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Briefing Report to Congressional Requesters

October 1989

**FEDERAL
RESEARCH**

**Information on Site
Selection Process for
DOE's Super Collider**



**Resources, Community, and
Economic Development Division**

B-227295

October 4, 1989

The Honorable John D. Dingell
The Honorable Bob Carr
The Honorable Carl D. Pursell
The Honorable William D. Ford
The Honorable Bob Traxler
House of Representatives

This briefing report provides the information you requested in November 1988 on several aspects of the Department of Energy's (DOE) site selection process for the superconducting super collider, a \$4.4 billion (in fiscal year 1988 dollars) high-energy physics facility. In January 1989, the Secretary of Energy selected a site in Texas for the super collider from among seven best qualified sites, one of which was in Michigan.

You were interested in whether DOE conducted the final site selection process in a fair and unbiased manner, particularly in its consideration of Michigan's site proposal. Among other questions, you specifically asked whether DOE's site task force (1) assigned weights to the technical criteria used to evaluate the sites and whether it ranked the sites according to how well each site performed on the basis of the evaluation, (2) complied with National Environmental Policy Act timing requirements for the draft and final environmental impact statements, (3) considered all the geological information the states submitted subsequent to the initial site proposals, (4) considered whether transfer of federal properties to the super collider included in four of the site proposals would conflict with the properties' intended use, and (5) considered in its site selection deliberations the \$1 billion financial inducement offered by Texas to defray construction and operating costs. As agreed with your office, this letter answers only these questions. Section 2 provides more detailed answers to these and your other specific questions.

In summary, we found the following:

- The technical evaluation criteria—geology and tunneling, regional resources, environment, setting, regional conditions, and utilities—were listed in descending order of relative importance in the invitation for site proposals. The task force did not assign weights to the technical criteria nor rank the sites according to how well each site performed on the basis of the technical evaluation. Qualitative descriptions were used instead, according to the task force executive director, so that if several

Should you have questions or need additional information, please contact me on (202) 275-1441. Major contributors to this report are included in appendix I.

A handwritten signature in black ink, reading "Keith O. Fultz". The signature is written in a cursive style with a prominent flourish at the end.

Keith O. Fultz
Director, Energy Issues

and engineers, to identify the best qualified sites. By prior agreement, DOE asked the academies to assist in the SSC site evaluation process by providing an independent evaluation of the qualified site proposals against the set of requirements in the invitation and to recommend an unranked best qualified list.

On the basis of its evaluation of the 36 proposals against the invitation's technical and cost criteria, the committee determined in November 1987 that 8 were best qualified.¹ Because of local opposition, New York State withdrew its Rochester proposal, which was one of the eight best qualified, from further consideration on January 15, 1988. After the task force reviewed the committee report, the Secretary of Energy announced his acceptance of the seven remaining sites as best qualified on January 19, 1988. These sites were Arizona (Maricopa), Colorado (Denver), Illinois (Fermilab), Michigan (Stockbridge), North Carolina (Raleigh-Durham), Tennessee (Nashville), and Texas (Dallas-Fort Worth).

The assessment of the seven best qualified sites to select the final site for the SSC consisted of (1) the DOE site task force's evaluation of the seven best qualified sites against the technical and cost criteria, (2) issuance of the draft and final environmental impact statements (EIS) for the SSC, and (3) presentations to the Secretary of Energy by state officials representing each site.

The DOE site task force comprised 10 members who were chosen for their experience in high-energy physics, accelerator design, management of the construction and operation of DOE scientific facilities, procurement, real estate acquisition, civil engineering, and environmental matters. To evaluate the sites, the task force formed six subcommittees consisting of task force members supported by other DOE personnel who provided technical expertise. The task force received additional assistance from Exeter Associates, Inc., which assessed electrical power capacity and power generation costs for each site, and RTK (a joint venture of Raymond Kaiser Engineers, Inc.; Tudor Engineering Company; and Keller & Gannon Knight), which developed the life-cycle cost estimates for each site and prepared the draft EIS and final EIS.

¹Our report, *Federal Research: Determination of the Best Qualified Sites for DOE's Super Collider* (GAO/RCED-89-18, Jan. 30, 1989), assesses the selection of the best qualified sites. As the report concluded, available documentation and interviews with committee members and staff indicated that the committee used DOE's site selection criteria in their order of importance and that the process was fair.

the draft EIS. No substantive comments were received on the final EIS during the 30-day comment period. On January 17, 1989, the task force reviewed the final EIS and public comments on the final EIS and determined that new information about the potential environmental impacts at each site did not warrant changing any of its ratings for the technical criteria and subcriteria. The Secretary of Energy issued the record of decision on January 18, 1989, that selected Texas as the site for the SSC.

Objectives, Scope, and Methodology

In a letter dated November 28, 1988, Representatives John Dingell, Bob Carr, Carl Pursell, William Ford, and Bob Traxler requested us to review the process for selecting the preferred site for the SSC to ensure that DOE conducted the process in a fair and unbiased manner consistent with then Secretary John S. Herrington's February 10, 1987, announcement that the selection procedure would be based on "fair and open competition." The request was prompted by concerns that Michigan expressed about the site selection process. In subsequent discussions with the Members' offices, we agreed to answer the following questions:

- Did DOE explicitly assign weights to the specific criteria utilized to evaluate the SSC site proposals and, if so, were site proposals ranked according to how well each site performed on the basis of the evaluation? What were these weights and rankings? How and when were these weights and rankings determined? If DOE did not weight the site selection criteria or rank proposed sites on the basis of a technical evaluation, please request DOE to explain why.
- Did DOE fully comply with regulations implementing the National Environmental Policy Act with regard to the timing of environmental impact statements in its SSC site selection evaluation process?
- Did DOE consider and evaluate all geologic information submitted by parties submitting SSC site proposals, including updated material produced in response to requests by DOE and RTK Associates for more information? In the case of the Michigan site proposal, was the material that was sent to RTK separately, at its request, incorporated into DOE's final decision-making process?
- Did DOE consider that the transfer of some of these federal properties as part of site proposals would conflict with the use intended by the federal agencies governing the land? Please request the DOE to explain how it intended to deal with these conflicts, such as any conflict that may develop with U.S. Army Corps of Engineers' property as part of the proposed Texas site?
- Did DOE take Texas' announcement of its willingness to provide \$1 billion in "inducements" as part of its site proposal into consideration in

Information on SSC Site Selection Process

Use of Weights and Rankings for Technical Criteria

DOE's April 1987 invitation for site proposals contained six technical evaluation criteria against which SSC site proposals would be evaluated. The criteria, listed in order of importance, were geology and tunneling, regional resources, environment, setting, regional conditions, and utilities. Each criterion was further described by a set of subcriteria as described below.

In a September 1, 1987, document entitled "Proposal Evaluation Methodology for Site Selection for the Superconducting Super Collider," the SSC task force set out the evaluation methodology for selecting the SSC site which included how the technical evaluation criteria would be applied. The methodology was approved by ESAAB, which is a group of senior DOE management officials, chaired by the Under Secretary of Energy, that is charged with reviewing major DOE projects. Concerning the rating system, the document stated that the "STF [site task force] will neither develop numerical ratings nor rank the proposals." It also stated the following:

"Noteworthy strengths and weaknesses on each technical evaluation criterion and subcriterion will be identified and documented to support the ratings. Following the development of individual ratings, STF voting members will develop a consensus adjectival rating for each criterion and subcriterion."

According to the task force executive director, weights and rankings were not used for two reasons. First, the site selection process for the Fermi National Laboratory in Batavia, Illinois, was used as a precedent for the SSC site selection process.¹ That process had similar technical evaluation criteria, and weights were not used in the evaluation. Also, the Under Secretary wanted qualitative descriptions so that, if several sites were similarly rated, the Secretary of Energy would have the flexibility to choose among them. In selecting the preferred site, the Secretary of Energy considered not only the technical evaluations but also the draft EIS, public comments on the EIS, and presentations by representatives of each proposing state.

Subcommittee Ratings

The SSC task force formed six subcommittees, corresponding to the six technical criteria, to evaluate the proposals against the specific technical evaluation criteria. Each subcommittee was chaired by a task force member who was responsible for the subcommittee's activities. Each

¹See Federal Research Projects: Concerns About DOE's Super Collider Site Selection Process (GAO/RCED-87-175FS, August 6, 1987) for a comparison of the Fermi Laboratory site selection process to the SSC site selection process.

descending order of importance. Thus, within the six criteria, geology and tunneling was considered the most important, and within geology and tunneling, geologic suitability was the most important.

However, two subcommittees—regional resources and utilities—used weights for rating the seven best qualified sites, while the other four—geology and tunneling, environment, setting, and regional conditions—did not. We asked the chairman of each of the subcommittees why they did or did not use weights or rankings to determine the ratings for the proposed SSC sites. The following sections describe how each subcommittee evaluated the site against the technical criteria.

Geology and Tunneling

The criterion of geology and tunneling included the following four subcriteria:

- the suitability of the topography, geology, and associated geohydrology² for efficient and timely construction of the proposed SSC underground structures;
- the stability of the proposed geology against settlement and seismicity³ and other features that could adversely affect SSC operations;
- the installation and operational efficiency resulting from minimal depths for the accelerator complex and experimental halls;⁴ and
- the risk of encountering major problems during construction.

The subcommittee did not assign specific weights to arrive at an overall rating for this criterion because it interpreted the ESAAB-approved methodology as precluding the use of numerical weights. The subcommittee report stated that

“... each of the subcriteria were divided into a number of individual, more specific factors. These factors were then used to develop a list of strengths and weaknesses for each site relative to geology and tunneling. ‘Strengths’ are those factors or characteristics of a site which would enhance timely and efficient construction and operation of the SSC, and reduce overall risk. ‘Weaknesses,’ while not necessarily significant impediments to SSC construction and operation, refer to factors which would add complexity to construction and increased level of risk.”

²Study of the properties, distribution, and effects of water on the earth’s surface and in the soil and underlying rock.

³Of, subject to, or caused by an earthquake or earth vibration.

⁴Experimental halls are underground chambers where the experimental equipment is housed.

- and visitors and, adequacy of community resources—e.g., housing, medical services, community services, educational and research activities, employment opportunities for family members, recreation, and cultural resources—all available on a nondiscriminatory basis;
- the accessibility to the site, e.g., major airport(s), railroads, and highway systems serving the vicinity and site;
 - the availability of regional industrial base and skilled labor pool to support construction and operation of the facility; and
 - the 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.

According to the subcommittee chairman, the subcommittee did not develop an overall rating for this criterion but left it up to the task force as a whole to do so. Weights were assigned within two of the subcriteria—accessibility and industrial base. Objective data were available for these subcriteria. Weights were not assigned for the community resources and the institutional support subcriteria, which were more subjective.

For the accessibility subcriterion, the factors were given relative emphasis as follows: air, 50 percent; roads and highways, 40 percent; railroads, 6 percent; public transportation, 2 percent; and waterborne transportation, 2 percent. According to the subcommittee report, air accessibility was given the greatest emphasis, since it is expected that approximately 80 percent or more of the scientists performing research at the SSC will be commuting via air from their home bases at other locations.

For the industrial base subcriterion, operations was given a relative emphasis of 65 percent and construction was given 35 percent. According to the subcommittee report, operations was given the most emphasis because of the long-term effect that it will have on the SSC project. The subcommittee report for the community resources listed the factors with relative importance but gave no percentage emphasis.

For the institutional support subcriterion, the subcommittee report states that “it is not possible to provide a single numerical value which represents the consolidated views of support and opposition.” Instead, the subcommittee qualitatively measured support and opposition using data and information from its site visits to determine the level of organization of support and opposition, the issues raised by the opposition, and the mechanisms used by the opposition to attempt to derail the program.

- the flexibility to adjust the position of the SSC in the nearby vicinity of the proposed location; and
- the presence of natural and man-made features of the region that could adversely affect the siting, construction, and operation of the SSC.

According to the subcommittee chairman, weights were not used for overall ratings because the subcommittee felt ESAAB-approved evaluation methodology precluded them from doing so.

For one subcriterion, flexibility, specific measures were used to determine ratings for “micro flexibility,” defined as the ability to relocate individual surface use areas independent of a shift in the SSC tunnel. The subcommittee report states the following:

“Each of the state proposed locations were evaluated to determine if a shift equal to the length of the area could be accommodated without being impacted by man-made or naturally occurring interferences. . . . If it could be moved in any direction, it was rated outstanding; in three of the four quadrants, good; in two, satisfactory; in one, poor; and in none, unacceptable.”

According to the subcommittee chairman, the subcommittee subjectively assessed the ability of each state team to deliver the title to the property within the time frames that DOE had specified in the invitation for site proposals. The assessment included the quantitative factor of the number of parcels, owners, and relocations and the qualitative factor of the quality of the acquisition team, including (1) the number of people, (2) their knowledge and experience with land acquisition, and (3) their experience specifically with federal land acquisition requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646). Because the task force was concerned about the state’s ability to deliver the title to the land on time, it was looking for

- a land acquisition team that was large enough for the state’s acquisition needs and was experienced with federal acquisition requirements,
- an experienced state management that could identify any problems early, and
- an acquisition plan and a relocation plan that indicated the state’s approach.

Michigan officials expressed concern that they received a satisfactory rating for the setting criterion because of the proposed use of a contractor for acquiring the property. Other proposals had also included using

The utilities subcommittee assigned percentage weights to the sub-criteria, with electricity worth 55 percent, water worth 35 percent, and other utilities worth 10 percent. The electricity subcriterion was stated to be the most important factor in the evaluation of the proposed site under this criterion. A consultant, Exeter Associates, Inc., evaluated the electrical stability, reliability, and rate issues and provided recommendations to the subcommittee. According to the subcommittee report:

“... numerous elements entered into the evaluation of the electrical subcriterion. It was judged that no single element could be more important than any other. In fact, it was judged that in this case the various elements form a 'chain' (all the way from the generating source to the SSC site) which is no stronger than its 'weakest link.' To arrive at a rating for a site for this subcriterion, each element was evaluated and the overall rating was set equal to the lowest rating among the elements.”

Although Exeter evaluated the estimated 1996 cost of electricity at each of the seven sites, the task force felt that it could use only the existing rates because of the uncertainty of projecting power costs even 8 years in the future, much less over the 25-year operating life of the SSC. The subcommittee chairman told us that the utilities criterion did not play a large role in the final site determination because a site had to have sufficient electrical power to be on the best qualified list in the first place. This was also the reason for the utilities criterion being ranked last of the six technical evaluation criteria.

Compliance With National Environmental Policy Act

Section 102 of the National Environmental Policy Act (NEPA) requires all federal agencies to draft an EIS whenever they propose to undertake a major federal action. The EIS for the SSC identified and analyzed the potential environmental impacts expected to occur from the siting of the SSC at each of the seven best qualified sites.

Regulations (40 C.F.R. parts 1500-1508) implementing the procedural provisions of NEPA were issued by the Council on Environmental Quality. Provisions include those for implementing the EIS and for the timing of the draft and final EIS. Michigan officials were concerned that the site task force did not follow these regulations in the timing of the preparation of the draft and final EIS and in the use of the SSC Site Evaluations report in the final site decision-making process.

Timing of the EIS Process

Although NEPA expressly imposes no timing requirements regarding the EIS, the regulations for implementation promulgated by the Council on

On October 31, 1988, the task force met to examine information received from public comments on the draft EIS. RTK, DOE's EIS support contractor, categorized the comments and prepared a summary document. In its summary review of the comments, the task force stated the following:

"As a result of the review of the summary document, as well as the review of approximately 40 percent of the comments and attendance at the public hearing, the Task Force believes that all major issues raised by the public and identified in the additional field studies have been appropriately considered. The task force finds that none of this information would justify a change in the technical evaluation ratings or life-cycle cost considerations as reported in the SSC Site Task Force report of November 1988."

The Secretary of Energy announced the "preferred site," Texas, on November 10, 1988. The final EIS was available on December 16, 1988, for a 30-day comment period. The final EIS identified the preferred location for the SSC as the site proposed by Texas.

The task force met again on January 17, 1989, to review differences between task force site evaluations and the final EIS. In its summary assessment of the final EIS, the task force concluded that

"... while there are some differences between the STF's technical evaluation and the FEIS [final EIS], these differences are not considered significant enough to require alteration to the adjectival ratings contained in the STF site evaluations report."

The Secretary of Energy announced Texas as the final site on January 18, 1989.

Attachment of Technical Evaluation to Final EIS

DOE attached the SSC Site Evaluations report, containing the task force's technical evaluations of the seven best qualified sites, to the final EIS as part of volume III. In it, DOE states that "the preferred site selection statement and the SSC Site Evaluation Report [sic], which are major references, are reprinted in their entirety at the end of this Chapter 3 for the readers' convenience, but are not a component of the EIS itself." Thus, the SSC Site Evaluations report was not prepared pursuant to NEPA and was not part of the EIS. According to a DOE official, the purpose of the technical evaluations was to determine a preferred alternative site, while the purpose of the EIS was to determine the environmental effects of a range of alternative actions, including site, technical, and programmatic alternatives.

geologist. The data did not change Michigan's geological picture but made it clearer. The rock structures were simpler, but there was still a broad range of material properties. The composition of the rock was sandstone, limestone, and shale and changed both laterally and vertically over short distances. Sandstone is permeable, and because it was not possible to predict where it would occur, the assumption was that the entire tunnel would need to be lined and sealed.

Although Michigan officials told us that the highest permeability they found through testing the core borings was 10^{-3} centimeters per second, the EIS cited a higher permeability of 10^{-2} centimeters per second.⁷ The SSC task force geologist stated that he determined the higher permeability in the EIS because of his ability to blow through a sample of the rock which he said was from tunnel depth. He said this type of test was not unscientific, although it was unsophisticated. According to a Michigan state official, Michigan officials were not present when the rock was so tested. In addition, the geological contractor to Michigan stated that he could not recall being present when such a test was being done, and in any case, blowing through a rock is not a legitimate testing method for permeability. To determine the permeability of the Michigan site, Michigan's contractor performed field tests that force water through rock under pressure.

According to the SSC task force geologist, even if the permeability were 10^{-3} centimeters per second, as Michigan reported, the technical evaluation rating would not have changed because the rock at tunnel level was water bearing. The highly variable rock qualities would affect construction in that wet conditions were unpredictable and therefore a water-proof liner would be needed for the entire tunnel. According to the SSC contractor, the Michigan rock had "primary permeability" which meant that the permeability was spread throughout the rock mass. The rock also varied from place to place, which meant that the permeability was variable and hard to predict.

Incorporation of Federal Properties Into Site Proposals

Four states included federal land as part of their SSC site proposals. Arizona's offer included Bureau of Land Management property, Illinois' offer included DOE land, Texas' offer included U.S. Army Corps of Engineers land, and North Carolina's offer included Army National Guard land.

⁷ A rating of 10^{-2} centimeters per second means the rock is very permeable, while a rating of 10^{-4} centimeters per second means the rock is nearly impermeable.

A DOE official stated in April 5, 1989, hearings before the House Committee on Science, Space, and Technology that financial inducements were not taken into account in the final site selection decision. In addition, the executive director of the site task force told us that although the task force had heard about the financial inducements, these public reports had no impact on its evaluation.

Use of Technical Criteria

The task force evaluated and rated the proposed sites in accordance with the technical and cost criteria and provided evidence to support its ratings. One technical evaluation criterion was modified during the site selection process—the setting criterion, which stated that each proposal would be evaluated on its ability to deliver the title for the proposed site to DOE in accordance with the schedule stated in the invitation for site proposals. The schedule in the invitation showed that the transfer date for the first area of the super collider was to be July 1, 1989, and the transfer date for the last area was to be April 1, 1990. This schedule assumed that construction funding would be appropriated in fiscal year 1989. However, those funds were not approved by the Congress. Consequently, in August 1988, DOE informed the governors of the seven states that the schedule for acquisition of land for the SSC had been delayed and that the first area would have a transfer date of March 1, 1990, and the last area would have a transfer date of January 1, 1991.

Analysis of Utility Resources

DOE contracted with Exeter Associates, Inc., to assess the stability and reliability of, as well as rate issues associated with, the electrical systems. For a discussion on the task force's analysis of utility resources, see the section on the use of weights by the task force's utilities criterion subcommittee and our previous report entitled Federal Research: Final Site Selection Process for DOE's Super Collider (GAO/RCED-89-129BR, June 16, 1989).

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According to the Chairman of the DOE SSC task force subcommittee for setting, for the states where federal land was part of the offering, the proposer submitted evidence from the federal agency controlling the land indicating the agency's willingness to make the property available. In addition, the subcommittee met with federal officials in charge of the lands in Arizona and in Texas.

In Texas, the tunnel would pass under land designated as Bardwell Lake, an Army Corps of Engineers' project. In a July 7, 1987, letter to the Texas National Research Laboratory Commission, the Corps of Engineers stated that it believed a permit could be issued that would be sufficient to meet the needs of DOE for the government-owned lands and water of Bardwell Lake. The SSC will have no impact on the lake because the lake is 30 feet deep, while the tunnel is 200 feet below the surface at that point. According to an Army Corps of Engineers official, the Corps sees no conflict in use of the land because the lake is above the SSC and no structures are planned for the particular area. The Corps would issue a permit to DOE to use the land. Under the permit, the Corps would retain control of the land except for those activities specifically permitted.

Consideration of Financial Inducements

DOE's April 1987 invitation for site proposals included a section stating that the proposer should clearly itemize any financial and other incentives offered to defray the cost of construction and operation of the SSC. The May 1987 Domenici amendment to the supplemental appropriations act of 1987 prohibited DOE from implementing this section to ensure that DOE based its final decision on where to site the SSC solely on the overall suitability of the site. As a result, DOE amended the invitation to delete the section concerning the offer of financial and other incentives and created a new section stating that financial incentives may be offered, but would not be considered in the evaluation of proposals for site selection. The new section stated that any information on financial incentives offered to defray the cost of construction and operation of the SSC should be stated on a single copy and submitted in a sealed envelope.

The unopened envelopes that were received with site proposals were secured in a safe for classified documents and returned unopened to the nonselected states after the final site decision was announced, according to the task force's executive director. The envelope containing Michigan's offer of financial inducements was returned to Michigan unopened, according to Michigan officials.

In addition, the SSC Site Evaluations report was not the only document the Secretary used to make his siting decision. The Secretary stated that he based his decision on the technical evaluation, the draft EIS, a summary of comments on the draft EIS, and presentations by representatives of each of the best qualified proposing states. Also, before the Secretary made the final site announcement, DOE prepared a January 17, 1989, summary assessment of the SSC final environmental impact statement that included a statement of key differences between the task force site evaluations report and the final EIS. For Michigan, the assessment noted the following:

“The estimated wetlands acreage to be impacted was reduced between the total considered for the STF evaluation and the FEIS (from 560 to 190). The STF Evaluation Report indicated there was a potential to cause impacts on area wetlands. The STF still believes that the potential resource impacts are still relatively high, despite the reduction in acreage. The STF evaluation stated there would be impacts to a relatively high percentage of prime farmland inventory. After reviewing a recalculation of potentially affected prime and important farmland as a percentage of county inventory, the STF concludes that there could be a minor impact to these resources.”

As previously stated, the task force believed these differences were not significant enough to change the adjectival ratings.

Task Force Use of Site Information

In January 19, 1988, and February 23, 1988, letters, DOE requested information from Michigan for preparing the environmental impact statement, including further borings to identify the location of possible buried valleys and for data on the frequency and orientation of joints and other discontinuities in the bedrock. Michigan subsequently submitted additional drilling core data that showed a simplified geological profile; that is, there were no buried valleys that would be encountered during tunneling.

The subcommittee used a variety of data sources in evaluating the seven best qualified sites, according to the geology and tunneling subcommittee report. The primary source of information came from the individual state proposals, including maps and geological profiles of each site. Additionally, the subcommittee reviewed the supplemental data requested from each state as part of the DOE's process of preparing the EIS.

The subcommittee did receive the additional information that Michigan supplied to RTR and considered the information in its deliberations at the technical evaluation meeting in September, according to the task force

Environmental Quality impose certain time limits. These regulations require that when agencies decide to prepare an EIS, they publish a Notice of Intent as soon as practicable in the Federal Register. The regulations also require the publication of the draft EIS before the publication of the final EIS. The draft EIS is intended to allow other federal, state, and local agencies, and other interested parties to comment. Generally, the agency preparing the draft EIS must allow at least 45 days for comment before the agency can publish the final EIS. The agency preparing the final EIS must consider these comments in the final EIS.

Part 1502.5(a) of the regulations implementing NEPA states the following: "For projects directly undertaken by Federal agencies the environmental impact statement shall be prepared at the feasibility analysis (go/no go) stage and may be supplemented at a later stage if necessary." Part 1502.14(e) provides that an agency shall "identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference."

The site task force complied with the Council on Environmental Quality's NEPA regulations in its timing of the EIS. DOE published an advance notice of intent to prepare an EIS on May 4, 1987, and a notice of intent on January 22, 1988. The draft EIS was available on September 2, 1988, for a 45-day comment period and did not identify a preferred site. Although the invitation for site proposals stated that DOE expected to identify the preferred site by July 1988, in February 1988 it announced that the decision would be delayed until late November 1988 so that the Secretary of Energy could consider the draft EIS and public comments on it in making his decision. The deadline for public comments on the draft EIS was October 17, 1988.

The SSC task force concurrently carried out its responsibilities for performing a comprehensive evaluation of the best qualified sites and for implementing NEPA. The task force determined its ratings on the technical criteria for the best qualified sites at a September 18 to 23, 1988, meeting. According to a task force official, it proceeded with its technical evaluation at that time because it was a period of downtime while it waited for public comment on the draft EIS. In addition, the task force knew that it would have two opportunities—after receiving comments on the draft EIS and after receiving comments on the final EIS—to reevaluate the technical criteria adjectival ratings if the EIS process revealed any new and/or substantially different information that could potentially affect the ratings.

contractors for acquiring property. According to the subcommittee chairman, the subcommittee believed that Michigan's management team of two people was not adequate to supervise the contractor staff and that the contractor's acquisition team was not experienced in federal acquisition requirements. The subcommittee chairman told us that, in contrast, the Texas proposal included staff from the state department of transportation district office, which offered good expertise and experience with federal acquisition requirements. He believed that even if Texas had a full workload of highway acquisitions, it could still meet the deadline for acquiring land for the SSC by delaying highway acquisitions.

The assessment for natural and man-made features was largely subjective. The subcommittee looked at the risk of each feature having an impact on construction and operations.

Regional Conditions

The regional conditions criterion included the following two subcriteria:

- the presence of man-made disturbances, such as vibration and noise, that could adversely affect the operation of the SSC and
- the presence of climatic conditions that could adversely affect construction and operation of the SSC.

According to the subcommittee chairman, no weights were used, although the vibration subcriterion was worth more than the climate subcriterion. The subcommittee rating generally reflected the extent of any vibration problem. Sites whose calculated vibration levels were at least an order of magnitude less than SSC tolerances were rated outstanding. The other sites were then evaluated on the ability to increase the margin of safety for vibrations. Sites that could increase the margin of safety relatively easily were rated good, while sites that could not were rated satisfactory.

Utilities

The utilities criterion included the following three subcriteria:

- the reliability and stability of the electric power generating and transmission grid systems and flexibility for future expansion;
- the reliability, quality, and quantity of water to meet the needs of the facility; and
- the availability of fuel, waste disposal, and sewage disposal.

Environment

The environment criterion included the following three subcriteria:

- the significance of environmental impacts from siting, constructing, operating, and decommissioning the SSC;
- the projected ability to comply with all applicable, relevant, and appropriate federal, state, and local environmental/safety requirements within reasonable bounds of time, costs, and litigation risk; and
- the ability of the proposer, DOE, or both to reasonably mitigate adverse environmental impacts to minimal levels.

No percentage weights were given to the three subcriteria under this criterion. However, according to the subcommittee chairman, the environmental impact subcriterion was the most important because the other two subcriteria could be equally met by each of the sites. In addition, no weights or rankings were used because environmental sciences have no accepted formula for balancing resource categories.

The subcriterion for significance of environmental impact was broken down into resource categories, such as water quantity, water quality, floodplains, air quality, noise, endangered species/sensitive habitat, and wetlands. According to the subcommittee report, the overall rating for each site reflected the significance of the environmental impacts in all the major resource categories. The potential for significant impacts in each resource category was characterized as low, moderate, or high. A site with impacts of predominantly “high” significance would be generally characterized as “poor.” According to the subcommittee chairman, a site could have better ratings all the way down the line, but if one category had a significant impact it could outweigh all the other ratings. For example, if siting the SSC would have a high impact on endangered species but a low or moderate impact on other resource categories, the high impact of endangered species would outweigh all the other impacts.

Setting

The setting criterion included the following three subcriteria:

- the ability of the proposer to deliver the title, in accordance with the provision of Section 2.2.2.4 of the Invitation, for land and estates in land that will adequately protect the government’s interest and the integrity of the SSC during construction and operation;⁶

⁶Section 2.2.2.4 of the Invitation for Site Proposals states that “the successful proposer must meet the schedule . . . for delivery of title to the proposed site and indicate its willingness to do so.”

According to the subcommittee chairman, in determining the ratings, the factors making up each subcriterion had to be looked at as a whole rather than individually. The subcommittee considered permeability,⁵ structural strength, and uniformity of the tunneling material. These factors determine, for example, whether a tunnel liner will be needed and how much material can be tunneled through each day (advance rate).

For Michigan, the subcommittee considered the range of permeability of the rock—from very permeable to nearly impermeable; the need for structural support because the rock contained shale; and heterogeneity of the rock, which consisted of limestone, sandstone, and shale, to arrive at the satisfactory rating.

Michigan officials questioned the state's satisfactory rating for construction risk. They informed us that they thought this rating was given to them because the task force concluded that because of the nature of the rock at the Michigan site, their proposed tunnel boring machine was inadequate. However, the task force report did not state that the tunnel boring machine was a factor in the satisfactory rating. In fact, the task force rated the Michigan site as satisfactory because, among other things, it believed that the water-bearing areas could not be predicted for Michigan's heterogeneous rock; consequently, a waterproof liner was assumed to be necessary for the entire tunnel.

Under the operational efficiency factor, an SSC task force staff member told us that more emphasis was given to the depth of the experimental halls rather than the tunnel depth. The ratings corresponded to the average depth of excavation—the shallower the depth, the higher the rating. For example, an average depth to the base of the excavation of 50 to 150 feet would be considered outstanding and an average depth of 151 to 250 feet would be considered good. For example, for Colorado, which received an outstanding rating in operational efficiency, the average depth to the experimental halls was 105 feet and for Michigan, which received a good rating, the average depth was 195 feet.

Regional Resources

The regional resources criterion included the following four subcriteria:

- the proximity of communities within commuting distance of the proposed SSC facilities capable of supporting the SSC staff, their families,

⁵The permeability of rock or soil is a measure of its capacity for transmitting a fluid.

Section 2
Information on SSC Site Selection Process

subcommittee prepared a report on its evaluation. According to task force members, at a meeting in Frederick, Maryland, from September 18 to 23, 1988, the task force discussed the reports and reached consensus on the adjectival ratings of outstanding, good, satisfactory, or poor for each site. Table 2.1 shows these ratings for each of the six criteria and their subcriteria.

Table 2.1: SSC Task Force Ratings of the Seven Best Qualified Sites

Criterion and subcriteria	Arizona	Colorado	Illinois	Michigan	North Carolina	Tennessee	Texas
Geology and tunneling	S	G	O	S	G	O	O
Geologic suitability	S	G	O	S	G	O	O
Operational stability	S	S	O	G	G	O	G
Operational efficiency	G	O	P	G	G	P	G
Construction risk	S	O	O	S	S	G	O
Regional resources	S	S	O	O	G	S	O
Community resources	G	S	O	O	O	S	O
Accessibility	S	S	O	G	G	G	O
Industrial base	S	G	O	O	G	S	O
Institutional support	S	O	S	O	P	G	O
Environment	G	O	G	G	G	G	O
Environmental impact	G	O	G	G	G	G	O
Compliance with requirements	G	G	G	G	G	G	G
Ability to mitigate	G	G	G	G	G	G	G
Setting	G	G	P	S	S	O	O
Real estate	G	S	P	S	P	G	O
Flexibility	G	O	S	S	G	O	G
Natural and man-made features	G	O	P	S	G	O	G
Regional conditions	S	O	G	O	G	O	G
Vibrations and noise	S	O	G	O	S	O	G
Climate	G	G	G	G	O	O	O
Utilities	G	G	G	G	G	G	G
Electricity	G	G	G	G	G	G	G
Water	S	S	G	G	S	G	G
Other utilities	G	G	G	G	G	G	G

Note: O = Outstanding; G = Good; S = Satisfactory; P = Poor.

Source: SSC Site Evaluations: A Report by the SSC Site Task Force, Nov. 1988, DOE/ER-0392.

Although the task force as a whole used neither numerical ratings nor rankings in its evaluation, the criteria and subcriteria are listed in

Section I
Introduction

the final site selection decision and, if so, did this action constitute a violation of the provisions and intent of the Domenici Amendment, which precluded DOE from including financial inducements in its evaluations?

The Representatives also had concerns about whether DOE evaluated each site against the technical criteria and whether it analyzed each state's ability to provide sufficient energy. We agreed that we would provide limited information on these two questions in this report since one of our earlier reports on the SSC largely addressed these concerns.²

We interviewed Michigan officials responsible for the site proposal to determine their concerns with the selection process. We also interviewed Michigan's geologic contractor to determine the company's role in preparing Michigan's site proposal and to determine whether contracting personnel were present during task force site visits. We interviewed seven members of DOE's SSC site task force, which included the chairman of each of the technical evaluation subcommittees, to enable us to respond to the request's specific questions. We also interviewed DOE's contractor, RTK, and its subcontractor, Earth Technologies, to determine their role in the evaluation of Michigan's geology. In addition, we reviewed documents submitted by the Michigan SSC Commission to the site task force, the invitation for site proposals, the subcommittees' technical evaluation reports, the task force's final report, the draft and final EIS, DOE correspondence, and contractors' reports.

DOE reviewed the technical data presented in the draft report. As requested by the Representatives' offices, we did not obtain official agency comments on this report. We conducted our review from February through July 1989.

²See Federal Research: Final Site Selection Process for DOE's Super Collider (GAO/RCED-89-129BR, June 16, 1989).

The task force members evaluated the sites against the technical criteria on the basis of (1) information provided by the states in the original site proposal and supplemental information that the states submitted in March 1988, (2) the draft EIS, (3) 4-day visits to each of the sites and the states' written responses to any follow-up questions, (4) verification of states' information by contacts with officials in federal and state agencies and other organizations, and (5) Exeter's utility report and RTK's life-cycle cost estimates for construction and 25-year operations for each site. Each subcommittee rated the sites against its assigned criterion and drafted its report during August and early September 1988. The task force and its DOE technical advisers met in Frederick, Maryland, from September 18 to 23, 1988, and developed consensus ratings for each site using the technical criteria.

While the DOE task force members gathered and assessed data to evaluate the seven sites, RTK developed the draft EIS for the SSC, which assessed environmental impacts for each site. DOE held hearings at each site in February 1988, and an RTK team visited each site during February and March 1988. RTK completed a preliminary EIS in June 1988. DOE issued the draft EIS in August 1988, and the Environmental Protection Agency announced the availability of the draft EIS on September 2, 1988, which started the 45-day comment period that closed on October 17, 1988. DOE held public hearings on the draft EIS at each site between September 26 and October 6.

Also in early October 1988, state representatives made oral presentations of their site proposals to the Secretary of Energy and other top DOE officials.

On November 4, 1988, the task force completed its site evaluation report, SSC Site Evaluations: A Report by the SSC Site Task Force. The report contained "adjectival" ratings (outstanding, good, satisfactory, or poor) of the technical criteria for each of the seven sites. On November 8, 1988, the task force presented its evaluation of each site, but did not recommend a preferred site, to the Secretary of Energy and DOE's Energy System Acquisition Advisory Board (ESAAB). On November 10, 1988, the Secretary announced the selection of Texas as the preferred site for the SSC on the basis of the task force site evaluations, the draft EIS, comments received on the draft EIS, and the Secretary's meetings with the site proposers.

The notice of availability for the final EIS was published on December 16, 1988, after the task force formally responded to public comments on

Introduction

The Department of Energy's (DOE) proposed superconducting super collider (SSC) will be the largest high-energy physics accelerator in the world. Designed to provide insight into the fundamental components of matter and the physical laws of the universe, the SSC will be located in a 53-mile, racetrack-shaped tunnel and is estimated by DOE to cost \$4.4 billion (in fiscal year 1988 dollars). President Reagan submitted the proposal to construct the SSC to the Congress in January 1987. The Congress has appropriated funds for SSC research and development costs, including \$100 million in fiscal year 1989, but through fiscal year 1989 it had not appropriated funds for SSC construction.

The Site Selection Process

In April 1987, DOE issued an invitation for site proposals, which described the SSC facility, the site selection criteria, and the process and time frames for evaluating the site proposals. The invitation identified five minimum qualification criteria that proposals were required to meet. These were

- location entirely in the United States;
- land size and configuration to accommodate the SSC facility as specified in the invitation;
- absence of cost to the government for land acquisition;
- capability of providing a specified minimum combination of electrical power and industrial water; and
- absence of known unacceptable environmental impacts from siting, operating, and decommissioning the SSC, taking into consideration reasonable mitigation measures.

The invitation also listed six technical evaluation criteria—geology and tunneling, regional resources, environment, setting, regional conditions, and utilities—in the order of their importance, against which the proposals would be evaluated. (Section 2 further explains the technical evaluation criteria.) In addition, the invitation stated that cost considerations were important and would be used in conjunction with the technical criteria in selecting the final site, although primary emphasis would be placed on the technical criteria.

DOE received 43 site proposals representing 25 states by its September 2, 1987, deadline. DOE's SSC site task force reviewed these proposals and determined that 36 met the invitation's minimum qualification criteria. DOE then sent the 36 proposals to a site evaluation committee established by the National Academy of Sciences and National Academy of Engineering, which are private, non-profit societies of distinguished scholars

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Abbreviations

DOE	Department of Energy
EIS	environmental impact statement
ESAAB	Energy System Acquisition Advisory Board
FEIS	final environmental impact statement
NEPA	National Environmental Policy Act
RTK	joint venture of Raymond Kaiser Engineers, Inc.; Tudor Engineering Company; and Keller & Gannon Knight
SSC	superconducting super collider
STF	site task force

sites were similarly rated, the Secretary of Energy would have the flexibility to choose among them. In selecting the site, the Secretary considered not only the technical evaluations, but also the environmental impact statement, comments on the statement, and presentations by state representatives.

- The task force complied with the timing requirements of the National Environmental Policy Act, including a 45-day comment period for the draft environmental impact statement and a 30-day comment period for the final environmental impact statement.
- The task force incorporated into its technical evaluations all supplemental geological information submitted by the states at its request.
- Federal agencies on whose land the super collider was proposed to be placed indicated that there were no insurmountable conflicts in using the lands for the super collider.
- According to the task force executive director, while the task force had heard about the financial inducements, it did not consider such inducements to defray construction and operating costs offered by Texas or other site proposers in its technical and cost deliberations.

Section 1 contains background information on the super collider site selection process and our objectives, scope, and methodology.

Because your request particularly concerned DOE's site selection process as it pertained to Michigan's site proposal, we interviewed Michigan officials responsible for the site proposal to determine their concerns with the selection process. We interviewed the members of DOE's site task force and its contractors to enable us to respond to the request's specific questions. DOE reviewed the technical data presented in the draft report. However, as you requested, we did not obtain official agency comments on this report. We conducted our review from February through July 1989.

We are sending copies of this briefing report to the appropriate House and Senate committees, the Secretary of Energy, and the Director, Office of Management and Budget. Copies will also be made available to other interested parties who request them.

