

PROGRESS IN SITING A NEW LOW-LEVEL RADIOACTIVE WASTE DISPOSAL FACILITY IN ILLINOIS

Terry R. Lash
Illinois Department of Nuclear Safety
Springfield, Illinois 62704

Dale Huffington
Clark County Economic Development Corporation
Marshall, Illinois 62441

ABSTRACT

The State of Illinois has made great progress toward having a new low-level radioactive waste (LLW) disposal facility in operation by 1993. Since late 1980, when federal Low-Level Radioactive Waste Policy Act established the requirement that each state provide disposal capacity for the LLW generated within its borders, Illinois has (1) entered into a viable compact with the Commonwealth of Kentucky, (2) established a statutory framework for managing LLW, (3) developed the resources and staff to implement a comprehensive LLW program, (4) become an Agreement State and developed most of the regulations pertinent to LLW management, (5) initiated numerous studies and published many reports on LLW issues, (6) identified many potential candidate areas in Illinois as possible locations for the disposal site, (7) complied with the July 1, 1986, and the January 1, 1988, milestones in the Low-Level Radioactive Waste Policy Amendments Act, and (8) initiated preliminary geological investigations into the suitability of promising potential alternative sites in Clark County, Illinois. Throughout this process there has been an active program for involving elected officials, interest groups, the general public and local government in the LLW program. Changes in the program have been made frequently in response to their input.

In addition, the Central Midwest Interstate Low-Level Radioactive Waste Compact Commission, composed of two Illinois representatives and one from Kentucky, has issued a draft Regional Management Plan for public review and comment. This draft Plan sets forth the Commission's proposed recommendations regarding (1) the number and type of regional facilities that will constitute the regional LLW management system, (2) policies for encouraging source and volume reduction of LLW, and (3) alternative means for treatment, storage, and disposal of LLW. The Commission is scheduled to adopt a final Plan in late April, 1988.

The Illinois LLW program is dynamic, interactive, and cooperative. As more and different people become involved in or are affected by the program, corrections and changes are made in response to new knowledge, advice, and requests. Major efforts are undertaken to make the program responsive to the needs and desires of Illinois citizens and the generators of LLW.

STATUTORY FRAMEWORK

The Illinois Low-Level Radioactive Waste Management Act was signed into law in December, 1983. This Act specifies a process by which LLW generated in Illinois is managed and covers requirements for treatment, storage, disposal, and transportation of LLW. The Act requires the Illinois Department of Nuclear Safety (IDNS) to register generators; collect annual reports and fees from generators; develop an Interim Management Plan; promulgate waste treatment standards; establish dedicated funds for the LLW program and for post-closure care of the disposal facility; regulate transportation of LLW; promulgate requirements for LLW facility operators; achieve Agreement State status with the U.S. Nuclear Regulatory Commission; and promulgate rules for the siting, licensing, and operation of LLW facilities. Table I outlines the major provisions of the Management Act and it summarizes our implementation of it to date.

The Management Act establishes a mixture of government and corporate involvement in establishing a LLW disposal facility in Illinois. After conducting detailed geological characterization and environmental studies on at least three alternative sites, a public official, the IDNS Director, is to select one site for developing the facility. A private contractor, however, will be responsible for designing, constructing, and operating the disposal facility. IDNS will select and regulate the contractor.

An important provision of the Management Act imposes fees on LLW generators that pay for the State's LLW program. No general revenue funds are used to support the LLW program. These fees assure adequate, predictable funding of the program. Currently, utilities pay an annual fee of \$498,000 per reactor. The annual revenue from utilities is divided between the development and operation fund (\$480,000 per reactor) and the long-term care fund (\$18,000 per reactor). Non-utility generators annually pay

TABLE I

**Summary of Major Provisions of the 1983 Illinois Low-Level
Radioactive Waste Management Act, as Amended**

<u>Section #</u>	<u>Title</u>	<u>Comment</u>
4	Generator Registration	Requires all generators to register with IDNS and to file an annual report. Registration was started in 1984. Annual reports for 1984 and 1985 have been issued. The Annual Report for 1986 is scheduled for release in April, 1988.
5	Requirements for Waste Facility Contractors	Rules governing the selection of a contractor(s) to design, develop, and operate LLW disposal facilities were adopted in January, 1988.
6	Requirements for Waste Facilities	Regulations for design, construction, operation, maintenance, and monitoring of LLW disposal facilities were adopted in February, 1988.
7	Requirements for Waste Treatment	Requires IDNS to promulgate LLW treatment standards. Planned for 1988.
9	Requirements for Waste Transporters	Requires IDNS to issue permits to anyone transporting LLW to a facility in Illinois; also requires development of a manifest document and a tracking system. Tracking system is under development and will be operational before the disposal facility is completed.

\$3.00 per cubic foot or \$50.00, whichever is greater. These revenues are split between the development and operation fund (80%) and the long-term care fund (20%). In 1988, the generators project that the utilities 13 reactors will produce about 180,000 cubic feet and the non-utility generators will produce about 40,000 cubic feet of LLW. For the 1988 calendar year, therefore, IDNS can expect revenue of about \$6.3 million for operational and developmental activities. An additional \$260 thousand will be deposited in the long-term care fund.

RESOURCES AND STAFFING

Development of a comprehensive LLW program is expensive and difficult, requiring substantial resources and a sizable qualified staff. IDNS, through the fee system established in the Management Act, has had access to sufficient funds to develop a high quality, diverse LLW program. Hiring and retaining a qualified staff, however, has not been fully achieved. As has been noted at this conference in past years, there are relatively few individuals in the country who have experience in LLW management. Hiring from this relatively small pool is difficult for state agencies, particularly in the short time periods states have to comply with federal milestones.

Despite the obstacles IDNS generally has been successful in finding capable people with a variety of pertinent backgrounds to hire into the LLW program. Over the past four years the LLW program has hired 21 people, not counting administrative, clerical, and secretarial support personnel. The program currently has 13 people on staff with 3

openings. Only one staff person, the program manager, has extensive prior experience in LLW management.

IDNS is aided in its recruitment of staff by a change in the state law allowing it to establish a special system for technical personnel. This technical personnel system has been in place for about a year and a half, allowing IDNS to make offers of employment faster and at higher salaries than was the case when the State's central personnel system had to be used. Additionally, promotions, job reclassifications, and reorganizations can be accomplished much faster than before.

IDNS has had to spend substantial effort in training staff in LLW issues. Although we have made use of meetings, seminars, and training courses routinely provided by others, IDNS is also developing a comprehensive internal training program. We are optimistic that this new initiative will provide substantial benefits in the years to come. The training program eventually will use self-instructional materials, including a workbook and video tapes.

AGREEMENT STATE STATUS

In order for IDNS to implement fully the Management Act, Illinois had to become an Agreement State with the U.S. Nuclear Regulatory Commission. Most importantly, the Management Act requires IDNS to regulate the new disposal facility, which could not be accomplished without the State substituting its authority for NRC's. The Management Act, for instance, prohibits shallow land burial of LLW, while the NRC's regulations permit it.

Preparing the application and seeing it through the approval process took about 3.5 years, almost twice as long as was planned initially. The process took as long as it did in part because Illinois is a large industrial state with many, varied nuclear materials licensees. Also, Illinois was the first large state to apply for Agreement State status in many years.

Having full regulatory control over LLW is very important to the siting process. IDNS will now be able to assure that LLW in Illinois will be managed in accordance with the high standards required by State law and the wishes of the Illinois public. Moreover, IDNS should be able to assure that the facility will be licensed in a timely manner and consistent with the tight time limits imposed by federal law.

STUDIES AND REPORTS

The Management Act takes a very different approach to LLW management compared to the past in the United States. As a consequence, IDNS has had to conduct studies and develop reports concerning a variety of issues, particularly the requirements for developing an engineered disposal facility other than a shallow land burial facility. The requirements for searching for and studying potential sites for the disposal facility also could not be met without substantial study.

In addition to conducting studies, the information developed has to be communicated effectively to a variety of interested individuals and groups. Preparing accurate materials for a general, diverse audience is challenging, but rewarding. IDNS has had the benefit of assistance from advisory groups and contractors in the development of the studies and reports.

Tables II and III list most of the reports concerning siting and operating the disposal facility that have been prepared so far. These reports have been widely circulated for review and comment, and they have been much improved by the input of others.

TABLE II

Selected Reports Concerning Identification and Study of Potential Sites for the Low-Level Radioactive Waste Disposal Facility

Siting a Low-Level Radioactive Waste Disposal Facility in Illinois: Description of Maps - Compilation, Data Base, and Intended Use, by Jerry R. Miller, Richard C. Berg, Thomas M. Johnson, and Allen Wehrmann. Illinois State Geological Survey and Illinois State Water Survey, December, 1985.

Siting a Low-Level Radioactive Waste Disposal Facility in Illinois: Site-Specific Criteria, by Thomas M. Johnson, Jerry R. Miller, Richard C. Berg, H. Allen Wehrmann and John M. Shafer. Illinois State Geological Survey and

Illinois State Water Survey, March, 1988.

Methodology for Siting and Characterizing a Low-Level Radioactive Waste Disposal Facility in Illinois: Geologic and Hydrologic Consideration, by Richard C. Berg, Jerry R. Miller, H. Allen Wehrmann and John M. Shafer. Illinois State Geological Survey and Illinois State Water Survey, March, 1988.

Assistance in Siting of a Low-Level Radioactive Waste Disposal Facility. Task 1 - Final Report. Summary of Technical Literature, Engineers International, Inc., July, 1987.

Assistance in Siting of a Low-Level Radioactive Waste Disposal Facility. Task 2 - Final Report. Technical Studies Needed for Characterization, Engineers International, Inc., July, 1987.

Assistance in Siting of a Low-Level Radioactive Waste Disposal Facility. Task 3 - Final Report. Requirements for an Environmental Report, Engineers International, Inc., July, 1987.

General Environmental Impact Study Plan. Draft, Battelle Memorial Institute and Hanson Engineers, Inc., March, 1988.

General Site Characterization Plan for Low-Level Radioactive Waste Disposal Facility Siting Project, Battelle Memorial Institute and Hanson Engineers, Inc., February, 1988.

Site Identification Plan and Status Report, January, 1988.

TABLE III

Technical Reports Concerning the Design, Construction, Operation and Closure of a Low-Level Radioactive Waste Disposal Facility.

Summary - Technical Considerations for Low-Level Radioactive Waste Disposal in Illinois. Draft, November, 1987.

Alternative Design Approaches for a Low-Level Radioactive Waste Disposal Facility. Draft, November, 1987.

Assessment of Mixed Waste Disposal. Draft, November, 1987.

Closing a Low-Level Radioactive Waste Disposal Facility. Draft, November, 1987.

Objectives and Evaluations of Alternative Designs for Low-Level Radioactive Waste Disposal Facilities. Draft, November, 1987.

Possible Fee Structures for Low-Level Radioactive Waste Disposal. Draft, November, 1987.

Reinforced Concrete and Other Manufactured Materials for Use in Low-Level Radioactive Waste Disposal Facilities. Draft, November, 1987.

Risks from Low-Level Radioactive Waste Disposal. Draft, November, 1987.

Safety Features to Prevent Releases from Low-Level Radioactive Waste Disposal Facilities. Draft, November, 1987.

IDENTIFICATION OF POTENTIAL ALTERNATIVE SITES

IDNS, with the assistance of Battelle Memorial Institute of Columbus, Ohio, and Hanson Engineers, Inc., of Springfield, Illinois, has begun the process of identifying a site for the LLW disposal facility. Using data generated by the Illinois State Geological Survey, the Illinois State Water Survey, the Illinois State Natural History Survey, the Illinois State Museum, and the Illinois Department of Energy and Natural Resources, IDNS has incorporated information pertaining to environmental considerations, wildlife habitat, prime farmland, and hydrogeological characteristics into its site selection decision making. An extensive examination of all pertinent issues will continue until a final site is selected, which is scheduled to occur in late 1989.

Although the licensed site will be approximately 1,000 acres in size, only about 100 to 200 acres will be used for disposal. The remainder of the site will be a buffer zone that may be used for activities, including farming, that are compatible with the safe disposal of LLW.

Throughout the site selection process, the analysis of potential sites will become progressively more detailed until IDNS's end goal of selecting a technically excellent site is achieved. The safety features of each site will be the most significant factor taken into consideration to ensure that the final site meets with the Department's strict protection requirements.

The site selection process consists of six steps:

1) Statewide Assessment - IDNS first identified those counties which expressed a possible interest in hosting the facility by contacting local government entities and county level leaders. In addition, using general geological information, other counties were identified which contained favorable characteristics. Twenty-one counties were selected for technical analysis during this process.

2) Potential Candidate Area Identification - Using the State's computer-based Geographic Information System (GIS), maps were generated showing the distribution of six exclusionary and seven performance-related favorability factors for each of the 21 counties. These factors are listed in Tables IV and V, respectively. After

a detailed analysis of the maps, 60 potential candidate areas of at least four square miles in size were identified. The distribution of these potential candidate areas among the counties is shown in Table VI.

3) Area Reconnaissance - During this step in the site identification process, IDNS is examining areas for technical excellence. Included in this analysis are: evaluations of prime farmland areas; projected development; existing industrial development; the existence of habitats of endangered species; the presence of archaeological, cultural, and historical sites; and other environmental considerations.

4) Selection of Potential Alternative Sites - Based on the area reconnaissance studies, IDNS intends to select a few potential alternative sites, each about four square miles each in size. Four square miles is the minimum area required to assure a comprehensive understanding of a site's characteristics. The Department will then complete a more detailed field study of each site to verify the location of ground water and the physical nature of the soil. Extensive interviews with local sources will be conducted to verify the distribution of the exclusionary and favorability factors.

5) Selection of Four Alternative Sites - Based upon these additional data, IDNS is planning to select four alternative sites, which will have been determined to be technically excellent based on available data, and, if possible, politically acceptable for further consideration. Extensive study of the sites' geological, hydrological, and environmental conditions will be conducted. This site characterization phase will take approximately 18 months.

6) Selection of the Site - In late 1989, after a thorough examination of all technical data, with full consideration of public input, and with the approval of the local government with jurisdiction, the Director of IDNS will select a technically excellent site for the disposal facility. This site, about 1,000 acres in size, will be included in an application for a license to build and operate the facility. At the end of the license review process, which will include extensive local government and public involvement, IDNS will determine whether the facility and site will be safe for the disposal of low-level radioactive waste.

TABLE IV
Exclusionary Factors

Areas with Freestanding Water.
 Areas Either Exceeding Earthquake Intensity Modified Mercalli Index (MMI) IX on Bedrock of MMI VIII on Unconsolidated Material.
 Designated Federally Protected Lands
 Designated State Protected Lands.
 Areas prone to Subsidence or Landsliding.
 Areas within 100 year floodplain.

TABLE V

Performance-Related Favorability Factors.

Areas of Low Permeability.
 Areas with Simple Geologic Structure.
 Areas without Surficial Sand and Gravel Deposits.
 Areas with Low Erosion.
 Areas away from Surface Water Supplies.
 Areas without High-Yield Ground-Water Aquifers.
 Areas without Shallow Aquifers.

Computer-generated maps have been produced for these counties depicting the distribution of the seven

TABLE VI

Potential Candidate Areas.

County	Number	County	Number
Bond	4	Greene	4
Carroll	0	Iroquois	1
Cass	2	Knox	0
Champaign	5	Logan	6
Clark	5	Marshall	1
Cumberland	4	Menard	4
Dewitt	4	Peoria	0
Effingham	5	Piatt	1
Fayette	1	Sangamon	5
Ford	2	Vermilion	6
Gallatin	0		

favorability and the six exclusionary factors. The composite maps identify potential candidate areas of at least four square miles each in 17 counties.

Additional potential candidate areas in all of the counties probably would be identified through more detailed technical analysis of specific situations. This is particularly true for Carroll, Knox, and Peoria counties, because they have areas lacking only the high-yield aquifer favorability factor. In several instances these high-yield aquifers are very deep, up to 600 feet. Such deep aquifers probably would be shown through specific analysis to be completely unthreatened by operation of the disposal facility. IDNS, therefore, will analyze these areas with deep bedrock high-yield aquifers in any county if the appropriate county board so requests.

PRELIMINARY GEOLOGICAL STUDIES NEAR MARTINSVILLE, CLARK COUNTY

IDNS, with the support of Battelle Memorial Institute, Hanson Engineers, Inc., and their subcontractors, has begun preliminary geologic investigations of three areas near the City of Martinsville in Martinsville Township, which is located in the central portion of Clark County in southeastern Illinois. These studies are progressing because of the strong political and public support for hosting the disposal facility in that area and because the earlier evaluation of Clark County using the GIS suggests that qualified sites can be found in that part of Clark County.

Communication between Clark County officials and IDNS began in March of 1987. Clark County officials initially learned of the project through the news media and a series of letters sent by the Director of IDNS to all 102 county board chairmen. The letters provided information about the Illinois program, LLW management and the economic benefits of hosting the facility. The letters encouraged interested local officials to contact IDNS for additional information concerning the project, safety considerations, and the benefits associated with the facility.

The initial public meeting on LLW in Clark County was in August, 1987, with a group of 40 influential citizens. The meeting was coordinated by the Clark County Economic Development Corporation (CCEDC). In attendance were County Board Members, City Councilmen from the larger cities in the County, educators, firemen, policemen, reporters, farmers, attorneys, bankers, ministers and merchants. Since then, IDNS has participated in approximately 50 public meetings in Clark County. The most effective meetings were small (20-40) and relatively informal. The meetings were never sponsored by IDNS. Rather, IDNS staff participated in meetings sponsored by local citizens or organizations. Holding small, informal meetings encouraged information exchange, and discouraged the

"pep rally" environment frequently fostered by opposition at large scale public meetings. The following is a sample of governmental bodies, service organizations and other groups the Department met with:

- Clark County Board
- City Councils
- Township Boards
- Farm Bureau Groups
- Ministerial Alliance
- Lion Clubs
- Rotary Clubs
- Chambers of Commerce
- Teacher Organizations
- High School Students
- School Boards

Even more important than the meetings were tours of an operating disposal facility, a major generator of waste, and the closed LLW disposal facility in Sheffield, Illinois. At the request of local officials, IDNS has arranged 8 tours of the operating disposal facility in Barnwell, South Carolina, by approximately 70 Clark County residents, including elected officials, merchants, farmers, educators, local government employees, reporters and others. Many individuals who were originally opposed or neutral to the concept of hosting the disposal facility became supporters after their visits to Barnwell. Inspecting the operating disposal facility was reassuring to the visitors. Perhaps of greater value was the opportunity to interact with citizens from the Barnwell area who had backgrounds similar to the visitors'. Tours of the Illinois Power (IP) nuclear reactor in Clinton, Illinois, and the closed disposal facility at Sheffield also helped reduce the "fear of the unknown," and counteract misinformation. Outstanding media coverage of the tours played an important role in disseminating information.

Continued involvement in the decision making process of siting, developing, and operating the disposal facility is of particular interest to Martinsville officials and citizens. Local citizens will have the opportunity to provide input in the evaluation of the following items, as well as any others of local interest:

- Facility design selection;
- Facility construction schedules, plans, and procedures;
- Facility operating procedures;
- Monitoring systems and procedures;
- Emergency, remedial action, and closure plans and procedures; and,

- Long-term care and maintenance plans and procedures.

The Governor of Illinois will also appoint a representative from the community hosting the disposal facility to serve as a non-voting member of the Central Midwest Interstate Low-Level Radioactive Waste Compact Commission.

IDNS has and will continue to support training programs and other educational opportunities for the County Radiation Safety Officer and Emergency Services Disaster Coordinator. The purpose of this training is to assure that local officials have the ability to oversee the activities of IDNS and its contractors, and to assist with the response to any accident associated with the disposal facility.

Compensation is designed to reimburse a community for any costs that might be associated with hosting a low-level radioactive waste disposal facility. Compensation can take the form of either direct monetary payments or other, more indirect measures. All are intended to ensure that the disposal facility poses no financial burden to the host community. Grants of up to \$150,000 will be awarded for each site undergoing detailed geologic and hydrologic evaluation. These grants can be used for independent technical evaluation of the siting process and for conducting public information efforts. When the facility site is selected, the community in which it is located may receive an additional grant of up to \$400,000. This grant could be applied toward activities such as further participation in facility development and operation, independent review of data, and detailed socioeconomic and technical study. Additional compensation that is currently under consideration include funds for infrastructure improvements, property value protection, and protecting the value of agricultural products. IDNS is willing to evaluate the feasibility of other measures recommended by the community.

IDNS is supporting a comprehensive benefits package designed to encourage community interest in hosting the facility and to mitigate any inequity associated with hosting the facility. A surcharge on the waste disposed of at the facility will be payable to the host community, and it could provide substantial revenue to the local government. Economic development also will be encouraged in the area of the facility. The facility operator will be required to investigate compatible commercial activities that might be established in the local vicinity. IDNS is also working with the Illinois Department of Commerce and Community Affairs to develop a plan for assisting the community in taking advantage of existing economic development programs and attracting new business.

Increased employment opportunities will be available. Education opportunities will be made available and

specialized training will be offered to assure that as many local citizens as possible are qualified to work at the facility. The concept of providing four year scholarships to local students who must return to work at the facility upon completion of college is particularly attractive to rural Illinois communities. In many communities like Martinsville the brightest students cannot return to the community after completing their educations because of the lack of suitable employment. IDNS has already begun conducting seminars at the Martinsville High School to provide information on employment opportunities, and these have been very well received.

On February 3, 1988, after many months of consideration and debate, the City Council of Martinsville unanimously adopted a resolution in support of hosting the disposal facility. The crowd attending the meeting applauded in approval, and a representative of the Chamber of Commerce stood to voice the Chamber's whole hearted support. On February 8, 1988, the Board of Trustees of the Township of Martinsville unanimously passed a resolution supporting the City. A similar resolution was passed by Casey Township, to the west of Martinsville, Orange Township, to the south, and Parker Township, to the north. By the middle of February, virtually all of the major units of local government in western Clark County had passed favorable resolutions.

A local study committee has been set up to monitor the siting process and to make recommendations to the Martinsville City Council regarding the provision of immediate economic assistance to the community. The committee will receive technical and support assistance from CCEDC.

Preliminary geologic studies, including test drilling, began on February 16 at three candidate areas in Martinsville Township. Within about four weeks, we expect to know whether any or all of these sites are technically suitable for full characterization. During characterization, much more detailed information will be collected for an area of

about four square miles, and analyzed to determine whether a LLW disposal facility could be safely established there.

IDNS plans to involve Martinsville in selecting the contractor responsible for designing, building, and operating the disposal facility, and to award the contract early this summer. We are now in the process of working with the local stakeholders, the City, the Townships, the school boards, and other local districts. Together we are making plans, including the establishment of a local steering group or advisory committee, for local oversight and involvement. Legislative initiatives are being considered which will formalize the relationships between State and local government regarding the facility, its burdens, and its benefits.

CONCLUSION

The State of Illinois is on schedule to develop a LLW disposal facility for use by generators in Illinois and Kentucky by 1993. Although not all target dates in earlier plans for the LLW program have been met, there have been no difficulties that will prevent meeting future federal milestones.

To continue on schedule, however, will require substantial work and more political support for the program than IDNS has had in the past. Although promising and rewarding, only one relatively small area of the State currently approves of site investigations. If the ongoing preliminary tests yield positive results, perhaps that will be enough. If no area around Martinsville proves to satisfy IDNS's stringent siting criteria, then other local government jurisdictions will have to be willing to have their areas considered for the facility. Such areas could be in other parts of Clark County, in the other 20 counties already studied, or in additional counties.

Public understanding of LLW disposal is increasing in Illinois. Misunderstanding and unfounded fears are disappearing. With time and hard work, we expect that there will be substantial, widespread public support for IDNS's efforts to site a new LLW disposal facility.