

# THE NEW YORK APPROACH TO LOW-LEVEL WASTE SITING --BALANCING TECHNICAL, SOCIAL, AND POLICY NEEDS

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## ABSTRACT

The New York State Low-Level Radioactive Waste Siting Commission is carrying out a four-step process to select one or more sites for disposal of low-level radioactive waste. Throughout each of these steps, the Siting Commission made a special effort to consider "volunteer" sites in communities that may be interested in hosting the facility. This process has been structured to recognize that the best sites from a technical standpoint will not be developed without public acceptance. On the other hand, public acceptance alone will not ensure successful licensing of a technically inferior site.

## INTRODUCTION

The State of New York is in the advantageous position of being neither the first nor the last host State to actively search for candidate sites for low-level waste disposal. The lessons learned by other states, such as Texas, California, and Illinois, have been used to combine approaches that seem to be working and to avoid those have been less successful. On the other hand, by not being the last, New York has not been discouraged from hoping that its approach will work and set a precedent for others involved in siting controversial facilities of any kind.

The New York Low-Level Radioactive Waste Management Act, passed in 1986, created the New York State Low-Level Radioactive Waste Siting Commission and gave it responsibility for selecting one or more sites for a disposal facility and a disposal method to be used at the site. The Commission is to seek certification of the site and method from the Department of Environmental Conservation (DEC).

In the past year, the Commission has moved rapidly to carry out its responsibilities. An approach to site selection that combines the best of others' approaches has been defined. A decision-making process has been developed that recognizes the political, public, and economic realities of the technical decisions. The Commission has chosen two key tools, a geographic information system and performance assessment, to enhance the technical defensibility and public understanding of the decision-making process. All of these have been applied to screening the State for areas and sites and the Commission is now comparing the sites to identify candidate sites for detailed characterization by the Summer of 1989.

## GUIDING PRINCIPLES OF THE NEW YORK SITING APPROACH

The Siting Commission has considered several key principles in designing the State's siting program. First, the site selection criteria and procedures are driven by the regulatory requirements of 6NYCRR Part 682, DEC's regulations for low-level waste disposal. Every criterion is derived from a performance objective or regulatory requirement in Part 382.

This regulatory basis means the process must take into account the different site suitability requirements for each

of the types of disposal technologies. This is particularly complicated in New York because of the legislative and regulatory requirement to consider mines as well as aboveground and near-surface belowground technologies.

Because of the rapidly approaching deadlines for beginning operation of a disposal facility, the Commission must identify quickly and efficiently a manageable number of candidate areas, potential sites, and then candidate sites. Therefore, criteria must be applied in a way that maximizes the use of existing information.

Finally, the Commission has defined a process that is expected to identify potentially suitable sites, but may not identify every possible site within the State. The Commission has also designed the process to identify and accommodate a range of value judgments on the relative importance of the siting factors but has recognized that the selected sites may not be considered the "best" by every single viewer. The determination of suitability of the selected site for certification must balance public acceptance and policy considerations with technical requirements.

## SITE SELECTION METHODS

A site selection plan has been prepared to define the methods, criteria, application steps, and decision-making processes the Siting Commission is employing to select low-level waste sites. The Commission has chosen to combine two methods for selection of sites for low-level waste disposal. The primary method is stepwise screening of the State to identify candidate areas, then potential sites, and finally candidate sites for detailed site characterization. The candidate sites will be fully characterized to provide information needed to select one or more preferred sites for certification and licensing.

The State has chosen stepwise screening as the primary selection method because it is expected to provide a technically defensible basis for decision-making. Such a process allows clear documentation and traceability for the siting process. New York has a NEPA-equivalent State environmental quality review act requirement for which it will be necessary to demonstrate that reasonable alternatives have been identified. It is believed that a process that begins with a screening of the entire State and methodically narrows to a slate of sites will satisfy this requirement. The stepwise nature of the screening process allows the Commission to

apply siting criteria in the most efficient way. Such a process provides a number of key decision-making points where public involvement can be solicited and also allows for public education efforts to gradually build as the focus of the screening process narrows down to the more local level where the degree of public interest and concern is expected to be the greatest.

In parallel with the stepwise screening process, recommendations of areas or sites are being sought and encouraged. Such "volunteers" may include communities that express interest in hosting a disposal facility, individual property owners offering a particular site, or third parties that suggest a particular location. Such volunteers will be subject to the same technical and regulatory requirements applicable to areas and sites identified in the screening process. A procedure has been developed and applied in several cases to quickly assess the viability of such volunteers. Unless exclusionary conditions are identified for a volunteer site supported by a community, every effort is being made to keep the site under consideration until the point where it can be compared with the sites identified from screening. Recommended sites without community support must be obviously superior compared to other potential sites in order to continue evaluations beyond the initial steps.

#### CRITERIA DEVELOPMENT

The Commission has defined two types of siting criteria: exclusionary and preference. The exclusionary criteria address conditions that are prohibited by law or regulation for low-level waste disposal facilities. The preference criteria describe conditions that are desirable for enhancing the performance of the disposal facility. The Commission chose to use preference rather than avoidance criteria for two reasons. First, avoidance criteria have too often been interpreted in other siting projects to equate to exclusionary criteria. Second, this approach enhances public perception of the selected sites because it accentuates the positive rather than minimizing the negative. The approach taken to define the criteria involved the following steps:

- Identification of the performance objectives
- Identification of specific regulatory requirements
- Identification of other environmental, social, policy, and economic objectives
- Categorization of the objectives and requirements into broad siting factors
- Identification of specific measures of compliance with the objectives and requirements for each siting factor
- Identification of the level for each measure at which an area/site clearly should not be considered at all (i.e., exclusionary level)
- Definition of the levels for each measure at which the conditions would be most favorable, more favorable, favorable, less favorable, or least favorable; preparation of a preference criterion

statement and assignment of scaling factors corresponding with the levels of favorability

This process led to the identification of 13 siting factors for which 17 exclusionary and 44 preference criteria were defined.

#### WEIGHTING FACTORS

The Commission recognized that some criteria are more important determinants of the overall suitability of a site than others. To make comparative technical evaluations of candidate areas and sites, the Commission found it necessary to make value judgments about the relative importance of each siting criterion by assigning weighting factors. The Commission chose to use a participatory process to assign the weighting factors. First, Commission staff and members of the WESTON team performed weighting exercises. A workshop was then held to seek input on similar weighting exercises from the Low-Level Radioactive Waste Advisory Committee and other representatives of State and local government, industry, interest groups, and others. The results were then compared and revealed a remarkable similarity of weighting factors assigned by Commission staff, WESTON, and workshop participants, with the average assigned factors varying only a few percentage points.

#### CRITERIA APPLICATION STEPS

Once the criteria, scaling factors, and weighting factors were defined, the Commission sought the most efficient way to apply them. Obviously, it would not be very timely or cost effective to collect and analyze data for all 61 criteria for the entire State. Moreover, the Commission needed to get a rapid start by initiating screening even while the site selection plan was undergoing public review.

Therefore, a four-step screening process has been developed for identifying candidate sites for site characterization. The four steps are as follows:

- Step 1 Statewide exclusionary screening to eliminate areas where regulatory or legal constraints prohibit the development of a low-level waste disposal facility.
- Step 2 Screening of the remaining areas using additional criteria to identify about ten candidate areas with the greatest potential for suitable sites.
- Step 3 Detailed screening of the candidate areas, limited on-site observations, and comparative evaluations to identify about eight potential sites that may be suitable.
- Step 4 Limited on-site studies of the potential sites to eliminate any sites having obvious "fatal flaws" or characteristics that could make certification more complicated; selection of four candidate sites for detailed site characterization.

#### STATEWIDE EXCLUSIONARY SCREENING RESULTS

The Siting Commission has completed the first two and part of the third step of site selection at this date. In the first step, the entire State was screened to exclude (1) all primary

public water supply aquifers, (2) towns and cities with population densities greater than 1000 persons per square mile, (3) units of the National Wilderness Preservation, National Wildlife Refuge, and National Park Systems, (4) the Adirondack, Catskill and other State parks, and (5) Indian reservations. Application of these five criteria eliminated 30 percent of the State from further consideration (Fig. 1). It should be noted that State parks accounted for most of this excluded area.

The results of the statewide exclusionary screening were subjected public review in a series of six public meetings around the State.

#### CANDIDATE AREA IDENTIFICATION RESULTS

The second step was completed in December 1988. The screening activities considered additional exclusionary criteria for aquifers, water bodies, air pollutant nonattainment areas, and other Federal and State protected lands. The Western New York Nuclear Service Center at West Valley, which was previously used for low-level waste

disposal, is prohibited by law from consideration was also excluded in this step. Application of these new exclusionary criteria eliminated another 10 percent of the State from consideration. Fourteen preference criteria for geology, natural resources, groundwater hydrology, surface water hydrology, meteorology, population density, Federal and State protected lands, and proximity to waste generators were then considered.

Point, line, and polygonal data for each of the criteria were inputted to a Geographic Information System (GIS). Through the GIS, a favorability map was generated for each preference criterion to show the degree to which conditions in a particular area satisfy the criterion. Finally, a composite favorability map was prepared with the GIS. In doing so, any area with a score of 0 for any criterion was excluded from further consideration. For each of the remaining areas, the score assigned to the area for each criterion was multiplied by its associated weighting factor. All weighted scores for each area were then added to determine a composite

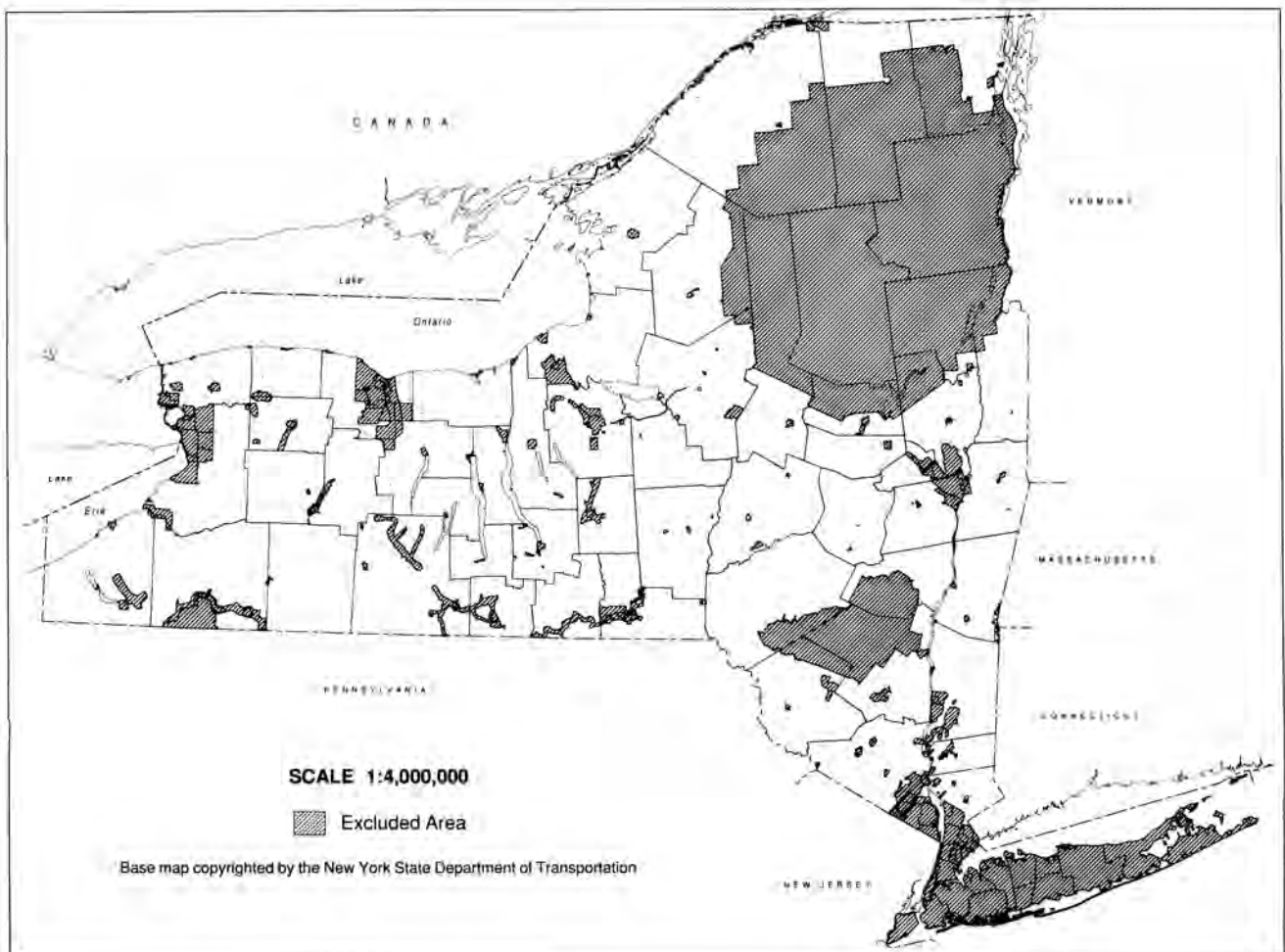


Fig. 1. Statewide Exclusionary Screening in New York.

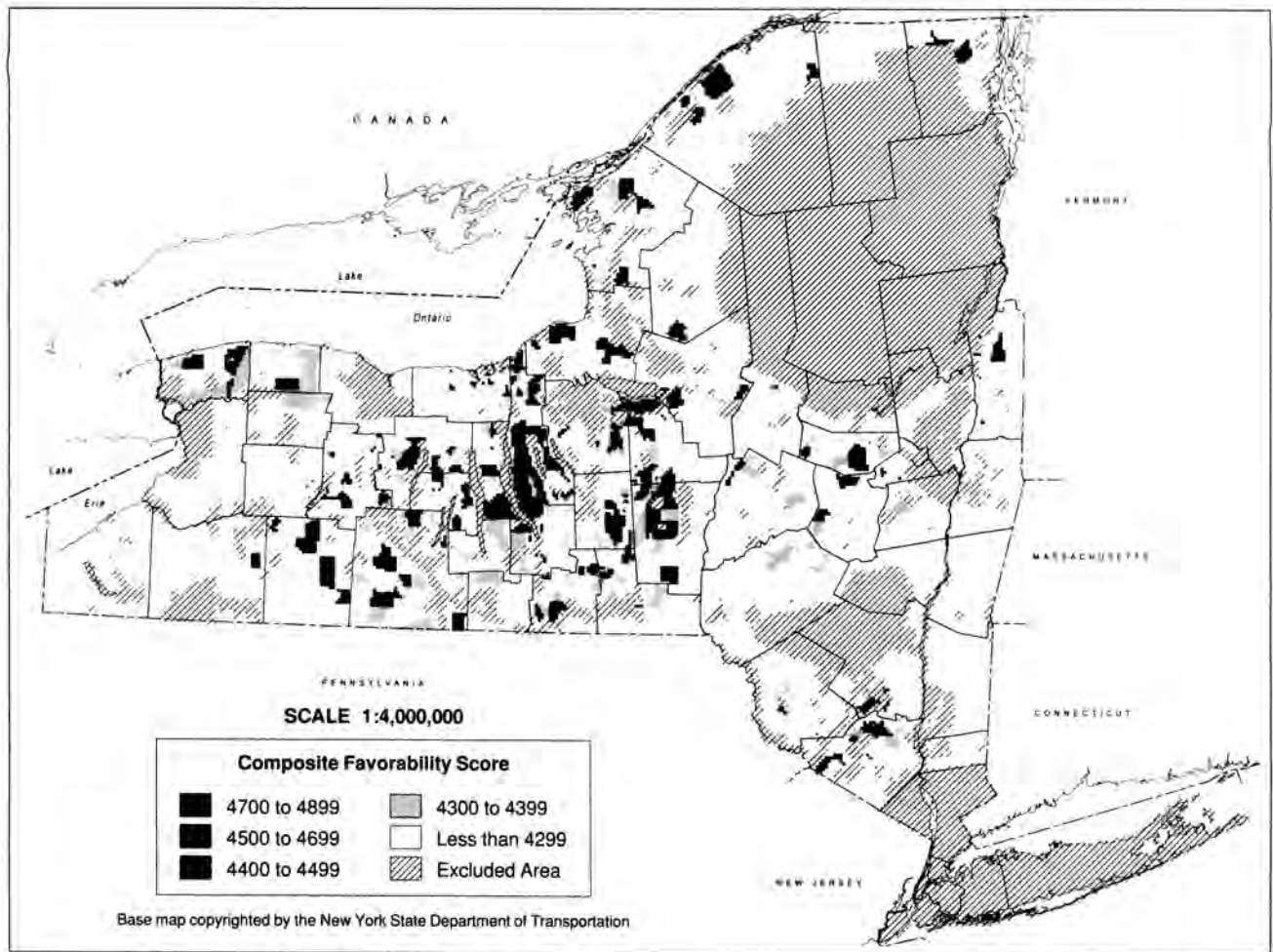


Fig. 2. Composite Favorability for Candidate Areas in New York.

weighted score. A composite map was then prepared to show the composite weighted scores for all areas (Fig. 2).

Using the GIS, the Siting Commission then performed two series of sensitivity studies. The first examined the effect of setting various cutoff composite scores for defining candidate areas. These studies showed that a cutoff score of 88 percent of the possible points allowed the Commission to readily identify about 30 potential candidate areas ranging from 50 to several hundred square miles in size located throughout the State. The total size of these areas was about 5 percent of the State.

The second set of sensitivity studies looked at the effects of changing some of the weighting factors. Eleven alternative cases were defined to delete criteria from the composite score, increase the weight given to one or more criteria, or limit the composite score analysis to four or six criteria generally considered to be very important. Some changes from one weighting scenario to another were found, but most of the potential candidate areas identified

previously continued to display favorability scores above the cutoff level.

An analysis was performed with the GIS to determine in how many of the weighting factor sensitivity analyses a particular area's composite score would exceed the cutoff level. All but 5 of the 30 potential areas exceeded the cutoff score in all the sensitivity cases. The remaining areas satisfied all cases except those where extra weight was given to proximity to waste generators. The consistency of results from the sensitivity studies provided assurance of the reasonableness of the weighting factors used by the Commission. It is interesting to note that the same candidate areas would have been identified if the screening had considered only criteria for thickness and extent of the geologic unit, distance from aquifers, distance from groundwater discharge zones, soil characteristics that retard radionuclide movement, surface water quality, and population density. The other five criteria had very little effect on the outcome.

At this point, the Commission wanted a preview of the next step to have better assurance of finding suitable sites

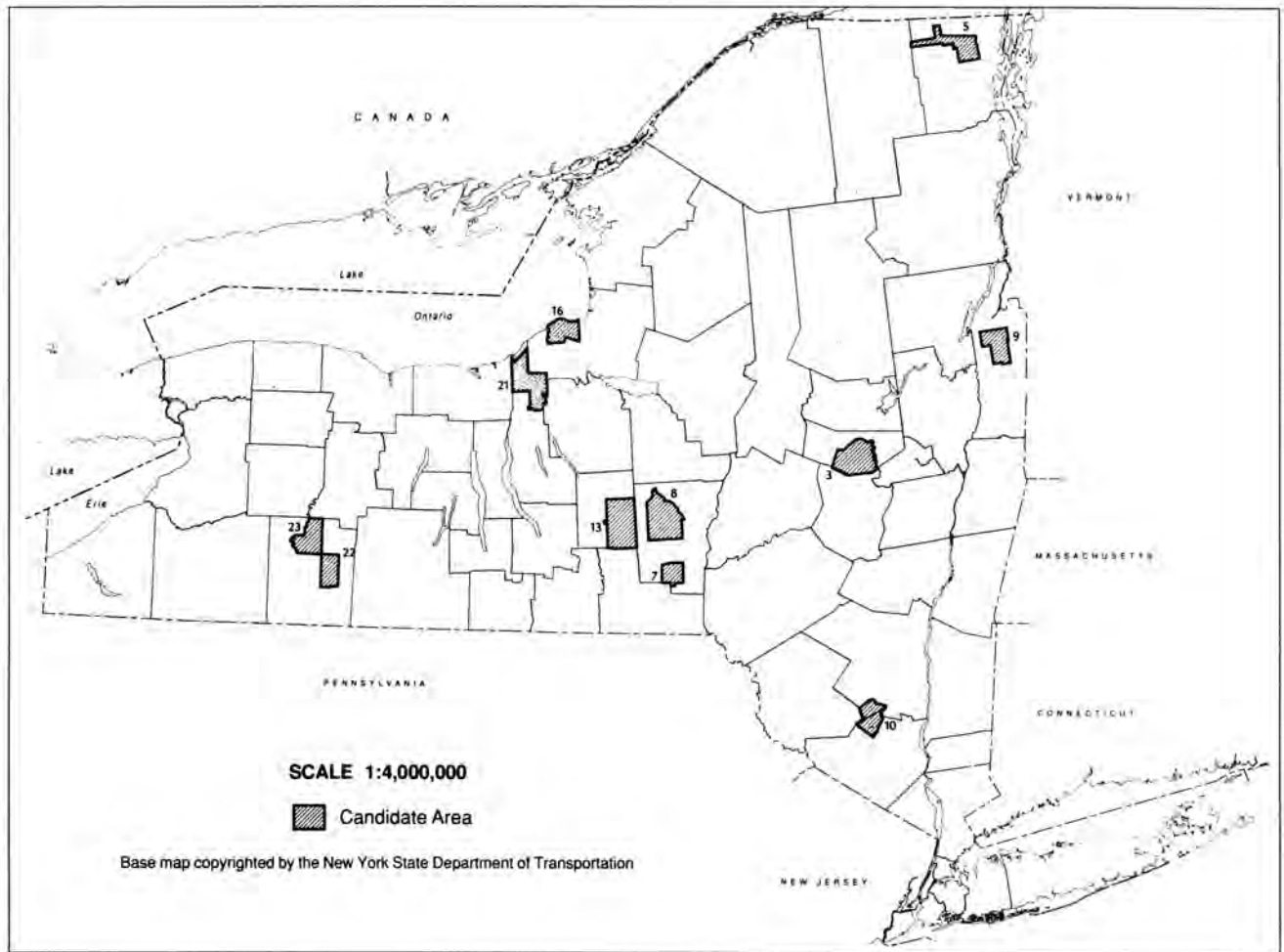


Fig. 3. Candidate Areas in New York.

in the candidate areas. Therefore, a limited, largely qualitative evaluation of conditions in the potential candidate areas for selected criteria to be applied in detail in the next step was performed. This effort turned out to be extremely valuable because it revealed that a number of the areas that had achieved very high scores in the GIS screening appeared less favorable when the additional criteria were evaluated and vice versa.

The final selection of candidate areas looked at the score resulting from the GIS screening and the results of evaluations of third-step criteria to determine the favorability of each potential candidate area for finding potentially suitable sites. Those areas that appeared at least favorable were also evaluated for their potential for finding new mine locations, proximity to waste generators, and geographic diversity. This analysis led the Commission to select ten candidate areas, ranging from about 50 to 150 square miles in size (Fig. 3). These ten areas comprise about

2 percent of the State, so a dramatic reduction in the area under consideration took place during the second step of the siting process.

Public meetings were then held in each of the candidate areas to present the results of candidate area identification and gather public comments on the areas. An effort was also initiated to gather data on local conditions from local sources and participants the public meetings. This local data is being incorporated in the next steps of the siting process.

#### POTENTIAL SITES IDENTIFICATION

The Siting Commission is now in the process of screening the ten candidate areas to identify potential sites for waste disposal. This involves three types of activities. The first, screening using the GIS, is nearly complete. In this activity, the criteria from previous screening steps are being carried through the data base and seven more exclusionary criteria and 16 preference criteria are being added. Several

of the criteria from previous steps are being expanded to include additional types of features. The data are being processed and analyzed as in the previous step and the composite analysis is expected to lead to the identification of about 30 to 40 potential siting areas.

Limited site inspections will be performed at each of the potential siting areas to confirm the conditions assigned in the GIS screening and to verify that there are no obvious reasons (e.g., a shopping center built on the site) to eliminate or set aside the site from further consideration. This activity is expected to reduce the number of sites under consideration by as much as half.

The potential sites remaining under consideration will then be evaluated in terms of a number of nonspatial criteria such as socioeconomic. Limited performance assessments will be performed for each site to develop indices of relative performance among the sites for atmospheric dispersion, surface water releases, and groundwater releases. The sites will then be compared in terms of scores from the GIS screening, conditions for nonspatial criteria, relative performance, and other factors such as:

- Flexibility to accommodate more than one disposal technology.
- Relative costs to characterize, construct, and operate a disposal facility at the site.
- Anticipated level of public support or acceptance.
- Types and amounts of impact mitigation, compensation, and incentives that might be required.
- Other policy considerations identified through public participation.

#### CONCLUSION

New York has developed a rigorous process for methodically screening the State to identify candidate areas,

potential areas, and finally, candidate sites for site characterization. The process is designed to balance geologic, hydrological, and environmental considerations with social, economic, and political needs. It is structured to lead to a slate of reasonable alternatives from which a preferred site can ultimately be selected in a way that complies with the requirements for the DEIS and reduces public criticism. It recognizes and accounts for differences in value judgments on the important parameters for describing the "best" site. The potential value of "volunteer" sites is recognized by making every effort to consider any such sites in parallel with the screening process. Finally, the process is designed to identify sites in a rapid and efficient manner while building documentation and traceability for the siting process.

The process has been applied through the first two steps and appears to have satisfied the objectives to this point. The State, consisting of almost 50,000 square miles, has been progressively screened down to ten candidate areas occupying 2 percent of the State in a six-month period. These are now being screened and are expected to yield eight potentially suitable sites in the next four months. Preliminary on-site studies will be completed during the summer to support selection of four candidate sites for detailed characterization.