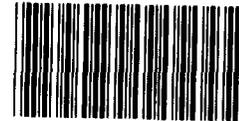


April 1993

NUCLEAR WASTE

Connecticut's First Site Selection Process for a Disposal Facility



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

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

B-251504

April 5, 1993

The Honorable Christopher J. Dodd
United States Senate

The Honorable Joseph I. Lieberman
United States Senate

This report responds to your requests that we review certain aspects of Connecticut's program for developing a disposal facility for low-level radioactive waste. Connecticut established its low-level radioactive waste disposal program pursuant to the federal Low-Level Radioactive Waste Policy Act of 1980, as amended. This act requires states to provide for the disposal of the commercial low-level radioactive waste generated within their borders.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 7 days from the date of this letter. At that time, we will send copies to the appropriate congressional committees; the Chairman, Nuclear Regulatory Commission; the Secretary of Energy; the Director, Office of Management and Budget; and state officials interested in the disposal of low-level radioactive waste. We will also make copies available to others on request.

Please contact me on (202) 512-3841 if you or your staffs have any questions. Major contributors to this report are listed in appendix I.

A handwritten signature in cursive script, appearing to read 'Victor S. Rezendes'.

Victor S. Rezendes
Director, Energy
and Science Issues

Executive Summary

Purpose

Connecticut is a small, highly developed, and densely populated state. Nonetheless, Connecticut, like all other states, is required by federal law to dispose of the commercial low-level radioactive waste generated within the state. (States may make arrangements with other states for such disposal). Connecticut's siting authority has been looking for such a disposal site. However, after local citizens groups opposed the first site screening results, the state legislature directed the siting authority to restart the site screening process.

Senators Christopher J. Dodd and Joseph I. Lieberman asked GAO to review Connecticut's first effort to develop a low-level radioactive waste disposal facility, including the opportunities provided for public involvement, and to compare the incentives that Connecticut will offer to potential host communities with the incentives that other states offer.

Background

The Low-Level Radioactive Waste Policy Act of 1980, as amended in 1986, made the states responsible for disposing of commercially generated radioactive waste beginning on January 1, 1993. The act encourages states to form compacts for this purpose by allowing states to prohibit disposal of low-level wastes generated outside the compacts beginning on that date. Connecticut and New Jersey formed a two-state compact and decided that each would develop its own disposal facility.

Connecticut enacted legislation requiring the Connecticut Hazardous Waste Management Service (Service) to select a disposal facility site and technology. After receiving public comments, the Service adopted a site selection plan that prescribed a screening approach and criteria to be used in choosing potential sites for a disposal facility. The Service and its contractor then screened land areas in the state by applying the criteria in several steps—each of which reduced the number of areas under consideration.

Results in Brief

The Service generally followed a systematic site screening and selection process and achieved its goal of objectively selecting three candidate sites for a low-level radioactive waste disposal facility. Ultimately, however, the state legislature voided the site selection results and directed the Service to restart the site selection process.

Citizens groups challenged the results of the site screening, saying that the Service did not apply one of the screening criteria correctly and did not

adequately consider the site's effects on current and projected populations near the sites. In addition, the Service may have contributed to perceptions by some that the site selection was flawed by keeping results of the site selection process confidential until the final three sites were selected and by not analyzing site-specific data on the three candidate sites. The Service believes that it chose the sites in an unbiased manner using objective, statewide data.

The 13 states seeking locations for low-level radioactive waste disposal facilities are considering a range of incentives to reduce the effects of, and to overcome local resistance to, acceptance of such facilities. Most states, including Connecticut, will provide, or are planning to provide, direct financial payments to communities where the facilities are built. In addition, Connecticut will use incentives found in other states, such as property value guarantees and opportunities to oversee the siting processes.

Principal Findings

Groups Questioned the Service's Selection Process

In June 1991 the Service announced the selection of three candidate sites to be investigated for suitability as disposal sites. However, the state government enacted legislation that voided the site screening and selection results and directed the Service to restart the site selection process. The Service is now committed to conducting a volunteer siting process, even though this process may be prolonged and controversial.

The state's decision to terminate the site selection process came after local citizens groups opposed to the sites criticized the process used to select them. Citizens Opposed to a Radioactive Environment (CORE), in collaboration with several other organizations, charged that the Service's site selection process lacked objectivity and that the three sites did not meet population-related screening criteria. For example, CORE objected to the method the Service had used at one stage of the site screening process to reduce the number of sites under consideration from over 500 to 45 by applying 1 of 12 high-ranked preference criteria. The Service used preference criteria to identify relatively desirable characteristics of specific sites. According to CORE, reducing the number of sites on the basis of one preference criterion, rather than all such criteria of equal importance, was indefensible because this procedure could skew the

outcome. According to the Service, it had applied this particular criterion (which concerned the slope of land areas) first because data on it were available on a statewide basis and because application of the criterion enabled the Service to produce a more manageable number of potential sites for consideration.

CORE also questioned whether the Service met a requirement not to locate the facility in an area of relatively high population. At issue, for example, was the rate of population growth (between 13 percent and 28 percent) in the potential host towns and the number of schools (11) and residents (about 75,000) near the candidate sites. The Service responded that there were no threshold demographic criteria that would have disqualified the sites and that such factors would be considered before it decided which of the three sites to select for additional tests.

An independent contractor hired by the Service to review the site screening process discovered some problems. However, the Service concluded that the problems would not have changed site screening results. On the other hand, CORE said the problems helped to repudiate the site screening process.

In addition, two site selection procedures may have hurt the Service's chances of successfully siting a disposal facility. First, the Service closed implementation of the plan to the general public. To be objective, the Service chose a "blind" site selection approach in which only a few Service and contractor staff were aware of the locations under consideration. However, the Service published the detailed results of this approach over 3 months later than planned, leaving the public without the information needed to understand and evaluate the site selection process. As a result, opposition to the sites formed quickly after officials in towns containing the sites were surprised by the screening results.

Second, so that all data would be comparable, the Service compiled site screening data on a statewide basis only and did not examine locally available data. According to the Service, it was concerned about political bias, public turmoil, and disruption to local real estate markets if local officials were contacted for site-specific data. This lack of detailed, site-specific data may have made the selected sites more vulnerable to challenge because the Service had selected sites without the benefit of up-to-date information on matters such as nearby populations and schools.

Incentive Programs Vary Among States

The siting of unwanted facilities often generates opposition because of real or perceived adverse effects on communities. For this reason, some siting authorities provide financial incentives and other benefits to communities to overcome local resistance and offset the burdens of hosting such facilities. Seven of the 13 states attempting to site low-level radioactive waste disposal facilities have approved incentive packages.

Connecticut law prescribes that the host community will receive, among other things, quarterly payments based on the amount of waste the facility receives. In addition, the host and the most affected adjacent communities will receive such benefits as funds to mitigate social and local impacts of the facility. Similarly, 11 other states will provide community payments that are based on variables such as property taxes and direct costs associated with the facility.

In addition, some states are offering other benefits to compensate communities and overcome resistance to siting. For example, Connecticut, Maine, and Nebraska offer guarantees to communities hosting the facilities that property values will not decrease for specified periods of time. Also, in Connecticut, the facility operator will provide funds to the host community to hire a full-time municipal employee to inspect the facility.

Recommendations

GAO is making no recommendations in this report.

Agency Comments

GAO discussed the factual information in this report with the Chairman of CORE and with the Service's Chairman and Executive Director and low-level radioactive waste program director. Their comments have been included where appropriate. CORE generally agreed with the facts but added that it had more concerns about the site screening process than discussed in the report. GAO revised the report to reflect this comment. In addition, CORE provided GAO with comments on the independent contractor's review of the site screening process. The Service agreed with the facts but reiterated that the public had had an opportunity to comment on the point that the Service did not intend to announce the results of intermediate steps in site screening until after the three candidate sites were selected. GAO changed the report to recognize the Service's comment. As requested, GAO did not obtain written comments on a draft of this report.

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Abbreviations

CORE	Citizens Opposed to a Radioactive Environment
GAO	General Accounting Office
NRC	Nuclear Regulatory Commission
SERVICE	Connecticut Hazardous Waste Management Service

Introduction

Low-level radioactive waste comes from nuclear power plants, pharmaceutical and chemical companies, and institutions such as hospitals and universities that use radioactive materials for diagnosis, treatment, and research. This waste is designated as “low-level” because its levels of radioactivity are relatively lower than those of radioactivity in spent (used) fuel from commercial nuclear power plants and certain radioactive waste from nuclear weapons production.

The federal Low-Level Radioactive Waste Policy Act of 1980, as amended in 1986, requires states, either separately or in compacts, to provide for disposal of commercial (and certain federal and state) low-level radioactive waste generated within their borders.¹ Connecticut and New Jersey entered into the Northeast Interstate Low-Level Radioactive Waste Management Compact to provide for disposal capacity for the low-level waste generated within the two states. However, the compact designated both as “host” states, so that each would develop a low-level radioactive waste disposal facility to handle the wastes generated within each state’s own borders. In 1992 Connecticut’s four nuclear power plants generated about 70 percent of the state’s low-level radioactive waste. The state sends its waste to a commercial low-level radioactive waste site in Barnwell, South Carolina.

In 1983, the Connecticut general assembly created the Connecticut Hazardous Waste Management Service (the Service) as a nonregulatory, quasi-public corporation responsible for planning hazardous waste siting and facilities and for promoting waste minimization and pollution prevention. In 1987 Connecticut’s low-level radioactive waste disposal facility law gave the Service the responsibility for selecting (1) a site for a low-level radioactive waste disposal facility, (2) a disposal technology, and (3) a company to build and operate the facility. In addition, the law provided rights and compensation to the community in which the low-level radioactive waste disposal facility is placed. State law also established the Low-level Radioactive Waste Advisory Committee to advise the Service on the suitability of sites for a low-level radioactive

¹In 1990 New York and two affected counties challenged the constitutionality of the federal law. New York questioned whether the Congress may compel a state to be responsible for and develop a plan for the disposal of low-level radioactive waste in the state and to take title to the waste if the state fails to develop such a plan and have disposal facilities in operation by 1996. On June 19, 1992, the Supreme Court held that the “take title” provision of the statute was unconstitutional but that the provision could be severed from the remainder of the act.

waste disposal facility.² In September 1990 the Service retained the Battelle Memorial Institute as the contractor responsible for implementing the site selection plan by, among other things, assisting the Service in selecting and characterizing candidate sites.

State and federal agencies are to formally determine the suitability of a site through license, permit, and certification proceedings. For example, the site must qualify for and receive permits from the Connecticut Department of Environmental Protection, obtain a certificate of public safety and necessity from the Connecticut Siting Council, and obtain an operating license from the Nuclear Regulatory Commission (NRC).

Connecticut's Site Screening and Selection Plan

The Service planned a site screening approach that would impose a site decision on a community after a statewide search was completed. In planning for screening the state and selecting candidate sites for detailed study, the Service chose to emphasize physical characteristics of the land over demographic considerations like population and land use because the Service believed that a technically sound site for the facility could be safely operated in close proximity to people.

The Service prepared a site selection plan that established procedures and screening criteria for selecting the site. According to the Service's contractor, the screening criteria were based on applicable state and federal laws and regulations, the advice of the Low-Level Radioactive Waste Advisory Committee, and public comments. The plan was designed to identify suitable sites of between 160 and 250 acres.

The site selection plan—published in November 1990—states that the fundamental requirement of a low-level radioactive waste site is to protect public health and safety and the environment from unwarranted exposure to low-level radioactive waste. The Service believed that there was an extensive body of statutory and regulatory requirements directed at ensuring isolation of waste and protection of public health and safety as well as a substantial body of standards and guidance on siting criteria. Therefore, the Service's site selection process relied almost exclusively on technical and legal criteria based on requirements from state and federal

²The governor and the majority and minority leaders of the Connecticut Senate and House of Representatives appoint 11 members to the Low-Level Radioactive Waste Advisory Committee. By law, the committee is composed of a geologist and representatives of industrial and institutional low-level radioactive waste generators, businesses, towns, an environmental group, and the general public.

agencies that will license and regulate the facility.³ The Service also used requirements from the Connecticut general statutes and public acts to develop siting criteria.

Objectives, Scope, and Methodology

Senators Christopher J. Dodd and Joseph I. Lieberman of Connecticut separately asked that we review, among other things, Connecticut's program for developing a disposal facility for low-level radioactive waste and that we compare the incentives the state offers to potential facility hosts with incentives offered by other states. We agreed to (1) review and analyze Connecticut's site selection process, including opportunities for public involvement, and (2) compare and contrast Connecticut's incentives for the facility's host community with those offered by other states attempting to site low-level radioactive waste disposal facilities.

To obtain information on the site screening process, we reviewed Connecticut's general statutes and public acts that establish the Service's authority and responsibilities and require the Service to submit plans for storing and disposing of low-level radioactive waste. In addition, we interviewed officials of the Service, Northeast Interstate Low-Level Radioactive Waste Management Compact, Connecticut Senate's Environment Committee, Connecticut Office of Legislative Research, Legislative Program Review and Investigations Committee of the Connecticut General Assembly, U. S. Geological Survey, and NRC. We obtained available documentation supplementing and supporting the oral evidence provided.

We also met with representatives of Citizens Opposed to a Radioactive Environment (CORE) to gain an understanding of the views of those opposed to siting a low-level radioactive waste disposal facility in the state. CORE describes itself as a nonprofit, all-volunteer, incorporated organization dedicated to providing a forum to exchange information on siting a low-level radioactive waste facility. CORE collaborated with other organizations that have opposed siting a low-level radioactive waste facility in the state, including Connecticut Opposed to Waste, Our Town/Our Planet, and Property Owners with Equal Rights.

To compare states' incentives packages, we obtained information from the Low-Level Radioactive Waste Forum and state boards, authorities, and

³According to the Service's site selection plan, the main sources of requirements include the Connecticut Siting Council, Connecticut Department of Environmental Protection, the NRC, and the Environmental Protection Agency.

commissions attempting to site low-level radioactive waste disposal facilities.

We discussed the factual information in this report with the Chairman of CORE and with the Service's Chairman and Executive Director and its director of the low-level radioactive waste program. Their comments have been included where appropriate. CORE generally agreed with the facts but added that it had more concerns about the site screening process than we discussed in our report. We revised our report to reflect this comment. In addition, CORE provided us with comments on the independent contractor's review of the site screening process. The Service agreed with the facts but reiterated that the public had had an opportunity to comment on the point that the Service did not intend to make public the results of intermediate steps in site screening until after the three candidate sites were selected. We changed the report to recognize the Service's comment. As requested, we did not obtain written comments on a draft of this report.

Site Selection Results Drew Criticism

The Service employed a phased approach to screening Connecticut for potential sites for a low-level radioactive waste disposal facility. After the state was screened using primarily objective criteria, the Service's Board of Directors chose three candidate sites for limited on-site investigations. Opponents challenged the Service's choice of candidate sites, charging that a preference criterion was not applied correctly, that current and future populations near the three sites had not been considered, and that the Service lost credibility by not adequately answering public concerns about the candidate sites. The Service did not agree with the opponents' views. In addition, an independent reviewer contracted by the Service found a limited number of problems with the site screening process.

Two aspects of the Service's site screening and selection approach may have contributed to public perceptions that the siting process was flawed. First, although the Service obtained public review on draft documents like the site selection plan, implementation of the plan was closed to the public until selection of the three candidate sites was announced. Second, to ensure uniformity of data when screening all potential sites, the Service had not analyzed site-specific data on the three finalists when it announced them to the public.

The concerns about the Service's site selection procedures and results had not been resolved, nor had further study of the three sites occurred, when the state government directed the Service to start the site selection process over.

Site Screening Based on Objective Criteria

In accordance with the site selection plan, the Service and its contractor applied 67 criteria—20 exclusionary, 14 avoidance, and 33 preference—throughout the state in three steps to successively reduce the area under consideration from the entire state to eight potential sites. The Service used exclusionary criteria to identify characteristics that, if present, eliminated a land area from further consideration. Avoidance criteria were defined as criteria identifying characteristics that should be avoided if possible but that could be present at a site; however, the Service applied them as if they were exclusionary criteria. Preference criteria identified relatively desirable characteristics of specific sites under consideration. After the Service had applied the screening criteria to narrow the number of sites under consideration to eight, the Service's Board of Directors used a similar approach to choose three of the eight potential sites for limited on-site investigations. A fourth step, which was not completed, was to have partially characterized and compared the three

candidate sites to select one preferred site for full characterization.¹ Table 2.1 shows at what steps screening criteria were applied.

Table 2.1: Exclusion, Avoidance, and Preference Criteria Applied by Screening Step

Step	Exclusion criteria	Avoidance criteria	Preference criteria	Total
Step 1: statewide screening	15	4	0	19
Step 2: areawide screening	2	6	0	8
Step 3: comparison of sites	3	4	33	40
Total	20	14	33	67

In Step 1, the Service applied 15 exclusionary and 4 avoidance criteria over the entire state to identify potentially suitable land areas that were to be carried forward into the next step. During this step, the Service removed land with features such as protected aquifers, major watercourses, river conservation zones, state parks and forests, and historic places and districts. Application of avoidance criteria then removed urban centers, rural community centers, urban growth centers, and existing preserved open spaces. According to the Service, at the end of this step, about 33 percent of the state's total land area was still under consideration.

During Step 2, two exclusionary criteria, pertaining to federal wetlands and areas of less than 160 acres, were applied to remove other areas from further consideration. Compiling and applying wetlands data was the most significant part of the Step 2 screening because wetlands are numerous and widespread in Connecticut. The Service also applied six avoidance criteria that removed certain agricultural lands, municipal forests, and municipal open spaces. Finally, the Service considered land areas that were volunteered by their owners to be considered as potential sites. Of 11 such land areas, 9 were judged as unsuitable when evaluated using exclusionary and avoidance criteria and 2 others were carried forward to Step 3, where they were eliminated from the process. About 11.5 percent of the state remained as potential sites after areawide screening.

Step 3 included several stages. Initially, the Service applied three additional exclusionary and four avoidance criteria to further reduce the land areas under consideration. The exclusionary criteria pertained to

¹Characterization is a detailed and extensive study of the site to determine if the site is technically suitable for a low-level radioactive waste disposal facility. Such studies will focus on detecting any conditions that would make a site technically unsuitable for meeting licensing and federal regulatory requirements.

known natural resources and critical habitats for threatened and endangered species and the avoidance criteria pertained to lands with seasonal high water tables, projected population growth, ancient burial places, and critical habitats. About 550 separate sites remained under consideration after exclusionary and avoidance criteria had been applied in Step 3.

Next, the Service applied the 33 preference criteria for the first time during site screening. Previously, the Service had ranked preference criteria into broad subject areas of relative importance on the basis of a recommendation by the Low-Level Radioactive Waste Advisory Committee. In this way, the highest-ranked criteria were applied first to identify potential sites to be carried forward for further evaluation using the next lowest rank of preference criteria. Sites not carried forward were deferred for possible later consideration but were not eliminated. Table 2.2 shows the subject areas by rank and by the numbers of preference criteria applied in Step 3 of the screening process.

Table 2.2: Subject Areas by Rank and by the Number of Preference Criteria

Subject area	Rank	Number of preference criteria
Geology	High	4
Hydrogeology		2
Hydrology		5
Water quality		1
Subtotal		12
Demography	Medium-high	2
Transportation		2
Subtotal		4
Environmental resources	Medium	1
Land use		14
Natural resources		1
Site size		1
Subtotal		17
Total		33

Note: No low-ranked preference criteria were applied during Step 3.

The Service applied a land slope criterion first among the 12 high-ranked preference criteria because the Service considered (1) the slope of land to be an on-site, mappable feature that allows sites to be objectively deferred

or carried forward without comparison with other sites and (2) the effect on a given site was the same regardless of when the slope criterion was applied. The Service derived the criterion from a Connecticut Siting Council requirement that active parts of the proposed facility shall not be located in areas with slopes greater than 15 percent, which would be subject to instability like landslides and erosion.² The Service's application of the slope criterion reduced the number of potential sites from about 550 to 45.

The Service then convened two in-house workshops to acquire more up-to-date information on a Step 3 avoidance criterion concerning projected population growth that had been applied earlier in Step 3. The Service reexamined the sites using new information, resulting in the avoidance of 17 additional sites and leaving 28 sites still under consideration. Then, the Service used high- and medium-rank preference criteria to reduce the number of sites to eight for consideration by the Service's Board of Directors.

At the Board's request, the sites and data were presented to them in a manner that did not reveal the sites' geographic locations. In June 1991 the Board of Directors selected three of the eight potential disposal sites as candidate disposal sites for limited on-site investigations. Two sites were in the town of Ellington, and the other site was on the border of the towns of East Windsor and South Windsor, Connecticut. The sites are all within 2 miles of each other and about 12 miles from Hartford.

Opposition Groups Believe Sites Are Unsuitable

Both CORE and the Service believe the results of an independent contractor's review of the site screening supports their opposing views of site screening. CORE, in collaboration with several other groups, concluded that the site selection process was fundamentally flawed, lacked scientific rigor, and was administered in a manner that precluded objective analysis. The group concluded, among other things, that the Service had misapplied the slope preference criterion and that population density and growth in

²The Connecticut Siting Council is a state agency that regulates, among other things, hazardous waste facilities. The council issues certificates of public safety and necessity for such facilities.

the area made the candidate sites unsuitable for a low-level radioactive waste disposal facility.³

The Service, however, maintained that the sites would likely meet NRC's requirements for disposal facilities. Furthermore, the Service stated that CORE provided no credible information clearly disqualifying the sites and that only investigations of the sites could confirm or disprove their suitability.

We found that the lack of public involvement in implementing the site selection plan and the limited, site-specific knowledge of the three candidate sites may have contributed to perceptions that the process was flawed.

Application of a Preference Criterion Questioned

More potentially suitable sites remained—about 550—than the Service had anticipated after it applied exclusionary and avoidance criteria during the first three steps of the screening process. Therefore, to keep the screening process moving forward, the Service chose to apply a slope criterion first among all preference criteria. In this way, the Service deferred potential sites with slopes greater than 15 percent and reduced the number of sites to the more manageable number of 45.

CORE asserted that deferring over 500 sites on the basis of one preference criterion was indefensible as a scientific methodology because the approach depends primarily on the order in which equally weighted criteria are applied. According to CORE, if the Service had chosen to defer sites that did not satisfy a different preference criterion, such as water quality, in the same manner as it did for the slope criterion, all three candidate sites would have been deferred from consideration. Furthermore, CORE stated that the Service deviated from its site screening methodology by giving the slope preference criterion the same weight as an avoidance criterion.

According to the Service, it applied the slope criterion before other preference criteria because slope was a land feature that was mapped statewide and publicly available. Also, the Service believed that excessive

³CORE identified and provided us with information on a variety of problems it found with the design, implementation, and results of the Service's site screening process, as well as the Service's management style. Specifically, CORE criticized the process for its insufficient consideration of groundwater, transportation, agriculture, economic feasibility, and risk to public health and safety. For the purposes of this report, we limited our review to the issues relating to slope preference, population density, and public participation because CORE highlighted these issues to us in criticizing the Service's site screening process.

slope (greater than 15 percent) was a reasonable surrogate for low stability because high-slope lands are more likely than low-slope lands to be susceptible to landslides and erosion, among other things. Finally, the Service did not consider its approach to be a departure from its site selection plan because the plan was written as general guidance and did not state precisely how preference criteria were to be applied.

Questions Raised About Siting in Areas With Large Populations

CORE questioned whether the Service had met a requirement in the site selection plan not to locate the low-level radioactive waste facility in an area with high population density. As evidence of the area's population and growth, CORE stated that (1) approximately 75,000 people lived within a 5-mile radius of the three candidate sites, (2) 11 schools were located within 2 miles of the sites, and (3) the towns of South Windsor, East Windsor, and Ellington have grown in population by 28 percent, 13 percent, and 15 percent, respectively, in the 1980s.

The Service did not dispute CORE's demographic information but considered it to be "misleading." According to the Service, no site should have or would have been disqualified on the basis of population statistics because none of the laws and regulations on which the Service based its criteria limit the number of people that may reside within a 5-mile radius of candidate sites or the number of schools located near these sites. In addition, the Service did not consider population growth to be relevant because many of Connecticut's nonurban towns experienced significant growth during the 1980s. According to the Service, the growth rates of the three towns containing the candidate sites were not exceptional when compared with other towns.

Furthermore, according to the Service, local information concerning the sites' proximity to population areas and schools is a major concern that would have been considered during site characterization. The Service said that if it had found that public health and safety would have been endangered by a low-level radioactive waste disposal facility on a candidate site, the facility would not have been built there.

CORE also argued that the Service violated the intent of NRC guidance by selecting candidate sites that were within 2 kilometers (about 1.2 miles) from the residential property limits of population centers. The guidance is contained in an NRC regulatory instruction that describes acceptable methods for selecting sites for disposing of low-level radioactive waste. In addition, CORE said that Connecticut should follow New Jersey's lead in

using the NRC distance guideline as an exclusionary criterion to eliminate sites from consideration if they are within 2 kilometers of population centers.

According to the Service, it addressed the NRC regulatory guidance by eliminating land classified as “long term urban potential” in the state plan of conservation and development. The Service believed that this approach was superior to drawing an “arbitrary” 2-kilometer circle around an existing demographic feature. Furthermore, it stated that NRC guidelines are merely suggested ways of complying with NRC regulations and are not binding on states. Finally, the Service did not consider another state’s adoption of a particular solution to be compelling justification for Connecticut to do precisely the same thing.

Correspondence from NRC’s staff to the Connecticut attorney general and a member of CORE indicates that NRC agrees that the Service’s compliance with NRC’s regulatory guides is not mandatory. According to NRC staff, the agency’s review of license applications is directed toward regulatory compliance. Confirmation of compliance will not necessarily depend on a given distance from the disposal site to property limits as long as the site applicant can show that projected population growth and future developments are not likely to affect the disposal facility’s ability to meet NRC performance requirements. Nonetheless, according to NRC, it designs regulatory guidance to help identify sites that have a reasonable likelihood of being licensed. Hypothetically, sites that do not meet the 2-kilometer guidance may be difficult to license, NRC said, because a site containing thousands of homes less than 2 kilometers from its border would not be consistent with the intent of NRC guidance.

Service’s Credibility Questioned

CORE told us that the Service lost credibility because it did not adequately answer public concerns after it had announced the candidate sites. CORE maintained, for example, that the Service repeatedly refused to answer questions at public meetings, required the public to submit questions in writing to the Service, and then failed to respond to written questions.

The Service acknowledged that it encouraged the public to submit questions in writing after September 1991, when the answer was likely to have policy implications. The Service agreed that it is possible, given the large number of inquiries it received, that it did not respond to all questions submitted in writing. However, the Service said that any such

instances were unintentional and that its policy is to respond to questions within 1 week of receipt, when possible.

In addition, the Service said that, for the most part, factual questions were answered at public meetings. For example, the Service noted that, after announcing the sites, it held 10 public meetings, including 6 in the three host towns. According to the Service, it did nothing but answer questions from the audience at the six meetings, which altogether took more than 30 hours. A meeting in Ellington on June 19, 1991, was attended by about 2,000 people.

In responding to the facts in this report, CORE said that the Service made it difficult for the public to receive answers to its questions about site screening because of the Service's requirement that questions with policy implications be in writing. CORE told us that by September 1991 the Service judged virtually all questions to have policy implications and that the Service was simply trying to reduce the number of inquiries and public speakers. Furthermore, CORE said that, despite the Service's policy of responding to written questions within 1 week of receipt, the Service took months to respond to written questions, if at all.

Public Was Not Involved in Implementation of the Site Selection Plan

The Service incorporated several elements into its program to include public participation in portions of the siting process. For example, the Service developed its site selection plan with the active participation of the Low-Level Radioactive Waste Advisory Committee. In addition, the Service involved communities by holding public meetings, briefings, and hearings, and by inviting public review of draft documents, such as the site selection plan. The Service received comments from over 70 individuals and organizations, responded to the comments, and changed the draft plan on the basis of those comments.

However, the Service and its contractor implemented the plan in a way that prevented public knowledge of all results of interim site screening and selection until it had made its decision on the three candidate sites. According to the Service's low-level radioactive waste program director, two objectives chosen by the Board of Directors had a "profound effect" on the site screening and selection process:

- to eliminate political pressures and geographic and parochial biases, either real or perceived, from the candidate site selection process, and to be strictly impartial in its deliberations; and

- to be an active participant in selecting the candidate sites.

To meet the first objective, the Board of Directors selected a “blind” or confidential site screening approach utilizing publicly available statewide data of uniform quality. Therefore, information on interim site screening activities and results was not made public. According to the Service, only 14 staff members of the Service, Battelle Memorial Institute, and Battelle’s subcontractor were aware of the sites being considered for a low-level radioactive waste facility. Intermediate screening results also were not revealed to the Board of Directors so that the Board could actively participate in selecting candidate sites rather than just approving a recommendation from the Service staff or contractor. The Board had decided that the Service’s staff would present it with extensive data on between 8 and 12 potential sites and that the Board would pick the 3 finalists.

The Board was given the data in a “geographically neutral” way so that it did not know the true locations of the sites. The Board examined the data, grading standards, and grades for all criteria for the eight sites. The Board then selected three preferred sites using an approach similar to that used by the Service in screening the state. Thus, neither the Board nor the public knew the locations of the sites until after selection was made on June 10, 1991.

Furthermore, delays in publishing the methods and results of the first three steps of site screening and selection may have contributed to public perceptions that the Service did not follow its established site selection procedures. In response to comments on the site selection plan, the Service said that a draft site screening report—which would provide interim site screening activities and results—would be made available for public review and comment when the three candidate sites were selected. However, the site screening report was not published until October 1, 1991, over 3 months after the Service announced the candidate sites. This delay left the public without the information needed to comprehend and evaluate the site selection process. According to Service staff, the Service delayed publishing the report to investigate the effect of two site screening errors.

**Limited Knowledge of
Candidate Sites**

At the outset, the Service was aware of the sensitive, unpopular, and controversial nature of siting a low-level radioactive disposal facility. Indeed, much of the public outcry about the results of the Service’s site

selection process was due to the close proximity of the three candidate sites to homes, schools, and population centers. Nevertheless, the process that the Service selected to identify candidate sites for on-site investigations was limited because it restricted the use of site-specific information to data available on a statewide basis.

A fundamental principle of the Service's siting approach was that the screening and selection of candidate sites should be made using comparable data. To do this, the Service compiled data primarily on a statewide basis from state and federal sources. As a result, local data from jurisdictions in proximity to potential sites was not requested. According to the Service, the following three policies precluded it from requesting local data during the three-step site screening and selection process:

- The Service used only uniform, publicly available statewide data to prevent bias from entering the process. In this way, less affluent towns would not be at a disadvantage because they could not, for example, produce high-quality maps of wetlands.
- The Service decided that it was in the public interest to conduct screening confidentially to minimize public turmoil and disruption of local real estate markets. This prevented the Service from contacting local officials and residents for detailed local information.
- The Service Board of Directors was concerned that their own personal or political biases might affect the process if they were aware of towns under consideration. To avoid this, the Board decided that their deliberations would be "blind."

The Service contends that the data used in site screening were the best available data on a statewide basis or the accepted standard source for Connecticut. In addition, local data would have been used in characterizing candidate sites during the final step of the site screening process.

Independent Review Finds Site Screening Problems

Following the announcement of the three candidate sites in June 1991, the Service discovered two significant errors in the work of its site screening contractor.⁴ Although the Service concluded that neither error would have changed the outcome of statewide screening, the Service questioned the

⁴In one instance, the contractor excluded all state-owned lands from consideration, when only state parks and forests should have been excluded. In another instance, the contractor assigned the wrong rank in applying a transportation criterion, which allowed a potential site to be dropped from consideration at an earlier step than it otherwise would have been.

accuracy of the process and hired an independent contractor to review the process and procedures followed during site screening.

In January 1993 the independent contractor reported that the “vast majority of data collected and analyzed for the site screening process was applied in accordance with the Service’s site selection plan and in a manner that utilized the most current and applicable data.” However, the independent contractor identified “a limited number of data selection, quality assurance and operational deficiencies and errors” in the site screening. According to the independent contractor’s staff, the report also made some recommendations about any future statewide sites screening processes. Two of the independent contractor’s 14 findings and recommendations relate to issues we discussed earlier and are summarized below:

- Many local mapping and data sources were more accurate and detailed than certain statewide sources. The contractor recommended that data should be requested from communities at the beginning of site screening and used before site characterization.
- The slope criterion tended to eliminate entire sites with land slopes greater than 15 percent. The contractor recommended that the 15 percent slope criterion should be applied only to the active areas of potential sites and not to the areas containing buffer zones.

The remaining findings and recommendations addressed the independent contractor’s quality assurance, data collection, data analysis, and implementation of specific steps or processes during site screening.

Both the Service and CORE believe the results of the independent contractor’s review support their opposing positions about the validity of the site screening process. For example, the Service said that the independent contractor did not find new major errors and that the errors and issues identified by the independent contractor would not have materially altered the results of site screening. On the other hand, CORE believed that the independent contractor’s findings validated many of its arguments and helped to repudiate the Service’s site selection process. For example, CORE said that the site screening contractor systematically deferred collecting the best data and deviated from its own plan. According to CORE, the Service’s policy of examining locally available, site-specific data only during site characterization, meant, by definition, that no information offered about a potential site would be deemed credible by the Service.

Connecticut Adopts a New Siting Approach

The Service had intended to conduct initial characterization on the three candidate sites shortly after it announced their selection. However, negative local reaction was immediate, and public opposition groups were formed. In addition, several other events altered the Service's plans:

- In January 1992, the Connecticut General Assembly's Legislative Program Review and Investigations Committee concluded that by focusing on technical aspects of potential sites, the Service fueled a perception that the site selection process ignored human values and needs.⁵ The committee said that it appeared that the only way to force the Service to redirect its site selection approach was through legislative action.
- In January 1992 the governor recommended that the General Assembly redirect the site selection process so that population density and other factors could be considered in establishing siting criteria.
- The General Assembly proposed two bills to change the way the Service conducts site selection for low-level radioactive waste disposal facilities.

In May 1992 the governor signed legislation that directed the Service to restart the process for selecting a site for a low-level radioactive waste disposal facility. The new law requires the Service to develop plans for a permanent disposal facility and a temporary storage facility for low-level radioactive waste. A temporary facility is one that operates for 5 years or less. The Service submitted both plans—which include a significant amount of public involvement—to the Connecticut General Assembly on February 1, 1993.

To encourage a spirit of cooperation, the Service's Board of Directors ordered Service staff to pursue a volunteer process for siting a permanent disposal facility. A draft plan for this approach was adopted after a series of public meetings. Under this new approach, only sites that have been voluntarily offered will be considered as potential sites. According to the draft plan, a volunteered site is one that has been approved by the local electorate in a referendum. If a volunteer approach does not result in a site that protects public health and safety and the environment, the Service will prepare another site selection plan that will focus on a statewide screening approach.

The Service also developed a draft plan for building a centralized, temporary low-level radioactive waste storage facility. According to the plan, however, the state does not currently need a temporary storage

⁵The Connecticut General Assembly created the Legislative Program Review and Investigations Committee to, among other things, evaluate the efficiency, effectiveness, and statutory compliance of selected state agencies and programs.

facility because most of Connecticut's low-level waste generators have or will develop the capacity to store their wastes at their sites. The Service will reassess the need for a temporary low-level radioactive waste storage facility if there is a significant change in the management of waste at generators' sites or in 1995, whichever occurs first.⁶

Observations

In one sense, the Service achieved its initial objective of selecting three candidate sites for investigation on the basis of the systematic application of technical and legal criteria to fewer and fewer land areas and then to specific sites. The Service's site screening process generally appeared to be reasonable because it included (1) advice and assistance by an advisory committee appointed by state political leaders; (2) a written plan outlining siting criteria and screening methods; (3) opportunity for public review and comment on the siting plan; (4) area and site screening activities that, for the most part, followed the approach described in the plan; and (5) public information about the program.

In another sense, however, the Service's siting process may have contributed to its ultimate failure. By relying on readily obtainable data and a "blind" site selection procedure, the Service selected three candidate sites that were vulnerable to challenge on demographic grounds before the Service had obtained detailed demographic information on the sites. Furthermore, CORE's argument that the Service gave undue weight to the slope-related preference criterion has some merit because that criterion had been ranked in the same "high" category as 11 other preference criteria but was used alone to reduce the number of candidate sites from 550 to 45. Finally, the lack of direct public participation in the implementation of the Service's site screening and selection activities may have contributed to the perception by some that the process was not objective.

The Service's decision not to publicly disclose the interim results of the site screening and selection process illustrates one of the inherent difficulties in acquiring sites for unpopular facilities such as low-level radioactive waste disposal facilities. Because siting authorities frequently begin their site selection processes by screening a very large area, such as an entire state, local governments and citizens may not become interested and involved until a few candidate sites have been identified. In Connecticut, for example, the Service received comments from

⁶According to Service staff, storage of waste may be effected if the commercial disposal facility in Barnwell, South Carolina—where Connecticut's low-level radioactive waste generators send their waste—is closed in 1994, as planned.

approximately 70 individuals and organizations on a draft of its site selection plan over a comment period of about 18 months. In contrast, after the Service announced that the town of Ellington contained two of the three candidate sites, 2,000 people attended a public meeting in Ellington on the selected sites.

To fulfill its revised mandate to select a site for a disposal facility, the Service has now abandoned its statewide site screening approach in favor of seeking a volunteer host for the facility. Although the siting process may be prolonged and controversial, it is essential that the Service make it public by encouraging extensive participation and by documenting and articulating results and decisions at specified points throughout the proceedings. Such a collaborative siting effort may help to establish and maintain credibility in the volunteer process. However, given the controversial nature of siting nuclear facilities, there is still no guarantee that a volunteer process will result in the acceptance of a site that is selected and in subsequent development of a disposal facility at that site.

Incentives to Communities Vary Widely

Site selection for facilities, such as prisons and halfway houses, that are necessary for achieving generally accepted public purposes often generates controversy and opposition from the communities proposed for their location. Despite their broad societal benefits, controversial facilities may be unwanted because of real or perceived negative side effects on the host community: health and safety risks, diminished property values, adverse environmental and social impacts, and the community's fear that by accepting one facility, it will be targeted for more controversial facilities.

Thirteen states—including Connecticut—are actively planning to develop new low-level radioactive waste disposal facilities. Those states are at various stages in the siting process and have incorporated a wide range of incentives for host communities. Connecticut uses some incentives found in other states such as direct payments to communities, property value guarantees, and oversight opportunities. Other forms of incentives include preferential hiring and basic training in radiation and waste management issues.

Connecticut's Incentive Package

Providing financial incentives and other benefits to host communities is a common approach taken to overcome local resistance to accepting such facilities and to reduce the burdens of hosting an unwanted facility. Connecticut's facility siting law provides the following rights and benefits to both the community in which a low-level radioactive waste disposal facility is built as well as to the most affected adjacent municipality:

- Payment in lieu of taxes. The facility operator will pay the host community the amount the municipality would receive if the property were a private industrial facility.
- Percentage of gross receipts. The facility operator will make quarterly payments to the host community and the most affected adjacent municipality that are based on an assessment of gross receipts.
- Property value guarantee. The value of the property within a 2-mile radius of the facility's boundary will be protected from potential impact by a property value guarantee. The guarantee begins when the site is selected and ends 5 years after the facility begins operation.
- Drinking water testing. The facility operator will pay annually to sample and test every well that supplies water within 1 mile of the facility.
- Full access to the facility. The host community's chief elected official or designee will have access to the facility and its records.

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- Funds to hire a full-time town employee. The facility operator will provide funds to the host community to hire a municipal employee to provide oversight and on-site inspection.

In addition, to sharing a percentage of the gross receipts, the host and adjacent communities will share in

- \$150,000 to mitigate the social and economic impacts of the facility,
- a local project review committee to represent the towns during facility development, and
- \$100,000 to the local project review committee to obtain technical assistance for reviewing the facility's application.

Pursuant to the state's new facility siting law (Public Act 92-45), the Service submitted a plan for siting a low-level radioactive waste disposal facility to the General Assembly on February 1, 1993. According to the Service's November 1992 draft plan for a volunteer approach to siting, state provisions for local control, impact mitigation, and compensation are not adequate. To remedy this, the draft plan would establish existing provisions as the base from which a town could negotiate additional conditions for hosting the low-level radioactive waste disposal facility. Subjects for negotiations might include local participation in selecting the site contractor, grants to the host community to study and identify potential social and economic impacts of the facility, and infrastructure improvements.

Incentives Used by Other States

Forty-two states, including Connecticut and New Jersey, have joined together in nine interstate compacts to dispose of their low-level radioactive waste in compliance with federal law. Eight other states, the District of Columbia, and Puerto Rico are not members of compacts. States are at different stages of attempting to site low-level radioactive waste facilities. Some states have laws prescribing rights and benefits, while others are developing incentive packages. Generally, siting authorities combine financial and nonmonetary incentives to compensate host and neighboring communities.

Financial Payments to Communities

At the time of our review, 7 of the 13 states that were developing low-level radioactive waste disposal facilities had formally approved incentive packages. Table 3.1 shows the states that had approved such packages.

Only California and Ohio had no plans to dispense payments to communities.

Table 3.1: States Approving Incentives Packages

State	Approved
California	No ^a
Connecticut	Yes
Illinois	No
Maine	Yes
Massachusetts	Yes
Nebraska	Yes
New Jersey	Yes
New York	No
North Carolina	No
Ohio	No
Pennsylvania	Yes
Texas	No
Vermont	No

^aThe California siting authority was considering providing some lump-sum payments to the host community.

Twelve states will provide for or were planning to provide for direct financial payments to host towns, counties, and/or towns near proposed sites. Such payments will come from several sources, including the states, the low-level radioactive waste management authorities, and/or facility operators. Table 3.2 shows which types of communities will receive direct financial payments.

Table 3.2: Direct Financial Payments by State

State	Payments to host community	Payments to adjacent community	Payments to county
Connecticut	X	X	
Illinois	X		
Maine	X		
Massachusetts	X	X	
Michigan	X	X	X
Nebraska	X		X
New Jersey	X		
New York	X		
North Carolina	X		X
Pennsylvania	X		X
Texas			X
Vermont	X		

The kinds of financial payments communities will receive differ by state and are linked to different variables. For example, some payments are connected to the amount of waste the facilities take in annually and others are linked to property taxes. Some communities will receive compensation for costs associated with the low-level radioactive waste facility. The following examples illustrate the variety of financial payments approved or being considered by some states:

- In New Jersey, the owner or operator of the facility would annually pay the host municipality 5 percent of annual gross operating receipts. These funds would be used for costs related to the operation of the facility, such as police and fire services, a local health inspection program, road construction or repair, and costs directly related to the facility.
- In Massachusetts, local community supervisory committees would receive direct compensation to ensure that concerns of citizens and officials are represented during site characterization activities. The committees would receive funds from the state's low-level waste siting authority to, among other things, choose the facility operator and select the facility technology best suited for the site and host community.
- In Michigan, the host community and any other county or municipality in the state would receive compensation for reasonable and direct costs related to the facility including, not limited to necessary road and other capital improvements, emergency response training, and other specialized personnel training.

-
- In Nebraska, the facility operator must make annual payments to the state, with \$300,000 annually reserved for community improvements. One-half of this amount will go to communities within 10 kilometers of the facility and the one-half will go to communities in the county containing the facility.

Other Benefits

States are also using other benefits to try to compensate communities and overcome resistance to siting low-level radioactive waste facilities. These benefits can include financial and nonmonetary incentives, such as property value guarantees, agreements to hire local residents, and health studies.

Connecticut, Maine, and Nebraska have enacted mechanisms to provide compensation to host communities for loss of property values. In Maine, for example, state law requires the siting authority to offer a one-time property value protection plan to offset any reduction of property values near the site. Under this plan, the value of property near the site after construction of the disposal facility would be compared with the value before the site was selected and any loss of value attributable to the facility would be paid to the property owner. Details of the plan would be negotiated with the potential host community and any communities bordering the site.

In Illinois, the state negotiated a community agreement prescribing incentives and benefits to the city of Martinsville for hosting a low-level radioactive waste facility.¹ The negotiated agreement included an economic development section that imposed certain requirements on the state and the facility operator to ensure that the facility would promote economic development and new business opportunities and jobs for people living in the area. For example, the facility contractor was required to provide about 200 construction jobs during initial facility construction and at least 100 permanent jobs in the county and to give hiring preference to local residents for those jobs. Also, the contractor was required to use its best efforts to give facility-related contracts to local businesses and individuals and assist Martinsville in attracting new businesses to serve the facility.

Finally, states have approved or are considering a variety of other benefits as components of their incentives package. For example, New Jersey offers voting membership on the siting board and full participation in the

¹Although the Illinois siting commission for a low-level radioactive disposal facility recently rejected the low-level radioactive waste disposal site in Martinsville, the agreement illustrates the kinds of benefits being negotiated.

administrative law judge's review process. Vermont's draft incentives package includes training in the fundamentals of radiation and radioactive waste management to interested residents. In Pennsylvania, the facility operator would monitor the environment and water supplies on and around the site.

Observations

States are developing incentives to compensate host communities and to overcome community resistance to accepting the states' responsibility of siting low-level radioactive waste disposal facilities. In Connecticut, the final incentives package will depend on negotiations between the Service and the communities most directly affected by the facility. Such negotiations could help to establish public confidence in the volunteer siting process if the negotiations demonstrate that the Service is responsive to the host community's needs. In this regard, the state legislature, the Service, and the public may find it useful to consider the incentives are being discussed in other states and those incentives' applicability in Connecticut.

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Related GAO Products

Nuclear Waste: New York's Adherence to Site Selection Procedures Is Unclear (GAO/RCED-92-172, Aug. 11, 1992).

Nuclear Waste: Slow Progress Developing Low-Level Radioactive Waste Disposal Facilities (GAO/RCED-92-61, Jan. 10, 1992).

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