

NEW YORK STATE'S LOW-LEVEL RADIOACTIVE WASTE STORAGE STUDY

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ABSTRACT

Like their counterparts in other states, low-level radioactive waste (LLRW) generators in New York State face the prospect of being unable to transfer their LLRW off site beginning January 1, 1993. How long will those generators be able to accumulate and store LLRW on site before activities producing the waste are seriously interrupted? Would a centralized storage facility be a more economically viable solution for medical and academic institutions? The New York State Energy Research and Development Authority is conducting a study that seeks to answer these and a variety of related questions over the coming year.

This paper describes the origin and design of the study. It reviews the plans for generator-specific data collection, the method for assessing generator storage capability, and the approach to evaluating economic viability.

In pursuing this study, the Energy Authority has attempted to incorporate the views of the broad spectrum of LLRW interests. The formation and role of the Study Review Panel, established specifically for that purpose, is discussed.

Finally, the paper reviews some of the more interesting questions and issues raised in the development of the study and relates the study to the State's other LLRW management activities, particularly its Interim LLRW Management Plan.

BACKGROUND

In 1986, New York State established a comprehensive LLRW management program designed to meet the mandates of the federal Low-Level Radioactive Waste Policy Act, as amended in 1985. The New York State Low-Level Radioactive Waste Management Act (1) provided for the siting, method selection, construction, operation and regulation of LLRW disposal facilities exclusively for LLRW generated in the State. The State Act also provided explicit opportunities for public participation in these endeavors.

In 1988, New York State recognized that its new LLRW disposal facilities would not be available by January 1, 1993, the date when the existing disposal facilities in the states of Nevada, South Carolina and Washington would no longer be required to accept LLRW from New York. New York State, through an interagency task force, initiated an evaluation of options for managing LLRW generated in the State after 1992, pending the availability of the anticipated new LLRW disposal facilities. The task force developed a plan that was subsequently adopted by Governor Mario Cuomo in support of the State's compliance with the 1990 federal milestone (2). Among other things, the plan called for LLRW generators to store waste on site to the maximum extent possible and for the two in-State LLRW brokers to provide back-up storage capacity. Based on the then-current schedule for establishing new LLRW disposal facilities, it was assumed that the State would begin accepting LLRW for permanent management about January 1995.

In 1990, in response to public concerns about the siting process, the State Act was amended (3). The amendments called for significant changes in the process for siting LLRW disposal facilities, including requiring that the disposal technology be selected and approved before any further siting activities could continue. As a consequence, the schedule for establishing those facilities was delayed. At this time, there is no reliable estimate for when such facilities will be available.

ORIGIN AND PURPOSE OF THE STUDY

Against the backdrop described above, in May 1990 the New York State Legislature directed the Energy Authority to conduct a LLRW storage study. More specifically, the Legislature added language to the 1990-91 State Operations Budget (4) that provided funding and direction to the Energy Authority to:

- examine existing capacity of LLRW generators to store waste on site and assess their ability to expand capacity to accommodate storage for a minimum period of 10 years; and
- investigate the economic viability of establishing a separate, centralized storage facility for Class A LLRW generated by hospitals, academic research and medical research facilities.

The Legislative mandate did not identify any specific purpose for this study. One explanation is that the study is intended to provide information necessary to evaluate longer-term interim management options (i.e., over longer periods than previously considered) (5). Other parties contend that the study was intended to evaluate indefinite on-site storage as an alternative to centralized disposal (6).

The Energy Authority interprets its mandate strictly as a fact-finding endeavor. It will collect and analyze information regarding the on-site storage capabilities of LLRW generators and the economics of on-site and centralized LLRW storage. The study will examine existing locations where LLRW is currently being generated and managed. The Study may draw conclusions regarding the information collected but it will not recommend any specific LLRW management approach. The Energy Authority understands that information developed in the Study will be used subsequently, in a process to be defined, to consider future LLRW management policy.

APPROACH TO CONDUCTING THE STUDY

The study is being conducted by the Energy Authority with the assistance of:

- a broad-based **Study Review Panel**;
- an independent **Facilitator** to work with the Study Review Panel;
- an independent **Technical Review Committee** to provide peer review; and
- a **Technical Support Contractor**.

The Energy Authority decided at the outset that the importance of the Study to the State and the degree of public interest in the results mandated a process whereby the Authority could draw upon the wide spectrum of views and perspectives on the matter. To meet this need, the Authority decided to form the **Study Review Panel**. It solicited nominations from over 90 individuals and organizations it identified as having a particular interest in the Study or who represented important public perspectives. The Authority received 34 nominations, and from those invited 16 individuals to participate. Panelists were asked to consider and provide feedback to the Energy Authority on such matters as the study design and schedule and the process for soliciting and selecting a support contractor to perform the major technical analyses. The Panel includes: representatives of local government, including municipalities where waste is generated, stored, and which have been identified as potential sites for new LLRW disposal facilities; local health and environmental officials; representatives of LLRW generators, including electric utilities and academic and medical institutions; regional planning organizations; public interest and environmental organizations; and a representative of the rural/agricultural community. The Panel members also were asked to serve as a link for communications to those affected communities and interests for the duration of the study.

To date, the Panel has actively participated in developing the scope of work for the study that was used to solicit a technical support contractor. It also has endeavored to better understand the problems facing LLRW generators by visiting a university/medical complex to meet with its LLRW staff and tour its LLRW management facilities. Similar visits have been planned for a nuclear power plant and a major urban medical research center. The Study design provides a number of explicit opportunities for the Panel to be briefed on progress and to provide input for further refining Study activities.

To assist it in working with and maximizing the effectiveness of the Panel, the Energy Authority decided to engage an independent facilitator. Dr. Barry Lawson of Barry Lawson Associates, Inc. was selected through a public competitive solicitation process to serve this role. Among Dr. Lawson's responsibilities are the planning, coordination and facilitation of Study Review Panel meetings; providing logistical and administrative support to Panel members; and evaluating the Study Review Panel process for further use by the Energy Authority.

It is the Energy Authority's practice, in pursuing major research actions, to provide scientific and technical validation of its plans and programs. To meet this objective, the Energy Authority has moved to establish a Technical Review Committee. The Authority requested the assistance of the Board on Radioactive Waste Management of the National Research

Council/National Academy of Sciences. With the approval of the Board, the Board's technical support staff provided the Authority with a list of candidates to contact. The Energy Authority sought to identify and engage individuals who, to the extent feasible, have no particular interest in the outcome of the Study yet who possess the technical expertise necessary for critical evaluation of design and conduct of the Study. Areas of expertise identified as being desirable were health physics, LLRW management, LLRW regulation, structural engineering or architecture, and economics. While the Energy Authority continues to seek qualified persons, to date, only two individuals, both from the academic community outside of New York State, have agreed to assist the Energy Authority in this review function. They represent health physics and LLRW management experience.

Finally, because the Energy Authority does not have sufficient staff or expertise in-house to perform all of the technical analyses necessary to complete the Study, it obtained the services of a technical support contractor. A competitive Request for Proposals (RFP) was issued and, as noted above, the Study Review Panel played an active role in defining the suggested Statement of Work that was incorporated into the RFP. Seven proposals were received by the Authority and evaluated by a team comprised of four Energy Authority staff members and a representative of the environmental protection agency from a neighboring state. Based on the recommendation of the proposal evaluation team, the Energy Authority in mid-February entered into a contract with Dames and Moore. The Dames and Moore office in downstate New York has lead responsibility for providing the required technical assistance, with additional support to be provided by the firm's western New York office.

STUDY DESIGN

The Study's principal technical tasks include: analysis of the regulatory environment; evaluation of waste storage, treatment and reduction technologies; evaluation of waste form and packaging issues and requirements; collection of generator-specific information and analysis of corresponding on-site capabilities; and evaluation of centralized storage economics. The results of the recent Electric Power Research Institute study on LLRW storage, of which the Energy Authority is a cosponsor, will be factored into these analyses.

Regulatory Analysis - The Study will identify, compile and summarize regulatory requirements, and associated guidance, applicable to extended on-site and centralized storage of LLRW, including requirements that would apply to one generator receiving and storing LLRW from another generator. Potential obstacles to extended storage of LLRW will be identified and the cognizant regulatory agencies will be consulted to seek clarification and additional guidance.

Treatment, Reduction and Storage Options - The Study will identify and evaluate commercially available and emerging on-site and off-site treatment and waste reduction options that might facilitate LLRW storage. In addition, available and emerging LLRW storage technologies for potential application in New York State, including approaches currently being used in other states and countries (e.g., Canada), will be identified and evaluated. To the extent feasible, the impact, if any, that such options/technologies might have on ultimate disposal will be determined.

Specific factors that will be evaluated include: commercial availability; conditions for acceptance of waste for off-site treatment; cost of services; installation and operational cost for on-site technologies; resulting waste forms; and benefits for extended storage.

Waste Form and Packaging - The Study will identify and evaluate waste form and packaging questions/problems associated with extended storage of LLRW for each major type/category of LLRW produced in New York State. It will attempt to identify waste forms and packages that would meet the technical and regulatory requirements for extended storage.

Among the factors that will be considered in this evaluation are:

- radionuclide-specific problems or considerations;
- stability of the waste over the storage period;
- integrity of the package over the storage period, including the ability of the package to be moved or transported following storage;
- compatibility of waste form and packaging (e.g., impact of waste on package integrity); and
- acceptability of the waste form and packaging for ultimate disposal.

Storage Period Evaluation - Based on a consideration of the regulatory analysis, the evaluation of treatment and storage technologies, and the evaluation of waste form and packaging factors, the study will attempt to determine if an upper limit on the acceptable period of time for LLRW storage, beyond the minimum 10 years specified by the Energy

Authority's legislative mandate, can be identified. If no specific time limit can be identified, the Energy Authority and Dames and Moore will develop procedures for evaluating on-site and centralized storage of LLRW for periods in excess of 10 years.

Generator Storage Capability - Probably the most significant part of the LLRW Storage Study will be the evaluation of the capability of LLRW generators in the State to store waste on site. Both present and potential future capability will be assessed for each generator. More specifically, the Study will attempt to estimate the maximum time that LLRW generators can accumulate and store waste on site without serious disruption of those activities that result in the production of the waste. In designing the Study, the Energy Authority concluded that the most effective way to perform such an evaluation is to visit those facilities where LLRW is generated for first-hand observation and direct interaction with generators.

To accomplish this task, several critical actions are necessary. First, all LLRW generators in the State will have to be identified. This includes those facilities that have historically generated waste and those that might generate waste in the future, such as users of sealed radioactive sources. Figure 1 illustrates the number and geographical distribution of LLRW generators that shipped waste to the existing disposal facilities during 1990.

To ensure the quality and consistency of the data gathering activities, a detailed investigation protocol will be developed. In addition to identifying the information to be collected, the protocol will establish the specific procedures that will be used, including: contacting generators; contacting

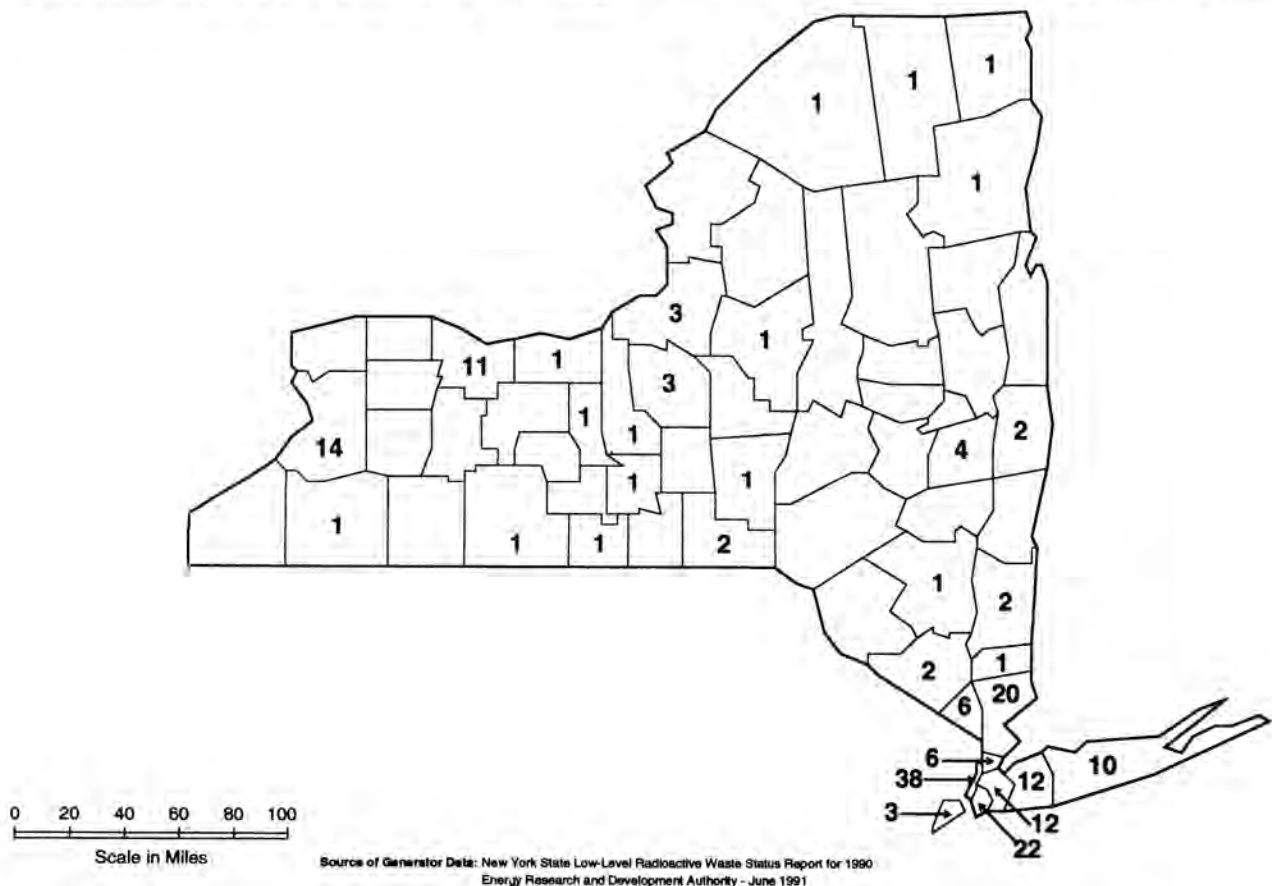


Fig. 1. Location and number of New York facilities which shipped LLRW for disposal in 1990.

local officials; scheduling and preparing for site visits; and contingencies for addressing problems in data collection. The protocol also will provide specific procedures for verifying the data collected, including review by the affected generators and consultation with cognizant regulatory agencies.

Information that will be collected during visits to the LLRW generator facilities will include:

- the generator's location and setting, including nearby facilities and activities;
- waste generation history and expected future LLRW generation, including a description of the activities that produce LLRW;
- generator on-site storage capabilities and ability to expand existing facilities or add new facilities, including factors limiting generator storage capacity that are beyond the generator's control;
- ability of the generator to minimize or otherwise reduce the amount of LLRW requiring storage, including current waste reduction practices; and
- capital, operational and maintenance cost, and operational impacts of on-site storage.

The protocol will also detail the criteria that will be used to evaluate generators' capability (both present and future) to store waste on site, the rationale for such criteria and the methodology for applying the criteria. Among other things, the criteria will likely include physical limitations, costs and the impact of local constraints.

Centralized Storage Facility - As noted earlier, the Energy Authority has been directed to evaluate the economic viability of establishing a centralized storage facility for Class A LLRW from medical and academic institutions in New York State. To accomplish this, the Study will:

- Define the basic design requirements for a centralized storage facility, including:
 - the types, volumes and radionuclide-specific content of LLRW that would be accepted for storage;
 - regulatory requirements; and
 - waste form and packaging requirements;
- Identify or develop optimal designs that would meet the design requirements (modular expandable designs will be explicitly considered);
- Develop cost estimates for establishing and operating such a facility for a period of 10 years. Cost estimates will be specified by major activity, including siting, licensing, construction, operation and maintenance, and will include to the extent feasible peripheral costs such as transportation and host community assistance; and
- Compare cost estimates with the costs of other management options including the estimated cost of generators storing LLRW on site.

SCHEDULE

The Study calls for the critical analyses of regulations, technologies and waste form and packaging to be completed early in the process. This information will be compiled in a preliminary report and provided to the generators in July as part of the storage capability evaluation. Generators will thus have this information to assist them in consideration of on-site

management options. The entire project is scheduled to be completed within one year, so that results will be available early in 1993.

ISSUES

In the course of designing the Study, a number of key issues were identified and considered:

Interaction with Local Governments - The need to consult with local jurisdictions within which LLRW-generating facilities are located was highlighted. The protocol will include specific procedures for this purpose. It is expected that local government officials will be formally contacted and advised of the Study. Generating facilities within their jurisdiction will be identified and the officials will be invited to provide information regarding local conditions that would impact the analysis. Some effort will be required to determine which officials should be targeted for such contact.

Storage Period - At this time, it is not clear exactly how long LLRW generators might be required to manage waste on site. Further, the directive to the Energy Authority was to evaluate the ability of generators to store LLRW on site for a "minimum period of ten years". The Study will address this issue in two ways. First, it will attempt to determine if an upper limit on the time for storage can be identified and, failing this, a procedure for evaluating storage for periods in excess of 10 years will be developed and used in the Study. Secondly, an estimate of the maximum capability of each generator to store waste on site will be made.

Role of the Brokers - There are two LLRW brokers located in the State. Their potential for contributing to the State's management capabilities was evaluated in developing the State's Interim Management Plan (2). The brokers have the capacity to provide supplemental storage capacity for LLRW generators that face severe on-site management limitations. While the brokers' storage capability is not the direct subject of the Study, their role in the LLRW management infrastructure will be evaluated. It is anticipated that the brokers will play a critical role in assisting generators in accessing LLRW treatment services and in obtaining the necessary management knowledge.

Cost Discontinuities - In assessing the ability of each generator to store LLRW on site, points of cost discontinuity will be identified. For purposes of the Study, a point of "cost discontinuity" is defined as a point when storage of LLRW over extended periods of time results in a sudden and substantial increase in cost (e.g., construction of a new facility).

Cross-Generator Storage - A variation of generator on-site storage is the possibility that one generator may have excess storage capacity and be able to store LLRW from another generator with presumably inadequate capacity. An example would be a nuclear power plant accepting waste from a neighboring plant (note that there are two multiple-plant sites in New York State). Similarly, an academic institution with multiple campuses may be able to consolidate LLRW management at one site. The Study will attempt to analyze this option in terms of pertinent regulatory requirements, individual generator capability

and the willingness of generators to participate in such an arrangement.

Impact on Generators - In discussing the Study with generators, two concerns were reported. The first concern is that tentative plans for enhancing on-site management capabilities (e.g., expanding existing facilities, adding new storage or treatment facilities) will be prematurely publicized, and thereby compromise State or local approvals that may be required. Secondly, generators expressed concerns that the site visits will be used for regulatory purposes, thereby putting the generators in jeopardy of being found in non-compliance and subject to enforcement actions. While these issues have not yet been resolved, the Energy Authority anticipates generator cooperation in the endeavor. The investigation protocol, however, will include procedures for responding to

difficulties in obtaining access to generator facilities or in obtaining required information.

REFERENCES

1. Chapter 673 Laws of 1986.
2. New York State Plan for Storage, Disposal and Management of Low-Level Radioactive Waste Generated in New York State After 1992, transmitted under cover of Governor Mario Cuomo's letter dated December 27, 1989.
3. Chapter 913 Laws of 1990.
4. Chapter 50, Laws of 1990.
5. An Update on the Low-Level Radioactive Waste Management Program in New York State, New York State Energy Research and Development Authority, December 6, 1990.
6. Letter from Fred Bateman, Don't Waste New York, to John P. Spath dated September 6, 1991.