conjunction with the technical evaluation criteria in selecting the most desirable site. Any financial or in-kind contribution offered by the proposer, other than the cost of the land, will be considered, as appropriate, in the life cycle cost estimate.[a]
	[a]This criteria has been deleted because of the Domenici amendment to the supplemental appropriations bill for 1987 (P. L. 100-71).
Source:	Source:
Atomic Energy Commission press release dated April 28, 1965 that served as the Commission's invitation for proposals.	Department of Energy Invitation for Site Proposals dated April 1987.

APPENDIX II

MAJOR CONTRIBUTORS TO THIS FACT SHEET

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