Report to Congress

**1994 Annual Report on
Low-Level Radioactive Waste
Management Progress**

U.S. Department of Energy
Office of Environmental Management

April 1995

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The Secretary of Energy
Washington, DC 20585

February 12, 1996

The Honorable Al Gore
President of the Senate
Washington, D.C. 20510

Dear Mr. President:

Enclosed is the *1994 Annual Report on Low-Level Radioactive Waste Management Progress*. This ninth annual report is required by the Low-Level Radioactive Waste Policy Amendments Act of 1985 (Amendments Act), Title I of Public Law 99-240. That law amended the 1980 Low-Level Radioactive Waste Policy Act, which made States responsible for disposal of commercially generated low-level radioactive waste and encouraged States to form regional compacts to fulfill that responsibility.

The Amendments Act established January 1, 1993, as the target date for the operation of new low-level radioactive waste disposal facilities and set January 1, 1996, as the final deadline. No new disposal sites have opened since enactment of the 1980 Act. Neither can it be said that the States and compact regions, considered as a whole, are notably further along in their site development processes than they were five years ago. While license applications for new disposal facilities have been submitted in four States, there are other jurisdictions where site selection processes face severe public opposition. In several States and compact regions, site selection processes remain in the formulation stage some 14 years after enactment of the Low-Level Radioactive Waste Policy Act.

Since the commercial use of nuclear materials began, 1994 was notable as the first year that access to a disposal facility was not widely available to the organizations that generate low-level radioactive waste. Low-level radioactive waste generated in 31 States, roughly 63 percent of the total generated in the United States, was mostly stored at the point of generation pending availability of a disposal facility. We note in the report that views as to the impacts of the lack of access to disposal capacity vary. Some industry groups forecast disruptions, unnecessary expenditures, and the potential for increased radiation exposure due to storage at a large number of locations in lieu of centralized disposal. Others indicated that onsite storage of low-level radioactive waste would be manageable in the near term.

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As this report was being prepared, two significant events occurred which may help to shift the emphasis from storage to disposal. On May 31, 1995, the Secretary of the Interior issued a statement indicating his approval of the transfer of land containing the proposed Ward Valley disposal site to the State of California. The Secretary's offer to transfer the land is conditional upon the State of California making binding commitments related to the amount of waste to be accepted at the site and addressing other issues related to disposal. The decision came after a panel of scientists, on behalf of the National Academy of Sciences, issued a report favorable toward the site.

On June 29, 1995, the Governor of South Carolina signed legislation making the disposal facility in Barnwell County available to waste generators nationally and withdrawing that State's membership in the Southeast Compact. These events will be analyzed in the report for calendar year 1995.

Even though new disposal sites were not established within the time frame envisioned in the Amendments Act, most State officials involved in the programs to develop new disposal facilities remain generally optimistic about their eventual prospects for success. Most waste generators who are concerned about their financial investments in these programs do not appear ready to abandon these efforts in favor of an alternative.

In accordance with the mandate in the Amendments Act, the Department of Energy will continue to support constructive efforts by States to develop safe and efficient systems for the disposal of low-level radioactive waste. The Department will continue to monitor the collective and individual views of State and compact organizations and stakeholder groups regarding the Federal policy on regional disposal of low-level radioactive waste.

If you have further questions, please contact me or have a member of your staff contact Mr. Dirk Forrister, Assistant Secretary for Congressional, Public, and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,

Hazel R. O'Leary

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ABSTRACT

This report for calendar year 1994 summarizes the progress that states and compact regions made during the year in establishing new low-level radioactive waste disposal facilities. Although events that have occurred in 1995 greatly alter the perspective in terms of storage versus disposal, the purpose of this report is to convey the concerns as evidenced during calendar year 1994. Significant developments occurring in 1995 are briefly outlined in the transmittal letter and will be detailed in the report for calendar year 1995. The report also provides summary information on the volume of low-level radioactive waste received for disposal in 1994 by commercially operated low-level radioactive waste disposal facilities, and is prepared in response to Section 7(b) of Title I of Public Law 99-240, the Low-Level Radioactive Waste Policy Amendments Act of 1985.

EXECUTIVE SUMMARY

Background

In the 1960s and 1970s, companies in the private sector developed six facilities for disposal of commercially generated low-level radioactive waste. Three of the facilities closed before 1980, leaving only one operating disposal facility in the industrial East. The three states in which the remaining disposal facilities were located (Nevada, South Carolina, and Washington) grew concerned that the private sector would no longer be able to develop new facilities for disposal of the waste, and that the existing sites would have to meet the national demand for disposal capacity indefinitely.

Concern over the disposal situation resulted in the enactment in 1980 of the Low-Level Radioactive Waste Policy Act (1980 Act), which declared that states were responsible for disposal of the waste. The 1980 Act provided an incentive for states to form regional low-level radioactive waste disposal compacts, as any regional compact approved by Congress would have legal authority to exclude waste from outside its region from its disposal facility after 1986. When it became apparent that no new disposal sites would be established by the new compacts by 1986, Congress declined to grant its approval to the several compacts that had been formed.

The impasse over congressional approval of the compacts led to enactment of the Low-Level Radioactive Waste Policy Amendments Act of 1985 (Amendments Act) (Title I of Public Law 99-240). The Amendments Act embodied a compromise between the regions that had operating disposal sites and those that did not have operating sites. The regions with operating sites would agree to extend access to their disposal facilities, through the year 1992, to states and compact regions that met a series of site development milestones specified in the law. (Although not required by the Federal law, South Carolina decided to extend out-of-region access to its disposal site through June 30, 1994.) The last of the site development milestones, which was to have been the beginning of operation of the new disposal facilities, occurred January 1, 1993. No new disposal sites have yet been developed.

National Events

The year 1994 was notable as the first year, since the beginning of commercial uses of radioactive materials, during which disposal capacity for low-level radioactive waste was not available for many generators. As of July 1994, waste generators in 31 states (plus the District of Columbia and Puerto Rico) were no longer able to ship their waste off site for disposal.

Two different prospective scenarios emerged from the loss of access to a disposal facility. Under the first scenario, dispersed storage of radioactive waste at many locations within a state could lead to disruption of organizational missions, unnecessary expenditures, and the potential for increased radiation exposure to workers and to the public. This view was put forth by a number of articles in trade magazines which have claimed that the lack of access to disposal capacity will have significant effects on industries that use radioactive materials. The second scenario was less alarming. Several early surveys of waste generators did not indicate serious problems. For example, the Army and Air Force facilities under the Department of Defense, which ordinarily ship waste to the state facilities for disposal, took steps to establish two centralized storage facilities in order to provide a storage option for those installations that lack adequate storage capacity on site. Other states and compacts also moved in the direction of evaluating the need for centralized storage.

Exactly how much low-level radioactive waste was stored in 1994 and will be stored in future years remains open to question. The 1993 Annual Report on Low-Level Radioactive Waste Management Progress noted that approximately 95 percent or 792,275 cubic feet (ft³) of the Nation's low-level radioactive waste was disposed in 1993. Data obtained from the Department of Energy Manifest Information Management System reported by the operators of the disposal sites at Richland, Washington, and Barnwell, South Carolina, indicate that a total of 858,681ft³ was disposed in 1994. Thus, it appears that the volumes of waste disposed in 1994 remained relatively constant. Although all compacts and nonmember states outside the Southeast, Northwest, and Rocky Mountain compacts lost access to a disposal site after June 30, 1994, it is likely that many generators attempted to send most of their low-level radioactive waste for disposal prior to the date when the Barnwell facility became unavailable. This could account for the high volume of waste disposed in 1994, even though access for most generators was limited to the first half of the year.

In 1994, compacts and nonmember states indicated that they did not expect any new disposal facilities to be open in 1995. Therefore, it is anticipated that at least the same volume disposed in 1994 would go into storage. In fact, that volume could conceivably be higher because the computation does not include waste generated by those states that did not have access to disposal sites because they were out of compliance with site development milestones.

Through 1992, information from the operating disposal sites on the amount of waste disposed provided a reasonably accurate estimate of the total amount of waste generated, since most of the waste generated was shipped for disposal sometime during that year. Because this source of information is no longer an accurate estimate of the amount of waste generated, the Department of Energy (DOE), at the request of states and compacts, developed a computerized system that might help keep a running inventory of waste in storage in the future. Three states and compact regions agreed to field test the new system.

During 1994, two issues that are related to state and compact responsibilities for low-level radioactive waste were addressed. The first issue concerned the respective responsibilities of the states and the Federal Government for low-level radioactive waste from different sources. Creation of the U.S. Enrichment Corporation (USEC) by the Energy Policy Act of 1992 gave rise to concerns during 1994 over the disposition of waste from the new corporation. Under the Energy Policy Act, DOE transferred the operational responsibility for facilities in Paducah, Kentucky, and Portsmouth, Ohio, to USEC. After discussions between the Department of Energy and the two affected states, Federal legislation was introduced under which DOE would accept, on a cost-recovery basis, low-level radioactive waste that previously had been generated at the two sites, as well as any low-level waste that would result in the future from decommissioning of the facilities. The remainder of the waste, a relatively small percentage that would be generated during operation of the plants by USEC, would remain a state responsibility consistent with the Amendments Act.

The second issue concerned the breadth of compact authorities to control access to facilities for the treatment and processing of low-level radioactive waste. While compact commissions clearly have powers to limit access to their regional "disposal" facilities to waste generators located within their respective regions, their authority to control access to treatment or processing facilities was less clear.

During 1994, the Central Midwest Compact introduced into Congress amended compact language intended, in part, to make clearer and more explicit the power of its compact commission to control access to several waste treatment and brokering operations located within the region. Although Congress granted its consent to the Central Midwest compact amendments, it did so subject to the provisions of the Low-Level Radioactive Waste Policy Amendments Act of 1985. Among those provisions are several that appear to qualify and limit any compact powers that are inconsistent with existing Federal laws, such as those dealing with interstate commerce. This had the practical effect of leaving the issue unresolved and a subject for possible future litigation.

In 1994, DOE began issuing surcharge rebate funds in response to the January 1, 1993, milestone in the Amendments Act. A portion (25 percent) of surcharges paid by generators for disposal of low-level radioactive waste at the operating disposal sites was transferred to an escrow account administered by DOE. As state and compact regions met site development milestones specified in the Amendments Act, DOE disbursed funds attributable to waste generators in those states or regions back to the state or compact region to help defray the costs of developing the new disposal sites. January 1, 1993, was the final milestone date specified in the Amendments Act. By that date, under the Amendments Act, each state or compact region became eligible for a rebate of its portion of the escrowed funds, if "the state in which such waste originated (or its compact region, where applicable) is able to provide for the disposal of all low-level radioactive waste generated within such State or compact region." Where the state or compact did not meet the milestone, DOE was required to transfer the applicable funds back to the waste generators who paid the disposal surcharges. Disbursement of the surcharge funds was delayed until resolution of two issues: (a) whether or not an extension of access by the State of South Carolina to its disposal site past the January 1, 1993, milestone date made states and compacts eligible for the rebates, and (b) whether or not states and compact regions had to provide for disposal of mixed low-level radioactive waste in order to be eligible.

In a Federal Register notice published on March 31, 1994, (59 F.R. 15188) the Department announced its policy that states and compacts that had entered into agreements providing for extended access to the South Carolina disposal facility would be eligible for a prorated portion of surcharge funds attributable to the state or region. The fraction of the rebates would be equivalent to the

number of months that access was provided under the agreements divided by 36 months, the duration of the period between the January 1, 1993, milestone and the January 1, 1996, deadline in the Amendments Act. On July 19, 1994, in response to a lawsuit filed by the Central Midwest Compact Commission, a district court in Illinois ruled in favor of DOE's plan to divide the surcharge rebates between the compact commission and the waste generators. Prorated rebate payments to eligible states and compact commissions and to waste generators began shortly after the Court's decision.

Federal regulatory initiatives gained the attention of state planners during 1994 because these initiatives had the potential to affect the development of disposal sites. These regulatory initiatives included new Nuclear Regulatory Commission (NRC) policies on concentration averaging and performance assessment. Concentration averaging guidelines spell out in greater detail the procedures for classifying low-level radioactive waste for disposal. Performance assessment policies detail the NRC's preferred methods for predicting the long-term performance of a proposed disposal facility. The other regulatory initiative was the Environmental Protection Agency's proposed standard for low-level radioactive waste disposal, storage, and treatment facilities. These regulations would set standards different from those previously established by the NRC and Agreement States. (NOTE: Agreement States are those that have entered into agreements with the NRC to license and regulate their own commercial low-level radioactive waste disposal facilities and low-level radioactive waste management activities, as well as other radiation control activities.) Apart from the technical details of each of the regulatory initiatives, some states expressed concern that regulatory changes at this time could disrupt the site development processes. New regulations and guidelines could further delay these processes by implying that technical assumptions based on previous requirements and guidelines were inadequate.

State Events

Throughout 1994, national attention focused on California's efforts to develop the first new disposal facility for low-level radioactive waste. Two issues slowed construction of the facility: one involved transfer of land ownership from the Federal Government to the state; the other involved protecting the desert tortoise, a threatened species. In response to concerns raised in an unofficial report by three geologists with the U.S. Geological Survey, the Secretary of the Interior decided to

delay transferring the land on which the proposed California site would be located until the issues could be resolved. The National Academy of Sciences (NAS) was asked to evaluate the issues raised in the report and to provide its views by the end of 1994. During 1994, a critical habitat was designated for the desert tortoise; this included the land on which the proposed disposal facility is to be located. The decision will require the State of California to seek a biological opinion from the U.S. Fish and Wildlife Service and other Federal agencies on whether a mitigation plan that had been developed several years earlier will be sufficient to protect the tortoise.

The Department of Energy's National Low-Level Waste Management Program published a report during 1994 on approaches taken by states and compacts to select locations for the new disposal sites. In the years leading up to 1994, several states re-examined their general approaches to site selection. Connecticut and Michigan, whose top-down screening processes resulted in local opposition, decided to begin again, with a more collaborative process based upon community incentives. Under the approach known as "top-down screening," site locations are selected through a map overlay process, whereby land area is eliminated from consideration in successive steps until only the candidate sites remain. New Jersey, New York, and Massachusetts are also interested in exploring more volunteer-oriented approaches. By contrast, Illinois decided not to act upon the results of its site selection process, which had emphasized finding a site in a supportive community, in favor of a top-down screening process. In late 1994, Ohio prepared draft legislation that also appeared to favor this kind of selection process. The DOE report did not recommend one kind of site selection process over another. However, the report did recommend that states and compact regions examine other options before deciding upon a top-down screening process.

Delays in constructing and operating new disposal sites may partly result from the additional time taken to review license applications, and from new decision steps the states have added to site development processes. Although the Amendments Act required that NRC develop procedures for reviewing license applications within 15 months of their submission, all of the applications submitted thus far have been submitted in Agreement States, which are not required to adhere to the NRC procedures. By the end of 1994, license applications in Nebraska, North Carolina, and Texas continued under active review. The oldest of these, the Nebraska application, was submitted to the state for review in July 1990. In addition to the time needed to evaluate the license applications,

several states have added additional decision points to their processes. Connecticut, for example, will require an additional adjudicatory-type hearing, estimated to take 12 to 18 months, after the NRC has approved a license.

Conclusions

Since mid-1994, the desire to maintain access to operating disposal sites no longer served as an incentive to state governments and compact boards to continue their own programs. Up until that time, access to operating disposal facilities was limited to those states and compacts that the regions with operating sites believed were making adequate progress toward the development of their own disposal sites. With the expiration of the site development milestones in 1993, and the decision by the U.S. Supreme Court on June 19, 1992, not to require states to "take title" to their low-level waste after 1996, the power of compacts to limit use of their disposal facilities to low-level radioactive waste generated within their respective regions remains the only Federally-derived incentive for states and compacts to establish new disposal sites.

Nevertheless, state and compact site development programs have continued because, aside from the external sanctions and incentives, an underlying motivation for the establishment of new disposal sites has always been the state's role in protecting public health and the environment from the consequences of radioactive releases. State and Federal regulators have long discouraged onsite storage of low-level radioactive waste at the site of generation in favor of permanent disposal in licensed facilities.

This report notes that state agencies reviewing applications for new low-level radioactive waste disposal facilities have devoted much more time and resources to the license reviews than had been expected when the Amendments Act was enacted in 1985. In most cases, states have not taken credit for the existence of the rigorous license application reviews near the end of their site development processes. Even though the license review processes have expanded and lengthened, a few states have created approval steps additional to the licensing process. Some of these approval steps occur after an operating license has been issued and many tens of millions of dollars have been invested. Thus, there appears to be some potential for states to streamline and accelerate their site development

programs by restoring the license application review effort as the focal point for the decision processes, ensuring the ability of the state regulatory agencies to conduct thorough and independent evaluations, and reducing redundant steps outside the established processes for technical review of the license application.

DOE based its conclusions regarding progress under the Amendments Act, in large part, on the public positions of state and compact officials and on the views of stakeholders with significant financial investments in these programs. As this report was being prepared, most state officials involved in the various programs to develop new disposal facilities informed DOE that they are generally optimistic about their prospects for eventual success, even though progress to date has been uneven and often disappointing. States in the Midwest Compact, for example, support the enactment by Ohio of legislation during 1995 to begin a disposal facility development process in that state, even though the new program will likely take many years to implement. Most waste generators, while concerned about their financial investments, do not appear ready to urge that the efforts be abandoned in favor of some alternative. The Nuclear Energy Institute (NEI), for example, continues to support the policy framework established by the Federal laws. In a policy statement issued February 1995, NEI stated:

“The basic premise of the Low-Level Radioactive Waste Policy Act is sound. States are best suited to manage low-level radioactive waste materials produced within their borders, and are in position to be the most sensitive to local concerns. While the interstate compact process and actions by states to fulfill that legal obligation have moved more slowly than desirable, the fact that several sites are in advanced planning stages is a clear indication that states can effectively meet this responsibility if they decide to do so. The current legislation also provides maximum flexibility for states and compacts to work together in a more economical and practical alignment.” (NEI Issue Brief, Low-Level Radioactive Waste Disposal, February 1995.)

Because states and compact regions, as well as the private sector organizations that bear much of the burden for funding the site development programs, do not currently advocate changes to the Federal framework, DOE continues to support that framework. The Department will continue to closely monitor the collective and individual views of state and compact organizations and stakeholder groups regarding the Federal policy.

Until there is significant state opposition to the general framework for management of low-level radioactive waste provided in the Amendments Act and Federal policies, DOE will support constructive efforts by states and compact regions to develop safe and efficient systems for the disposal of low-level radioactive waste.

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INTRODUCTION

In 1959, Congress enacted an amendment to the Atomic Energy Act that allowed qualified states to take over some licensing and regulatory functions that had been the exclusive domain of the Atomic Energy Commission. Since 1959, twenty-nine states have assumed responsibility for regulating radioactive materials, including the disposal of low-level radioactive waste.

The siting, development, and operation of low-level radioactive waste disposal facilities, as opposed to the licensing and regulation of such facilities, was left to the private sector. During the 1960s and 1970s, six low-level radioactive waste disposal facilities were established by privately owned companies. For reasons of market economics, the disposal sites were distributed regionally across the United States. Three of the sites closed in the 1970s, leaving only three operating disposal sites nationally, and only one in the industrial east. Without new disposal sites, these three states believed that they might be forced to provide disposal capacity for the nation indefinitely.

In response to these concerns, the Low-Level Radioactive Waste Policy Act of 1980 (Public Law 96-573) declared the general policy that states should be responsible for disposing of their own low-level radioactive waste. The law also encouraged states to enter into regional low-level radioactive waste disposal compacts. In order to provide an incentive for regionalization and for developing new disposal facilities, the law stated that regional compacts approved by Congress in subsequent legislation would be able to exclude waste from outside their respective regions after 1986 (known as "exclusionary authority").

By the mid-1980s, it became evident that the states and new compact regions would not be able to establish new disposal facilities by 1986. As part of an agreement negotiated by states through the National Governors Association, the three states with disposal sites agreed to extend access to the

facilities through 1992, if the states and compact regions without disposal sites met specific milestones for development of their own sites. This compromise is embodied in Title I of Public Law 99-240, the Low-Level Radioactive Waste Policy Amendments Act of 1985 (the Amendments Act). The final site development milestone was January 1, 1993. In addition to the site development milestones and the threat of loss of access to the operating disposal sites after 1992, Congress added a final sanction meant to ensure that states would take timely and deliberate steps to develop the new disposal sites. Any state that could not provide for disposal by January 1, 1996, at the request of each waste generator, would have to:

"take title to the waste, be obligated to take possession of the waste, and shall be liable for all damages directly or indirectly incurred by such generator or owner as a consequence of the failure of the state to take possession of the waste..."

In 1992, the U.S. Supreme Court declared the "take title" provision of the Amendments Act unconstitutional. Lack of access to disposal facilities for low-level radioactive waste did not become an issue until July 1, 1994, after expiration of an unexpected 18-month extension of access to the South Carolina disposal facility.

In the Amendments Act, Congress set the groundwork to exercise oversight over the progress of states and compact regions in meeting the objectives of the law. Among other provisions, the Amendments Act requires U.S. Department of Energy (DOE) to submit to Congress an annual report summarizing the progress made by states and compact regions in fulfilling the objectives of the law. Section 7(b) of the Amendments Act requires DOE to:

...prepare and submit to the Congress on an annual basis a report which (1) summarizes the progress of low-level waste disposal siting and licensing activities within each compact region, (2) reviews the available volume reduction technologies, their applications, effectiveness, and costs on a per unit volume basis, (3) reviews interim storage facility requirements, costs, and usage, (4) summarizes transportation requirements for such wastes on an inter- and intra-regional basis, (5) summarizes the data on the total amount of low-level waste shipped for disposal on a yearly basis, the proportion of such wastes subjected to volume reduction, the average volume reduction attained, and the proportion of wastes stored on an interim basis, and (6) projects the interim storage and final disposal volume requirements anticipated for the following year, on a regional basis.

As these topics indicate, a primary concern of Congress at the time the Amendments Act was under consideration was the impact of proposed caps on the amount of waste required to be accepted at the three operating disposal facilities during the interim access period, 1986 through 1992. Under provisions of the Amendments Act, the disposal sites in Washington, South Carolina, and Nevada were allowed to limit annual waste acceptance to 1.4, 1.2, and 0.4 million ft³, respectively. Industry organizations were concerned that more waste would be generated than could be disposed of under the site caps. Each nuclear power reactor was also assigned a limit on the amount of waste it could ship for disposal during the interim access period. Congress was also concerned about management of waste between 1993 and 1996, the date when states without access to disposal capacity would be required to take title to the waste. Hence, the attention of Congress to volume reduction and "interim storage" needs, noted above.

In each year's Annual Report on Low-Level Radioactive Waste Management Progress, DOE has attempted to emphasize the issues noted above that were most salient at the time. Previous annual reports to the Congress in this series (1989 through 1993) have included an appendix summarizing volume reduction activities, interim storage of low-level radioactive waste, and interregional shipments. Even though these activities have shown little change from year to year, an appendix containing this information is again included (Appendix E). With the end of the interim access period and the beginning of extended waste storage, this report emphasizes the impacts and implications of the transition from the milestone system of siting incentives to one of extended waste storage. Other issues and developments discussed in the report are:

- the difficulty of estimating how much low-level radioactive waste will be stored and the steps taken to better account for waste awaiting disposal;
- activities taken to clarify responsibilities for managing and disposing of low-level radioactive waste;
- the January 1, 1993, milestone under the Amendments Act;

- changes in regulatory policy that might affect the efforts of states and compact regions to establish new disposal facilities;
- continued efforts by the State of California to develop the nation's first new disposal facility for low-level radioactive waste in over two decades;
- the adoption by states and compact regions of new strategies for selecting site locations for the new disposal facilities;
- the longer-than-anticipated time taken to review license applications for new disposal facilities; and
- new decision points in state development processes that lengthen the process for establishing the new facilities.

Appendix A includes summaries of key activities in the various states and compact regions related to the establishment of new disposal facilities; Appendix B contains data about low-level radioactive waste shipped for disposal in 1994; Appendix C describes DOE activities in support of state and compact region efforts under the Amendments Act; and Appendix D is a list of the states and compacts and their addresses. Appendix E addresses volume reduction, storage, transportation, and cost considerations of low-level radioactive waste management.

SIGNIFICANT NATIONAL EVENTS IN 1994

Long-Term Waste Storage Begins

The year 1994 was notable as the first year, since the beginning of commercial uses of radioactive materials, during which access for disposal of low-level radioactive waste was not available for many waste generators. As of June 30, 1994, South Carolina stopped accepting low-level radioactive waste from outside the Southeast region. To those who follow low-level radioactive waste issues, the loss of access to disposal capacity was neither surprising nor alarming. As long ago as 1985, state officials notified congressional committees that new disposal sites would probably not be available by January 1, 1993, the year when the three operating sites were allowed by Federal law to discontinue accepting waste from outside their respective regions. As of July 1, 1994, waste generators in 31 states (plus the District of Columbia and Puerto Rico), were no longer able to ship their low-level radioactive waste off site for disposal.

To avoid problems that might be caused by interim storage of low-level radioactive waste, the Amendments Act required that governors of states that did not expect to have access to disposal capacity by the beginning of 1994 prepare plans for interim storage of the waste. These "Governors' Certifications" were submitted to the U.S. Nuclear Regulatory Commission (NRC) in response to the January 1, 1990, milestone.

In late 1989, as states were preparing their Governors' Certification plans, the duration of post-1993 waste storage was expected to be relatively short, a matter of a few years. One reason for this expectation was a requirement in the Amendments Act that any state unable to provide for disposal by 1996 must, upon request, take title and possession, and assume liability for, any low-level radioactive waste generated within the state. The states assumed that this "hammer provision" would motivate them to provide the necessary disposal capacity. (This "take title" provision was later declared unconstitutional by the Supreme Court in 1992.) Expecting the interim storage period to be short, most of the Governors' Certification plans were modest documents that did not call for extensive

programs on the part of state governments to provide storage services. As DOE explained in its 1989 Annual Report,

"In most of the plans, the approach to managing low-level waste is essentially twofold: to require generators to expand storage capacity through license amendments, or actual construction of new capacity; and to reduce the amount of waste requiring storage through volume reduction or waste minimization (p.100)...Most of the States that submitted Governors' Certifications indicate that the actions are consistent with their current regulations and new regulations are not required (p.107)."

Most generators of low-level radioactive waste, in fact, were left to fend for themselves in planning for extended storage of waste. In some states and compact regions, storage may appear to be an interim phase, with restoration of access to disposal capacity a possibility. In other jurisdictions with no realistic target date for disposal, indefinite storage is essentially the only plan. The actions taken by waste generators to respond to this new circumstance depended on each individual organization's assessment of the likelihood that disposal capacity would be restored within the foreseeable future. Even within the same state or compact region, this assessment may differ among organizations that generate low-level radioactive waste.

One account of the impacts of the loss of access to disposal was that dispersed storage of radioactive waste at many locations within a state would lead to disruption of organizational missions, unnecessary expenditures, and the potential for increased radiation exposure to members of the work force and the public. A number of trade magazines published articles claiming that the lack of access to disposal capacity would have significant effects on industries that use radioactive materials. According to the newsletter, "Seeking Solutions for the Safe Disposal of Radioactive Materials," December 1994, published by the Nuclear Energy Institute:

"New York Hospital-Cornell Medical Center announced on November 2 that it has indefinitely curtailed all research relying on long-lived radioisotopes in response to its growing storage problem....The ban on the use of long-lived isotopes has meant curtailing research on several experiments investigating metabolic and structural studies of heart disease...."

Anecdotal information tells of companies threatening to move to regions that provide for disposal of radioactive waste, and degradation of the competitiveness of industries that rely upon the

use of radioactive materials in manufacturing. To date, however, concrete examples of such impacts have been difficult to document.

Other accounts of the impacts, thus far, of the lack of access to disposal capacity were less alarming. Surveys of waste generators by Connecticut and the Central and Southeast Compact Commissions, and a study of waste storage conditions in Michigan sponsored by DOE's National Low-Level Waste Management Program, did not point to serious problems at this time or in the near future. In a guest editorial in the February 1995 edition of the same newsletter referenced previously, a hospital administrator explained how his organization dealt with the reality of no longer having access to disposal capability in order to avoid the outright curtailment of medical services:

"In 1992, the medical center came to the realization that time was running out on our ability to ship waste to South Carolina. It also became clear to us that anything less than building our own storage facility was downright foolish...Looking back, I suppose we did have another alternative. We could have told our physicians, 'No more work with any isotope that has a half-life of 90 days or more'...But that would have been like going to a restaurant and receiving only half the menu. The Albany Medical College is in the business of saving lives, not in limiting patients' treatment options."

In 1994, the lack of access to disposal capacity affected Federally owned facilities as well. Under the Amendments Act, disposal of low-level radioactive waste generated by a number of Federal facilities is the responsibility of the states. In general, states are responsible for disposal of all Class A, B and C low-level radioactive waste (see 10 CFR 61.55), except that generated by DOE or other Federal agencies in the decommissioning of naval vessels or the production of atomic weapons. For example, states and compact regions are responsible for disposing of low-level radioactive waste generated by the National Institutes of Health and Veterans Administration hospitals.

The largest group of Federal generators without access to disposal capacity are those under the Department of Defense (DOD). Hundreds of DOD organizations in the 31 states without access to disposal capacity generated low-level radioactive waste. In response to the potential problems of widespread onsite storage of the waste, the Army worked with contractors in the private sector to construct and operate two centralized waste storage facilities. In 1994, the first facility, located in

Richland, Washington, was issued a license to accept a variety of waste types. A license application for the second facility, located near Barnwell, South Carolina, was submitted to the state for review in 1994. A licensing decision is expected in 1995. The two facilities will accept waste from Army, Air Force, and some Naval facilities that are unable to store the waste safely on site. The waste would be segregated by state of origin so that it could be shipped for disposal to the applicable state or compact region once disposal capacity becomes available.

As in previous reports in this series, Appendix B provides a summary of data concerning low-level radioactive waste shipped for disposal during the year. Since most low-level radioactive waste that was generated was also shipped for disposal, the disposal data in past years gave a reasonable estimate of the total amount of low-level radioactive waste generated within the U.S. (except for short-lived low-level radioactive waste held for decay).

Exactly how much low-level radioactive waste was stored in 1994 and will be stored in the upcoming year remains open to question. The 1993 Annual Report on Low-Level Radioactive Waste Management Progress noted that approximately 95 percent, or 792,275 ft³, of the Nation's low-level radioactive waste was disposed in 1993. Data obtained from the Department of Energy Manifest Information Management System reported by the operators of the disposal sites in Richland, Washington, and Barnwell, South Carolina, indicate that a total of 858,681 ft³ was disposed in 1994. Thus, it appears that the volumes of waste disposed in 1994 remained relatively constant. Although all compacts and nonmember states outside the Southeast, Northwest, and Rocky Mountain compacts lost access after June 30, 1994, it is likely that many generators attempted to send most of their low-level radioactive waste for disposal prior to the closure of Barnwell, thus accounting for the high volume of waste disposed in 1994, even though access for most generators was limited to the first half of the year.

In 1994, compacts and nonmember states indicated that they did not expect any new disposal facilities to be open in 1995. Therefore, it is anticipated that at least as much waste as was disposed in 1994 would have to go into storage in 1995. In fact, that volume could conceivably be higher, because the computation does not include waste generated by those states that did not have access to disposal sites because they were out of compliance with site development milestones.

At the request of states and compact regions, DOE's National Low-Level Waste Management Program (NLLWMP) has developed a system that, if widely used, would allow participating states and compact regions to maintain uniform records about low-level radioactive waste that is in storage while awaiting the resumption of access to disposal. The heart of the system is software called Low-Track, a personal computer based, data base management system that is designed around the NRC's uniform manifest. Once installed at generator locations, the system would:

- provide a tool for waste generators to keep a detailed, running inventory of waste in storage;
- produce a two-dimensional bar code for each waste package that corresponds to each individual record in the Low-Track data base;
- generate uniform manifests whenever it becomes necessary to ship the waste packages; and
- provide a convenient and routine means to consolidate waste storage information into a statewide, regional, or national data base.

In addition to making a single software package widely available, the NLLWMP would coordinate plans to ensure the compatibility of data from different regions and from different waste generators. Information from each generator's onsite Low-Track system could be transferred on a regular basis to a central data base maintained at the Idaho National Engineering Laboratory. Because much of the waste would potentially be stored for many years before disposal capacity becomes available, Low-Track records in the central data base would be archived under controlled conditions that would help ensure the integrity of the records when the time came to ship the waste. After a long disposal hiatus, certifying that the manifest information accurately reflects the contents of each waste package is expected to be a major issue at new disposal facilities.

The states of Connecticut and California, as well as the Midwest Compact, agreed to field test the Low-Track system during 1994. The system is expected to be operational and available during the second quarter of 1995. Once the Low-Track system is fully deployed, DOE will be able to

resume its regular reports on the volumes and characteristics of low-level radioactive waste generated in the participating regions, if not in the United States as a whole.

Clarifying Responsibilities for Low-Level Radioactive Waste Disposal

A central feature of the Amendments Act is the division of responsibility for waste disposal between the states and DOE. A related issue, which was left ambiguous in the Amendments Act, is the extent of authority of interstate compact organizations to regulate access to radioactive waste management facilities other than disposal facilities, i.e., treatment and storage facilities. During 1994, both of these issues received attention.

Responsibilities of States and the Federal Government

Section 3 of the Amendments Act sets forth the respective responsibilities of the states and the Federal government (by inference, DOE) for disposal of low-level radioactive waste from different sources. This division of responsibility in the statute was written to reflect policies and practices that had evolved in the years preceding its enactment. In general, states were made formally responsible for low-level radioactive waste from licensed, commercial organizations, and from state and Federal government activities, with the following exceptions:

- waste "owned" or generated by DOE;
- waste generated in the production of atomic weapons or the decommissioning of naval vessels; and
- waste that exceeded Class C limits in NRC regulations.

State responsibility for low-level radioactive waste does not mean that a state cannot use waste management services provided by the private sector or by the Federal Government when such services are made available. For example, a number of state officials have urged DOE to provide for disposal of commercially-generated mixed waste, for which the states are otherwise responsible under the

Amendments Act. The question of DOE acceptance of commercially-generated mixed waste was discussed, but not resolved, by state and DOE officials involved in implementing the Federal Facility Compliance Act. These discussions are expected to continue.

The creation of the U.S. Enrichment Corporation (USEC) by the Energy Policy Act of 1992 gave rise during 1994 to concerns on the part of the affected compact regions that they would inherit from DOE responsibility for low-level radioactive waste for which they had not previously planned. USEC has leased and operates the facilities in Paducah, Kentucky, (in the Central Midwest region), and Portsmouth, Ohio (in the Midwest region), which were formerly owned by DOE. Under the Amendments Act, low-level radioactive waste generated by USEC would be the responsibility of the applicable compact region. Questions have arisen, however, over the responsibility for low-level radioactive waste that was generated before the creation of USEC, which is stored on site, as well as for waste that will be generated by the decommissioning of existing facilities. After discussions between DOE and the states of Kentucky and Ohio, Federal legislation was introduced under which DOE would dispose of the low-level radioactive waste in these two categories, on a cost-recovery basis.

It is estimated that the remaining low-level radioactive waste from the two plants (which would result from ongoing operations by the Corporation) would result in about 1,000 ft³ of waste for disposal annually, after compaction, incineration, or other treatment had been applied. (For comparison, the Central Midwest Compact and the Midwest Compact regions shipped 287,219 and 88,793 ft³, respectively, of low-level radioactive waste for disposal during 1992.) The two potentially affected compact commissions have indicated that they plan to seek legislative remedies to formally transfer responsibility for disposal of this waste to DOE.

Breadth of Compact Powers

During 1994, the Central Midwest Compact took steps intended, in part, to clarify a long-standing issue involving the authorities of compact commissions. The Amendments Act and subsequent Federal laws left unanswered questions regarding whether compact commissions have statutory powers to regulate access to facilities for the treatment of low-level radioactive waste.

Treatment includes incineration, compaction, consolidation, and various kinds of technologies other than disposal.

The language of the compact agreements grants their governing boards powers to regulate access to regional treatment facilities located within their borders. Section 4 of the Amendments Act, however, includes provisions that appear to qualify and limit any compact powers that are inconsistent with existing Federal law. The unresolved question has been whether the asserted authority of compact commissions to regulate access to waste treatment facilities is rendered void by the apparent limitations in the Amendments Act.

Amendments to the Central Midwest Compact that had been enacted earlier by the compact region's two member states were introduced into Congress for approval in 1994. The compact amendments were intended, in part, to make clearer and more explicit the power of the compact commission to control access to several waste treatment and brokering operations located within the region. Although Congress approved the Central Midwest Compact amendments during the session, it approved them subject to the original provisions of the Low-Level Radioactive Waste Policy Amendments Act of 1985, which includes the apparent limitations on compact powers. This had the practical effect of leaving the issue unresolved.

Aside from the legal issues, those who favor compact authority to regulate access to waste treatment facilities believe that treatment is an integral step in the waste management process leading to disposal. They believe that, if treatment facilities accept low-level radioactive waste from outside the region, the region may also inherit responsibility for the waste treatment residue that results from these processes. They point out that compact boards have thus far not exercised such powers in a manner that would reduce the markets for waste treatment services. Acting on the premise that compact regions do have the authority to control the interstate movement of low-level radioactive waste for purposes other than disposal, a number of compact regions have signed a standard "interregional agreement" that requires generators who ship waste to other regions for treatment to take back the radioactive residue that results from those treatment processes. Several unaffiliated states have also signed the agreement.

Industry officials who oppose the power of compact commissions to control access to treatment facilities believe that the current configuration of small regions is a deterrent to the establishment of new waste treatment facilities by the private sector because compact boards can control the size of the market for such facilities. Currently operating waste treatment facilities that operate on a national scale have substantially reduced waste volumes requiring disposal while improving the form of waste ultimately disposed. The opponents of broader compact powers believe that states can avoid inheriting responsibility for the disposal of waste treatment byproducts by exercising regulatory powers which they already have under the Atomic Energy Act.

The January 1, 1993, Milestone

During the interim access period under the Amendments Act (January 1, 1986 through December 31, 1992), states and compact regions that met specified milestones for disposal site development were eligible for a rebate of a 25% portion of surcharge payments made by generators within those states for disposal of low-level radioactive waste. The three states that had operating disposal facilities during that period (Nevada, South Carolina, and Washington) collected these disposal surcharges and transferred the 25% portion to an escrow account managed by DOE.

The final milestone in the Amendments Act occurred January 1, 1993. By that date, each state or compact region became eligible for a rebate of its portion of the escrowed funds, if "the state in which such waste originated (or its compact region, where applicable) is able to provide for the disposal of all low-level radioactive waste generated within such state or compact region." States that did not meet the January 1, 1993, deadline, but were able to provide for disposal before January 1, 1996, would receive a prorated portion of the rebate funds otherwise due to them. Under the Amendments Act, states and compact regions that receive surcharge rebate funds must spend the money on activities related to establishing and regulating a low-level radioactive waste disposal facility. The remainder of surcharge funds for which states and compact regions were not eligible were to be returned to the waste generators who paid them.

On September 30, 1992, DOE issued two Federal Register Notices containing draft policies and procedures on eligibility for surcharge rebates under the January 1, 1993, milestone (57 F.R. 45248

and 45249). Comments received on the Notices focused upon two issues central to a decision on whether the states and compact regions, or the waste generators, should be eligible to receive surcharge rebates. The first issue involved the impact of an extension of access to the disposal facility in South Carolina. Although the Southeast region was obligated to accept out-of-region waste only through December 31, 1992, South Carolina decided to extend access to the Barnwell site to waste generators in certain states and regions for an additional 18 months. A number of commentors argued that states and compact regions with access to the South Carolina disposal facility should be eligible for rebates since they were able to provide for disposal, as required by the Amendments Act. Other commentors argued that 18 months of access should be deemed insufficient for milestone compliance. The other issue concerned whether or not a state or compact region should be required to provide for disposal of "mixed waste" (waste containing both hazardous and radioactive constituents) in order to be eligible for rebates.

On June 4, 1993, the Central Midwest Compact Commission filed suit in U.S. District Court seeking an injunction requiring DOE to issue surcharge rebates to the Central Midwest Commission. On March 31, 1994, DOE issued a Federal Register Notice (59 F.R. 15,188) announcing final policies and procedures for surcharge rebates. Under the final policies, DOE would award a prorated portion of surcharge rebates to states and compact regions that had extended access to the South Carolina disposal facility based on the portion of the 36-month period (between January 1, 1993, and January 1, 1996) that they actually had access and provided for disposal. For most of the states and compact regions, this was a 50% portion, providing access for 18 out of the 36 months. The Notice also announced DOE's view that states and compact regions did not have to provide for disposal of mixed waste in order to be eligible for surcharge rebates. Among other reasons, the Notice pointed out that none of the surcharge rebate funds had been paid for disposal of mixed waste, since the three operating disposal facilities did not accept such waste.

On July 19, 1994, the District Court issued a decision affirming the policies and procedures issued in DOE's March 31, 1994, Notice. In September, DOE began issuing surcharge payments to eligible states, compact regions, and waste generators consistent with the policies and procedures in the Notice. However, another lawsuit was brought by the Appalachian compact commission in a Pennsylvania district court on June 30, 1994. For reasons similar to those expressed in the earlier

lawsuit, the Appalachian Compact Commission claimed that it was entitled to a rebate of the full amount of surcharge funds attributable to generators in that region.

Regulatory Changes

Federal regulatory initiatives gained the attention of state planners during 1994, because these initiatives have the potential to affect the progress of disposal site development. The Amendments Act attempted to freeze responsibility for low-level radioactive waste by making states responsible for such waste as it was defined on January 26, 1983. This was the date that NRC issued 10 CFR Part 61, the regulation governing near-surface disposal of radioactive waste. The regulations were supported by an Environmental Impact Statement (NUREG-0945, November 1982), which evaluated the disposal of various forms of low-level radioactive waste using improved shallow-land disposal techniques. During 1994, there were efforts by NRC to issue new regulations, or to clarify and improve the guidance related to the existing regulations.

Concentration Averaging

Low-level radioactive waste is disposed according to its waste "classification." The classification is a function of the radionuclide content of a package of waste divided by its volume or weight. While the classification tables in 10 CFR Part 61 provide general direction, the specific guidelines for applying the technique come from Federal and state policies. During 1994, the NRC continued its efforts to refine the guidelines for classifying low-level radioactive waste. On January 17, 1995, NRC issued a final "Branch Technical Position on Concentration Averaging and Encapsulation."

The Branch Technical Position defined a set of concentration averaging practices that NRC would find acceptable in determining the classification of individual waste packages. Individual waste packages typically contain a number of individual items of waste, with the waste classification assigned to the package as a whole. Although not directly applicable to Agreement State licensees, states often consider NRC policies in developing their own guidelines.

The new NRC position on concentration averaging specifies that, for non-homogeneous wastes (e.g., activated metal pieces, filters, etc.), the activity of a waste item in a package cannot exceed 10 times the average activity of the package for alpha and beta radionuclides, and cannot exceed 1.5 times the average for gamma-emitting radionuclides. The policies could affect whether some forms of waste should be considered suitable for near-surface disposal, or whether the Federal government will have to dispose of them as "greater-than-class C" low-level radioactive waste.

Performance Assessment

Before an operating license can be issued for a low-level radioactive waste disposal facility, the applicant must show through mathematical models that the facility will protect public health and safety and the environment into the future. To do this, a performance assessment is conducted. The performance assessment helps predict whether radionuclides that may migrate from the disposal cells have the potential to harm people. One test used to evaluate the proposed facility's performance is to identify the potential for a person who lives on the facility boundary to be exposed to radiation that exceeds the regulatory limits.

During 1994, NRC issued new proposed policies for conducting performance assessments. The draft "Branch Technical Position on Performance Assessment" differs from previous guidance in several respects. One of the more significant changes was a recommendation that performance assessments include a range of possible values for the amount of potential radiation exposure to the person living on the site boundary, along with a statistical probability for each possible outcome. State officials and others have expressed concern with this approach because reporting outcomes with negligible chances of occurring might be misleading and could make licensing more difficult.

Organizations planning new disposal facilities have expressed some concern that the new guidelines change the basic ground rules for conducting performance assessment evaluations that have been in existence since 10 CFR Part 61 was issued. Some have complained that the disruption that may be caused by changing the policies at this critical time in the site development processes outweighs any benefits that might be gained by the new techniques.

Low-Level Radioactive Waste Standard

Currently, the standards for determining whether a proposed low-level radioactive waste disposal facility will perform adequately are contained in the NRC regulations at 10 CFR Part 61. The regulations require that the disposal facility perform in a manner that would prevent any member of the public from receiving an annual dose exceeding 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ. To determine whether a proposed disposal facility meets these requirements, performance assessment evaluations are done that presume that a member of the public in the distant future is directly and indirectly exposed to radiation from the disposal facility. (See "Performance Assessment".)

During 1994, the Environmental Protection Agency (EPA) revived a 10-year-old effort to issue generally applicable standards for low-level radioactive waste disposal, storage, and treatment facilities. While the EPA's position on the standards was still under development at year's end, a preliminary draft rule provided to state and Federal agencies proposes standards that are different in some respects from the NRC's requirements in the disposal regulations, 10 CFR Part 61. The proposed EPA rule would also impose standards for the protection of groundwater and underground sources of drinking water. These standards would set much lower limits on possible radiation exposure to members of the public through those pathways than the limits mandated under 10 CFR Part 61.

While the exact policies are still under evaluation within EPA, some states have expressed concern that the new rules might disrupt siting efforts by imposing new requirements in the midst of site development efforts. New regulations and guidelines could further delay these processes by implying that technical assumptions based on the previous requirements and guidelines were inadequate, or by providing site opponents grounds to demand reconsideration of key decisions regarding site development.

SIGNIFICANT STATE EVENTS IN 1994

Proposed California Site Remains the Center of National Focus

As the first site since 1970 to receive an operating license for a low-level radioactive waste disposal facility, the California project has been looked upon as something of a bellwether of national progress. California began its program in 1983, featuring a site selection process that emphasized local public involvement. In March 1988, the state's license-designee, US Ecology, Inc. selected a remote site in Ward Valley, about 20 miles west of Needles, California, as the preferred site. Two major issues with the Ward Valley site have involved transferring the land from the Federal Bureau of Land Management (BLM) to the State of California, and protecting the desert tortoise, an endangered species. The issues received considerable attention during 1994 and are detailed below.

Land Transfer

Like much of the southern California desert, the Ward Valley site is located on land owned by the BLM under the Department of the Interior. In August 1993, the Secretary of the Interior notified the governor of California that the Department proposed selling the land to California under the sales procedures of the Federal Land Policy and Management Act. Also in 1993, following review of the license application, the Department of Health Services (DHS) issued a disposal facility operating license to US Ecology for the Ward Valley site. (Except for the land transfer issue, the issuance of an operating license ordinarily would have triggered the commencement of facility construction.)

A month after the license was issued, a report by three US Geological Survey (USGS) geologists (Wilshire report) "found significant potential for radioactive contamination of the groundwater and eventual contamination of the Colorado River." Both DHS and US Ecology took strong issue with the report, noting that the Wilshire report had not been subject to the normal internal USGS review process and that the authors had relied upon faulty and incomplete information to support their conclusions.

In late October 1993, two lawsuits were filed, claiming, among other things, that an adjudicatory hearing was required by California law before final issuance of an operating license. One of the suits was filed by the Fort Mojave Indian Tribe, Southern California Federation of Scientists, Los Angeles Physicians for Social Responsibility, and the Committee to Bridge the Gap. The second suit, filed by the City of Needles, was withdrawn after the Cal Rad Forum, an association of organizations that generate low-level radioactive waste, agreed to support legislation to provide economic benefits to the town.

In the meantime, the Department of the Interior and DHS continued planning for the land transfer hearings. In November 1993, however, the Secretary of the Interior notified the governor that he was postponing further action pending final resolution of the litigation. In early 1994, the Secretary asked the National Academy of Sciences to review the issues raised in the Wilshire report.

In May 1994, the Superior Court combined the two lawsuits and issued a decision dismissing all the allegations except one. The Court ruled that the licensing decision should be reexamined in light of the findings in the Wilshire report. The following month, DHS submitted a petition to retry the case, along with technical information showing that the issues in the Wilshire report had already been addressed in the environmental impact statement and the license application review. The court declined to retry the case. The DHS appealed the case to the Second District Court of Appeals in Los Angeles. As of the writing of this report, a decision in that case is still pending.

Desert Tortoise

Because the desert tortoise has been classified as a threatened species, DHS, with assistance from the Desert Tortoise Working Group, submitted a plan to the BLM and the U.S. Fish and Wildlife Service (USFWS) in 1990 to mitigate impacts of the proposed facility on the tortoise. The plan includes installing several miles of tortoise-proof fencing along Interstate 40 to eliminate road kills, which is the leading cause of mortality for tortoises in the northern portion of Ward Valley. The plan was expected to more than compensate for the loss of 80 acres of habitat that would be used for the disposal facility.

Although the USFWS received the mitigation plan favorably, two organizations sued the agency to designate a critical habitat for the tortoise, in accordance with the Endangered Species Act of 1974. That law and accompanying regulations require that critical habitat areas be designated at the time a species is declared to be threatened or endangered, or as soon as possible thereafter. In February 1994, the USFWS designated a critical habitat that included land in which the proposed disposal facility would be located. The listing requires the BLM to seek another biological opinion from the USFWS on the mitigation plan. Because the site is located within a critical habitat, EPA and several other Federal agencies will also have to be consulted.

Changes in Site Selection Strategy

States and compact regions have not progressed toward the development of new disposal facilities as quickly as had been expected when the Amendments Act was passed. The delays have stemmed largely from opposition at two levels. At the state level, some of the projects have not enjoyed the degree of support necessary to overcome opposition to the general objective of developing a disposal facility. At the community level, opposition to the choice of site locations has been strong enough in some places to hamper or defeat the projects. The approach to selecting sites may strongly influence whether or not there is sufficient community support at the local level to follow through in developing the disposal facility. During 1994, DOE examined the approaches taken by states and compact regions when selecting candidate sites in order to determine what could be learned. The report, "Comparative Approaches to Siting Low-Level Radioactive Waste Disposal Facilities" (DOE/LLW-199, July 1994) describes these site selection processes and presents conclusions.

The Comparative Approaches report observed that states may use either of two different strategies for selecting locations for low-level radioactive waste disposal facilities. Under the more commonly used approach known as "top-down screening," site locations are selected through a map overlay process, whereby land area is eliminated from consideration in successive steps until only the candidate sites remain. Under the second approach, land is not eliminated from consideration at any stage in the process. Instead, "volunteer" sites are solicited, and these are evaluated against the siting criteria. Often, community support is a prerequisite for evaluating any volunteered site. Two

jurisdictions, Illinois and the Central Compact region, used processes that combined elements of both strategies.

During 1994, and during the last several years, some states re-examined their general approaches for selecting locations for new disposal facilities. Connecticut and Michigan, whose top-down screening processes resulted in local opposition, have decided to begin again with a more collaborative process based upon community incentives. New York, whose top-down screening also resulted in substantial public opposition, is said to be informally exploring options for a more volunteer-oriented approach. Massachusetts, which initiated a site selection process in 1994, is also interested in emphasizing the voluntary aspects of its site selection process. New Jersey, which had initially thought in terms of a top-down screening process, later adopted a more collaborative approach in response to the poor results of top-down screenings in other states. Illinois, on the other hand, decided not to act upon the results of its site selection process, which had emphasized finding a site in a supportive community, and to adopt a top-down screening process. In addition, legislation was introduced in Ohio in late 1994 that appears to favor the top-down process.

The Comparative Approaches report did not recommend one kind of site selection process over the other. However, the report did recommend that states and compact regions examine other options before deciding upon a top-down screening process as the method for selecting the location for a low-level radioactive waste disposal facility. In addition to public acceptance issues, the report noted that data used in such screenings often have inherent weaknesses that make the results more difficult to defend. The report also cautioned siting organizations against reducing the flexibility needed to negotiate with potential host communities by preempting key technical and economic decisions through laws and regulations.

License Application Reviews Take More Time than Expected

While considering the bill that became the Amendments Act, members of Congress expressed concerns that the processes for reviewing license applications for the proposed disposal facilities might seriously delay the opening of the new sites. To help address the problem, the Amendments Act directed that NRC "to the extent practicable, complete all activities associated with the review and

processing of any application for such a license (except for public hearings) no later than 15 months after the date of receipt of such application," and "to the extent practicable, consolidate all required technical and environmental reviews and public hearings" [Section 9(1) and 9(2)].

Although NRC responded by developing plans for implementing the directive, NRC, in fact, is not the licensing agency for most of the proposed disposal sites. Of the states planning new disposal facilities, 29 are NRC Agreement States and two more plan to become agreement states by the time a disposal facility license application is submitted. All five of the states that have progressed to the point of submitting an application have been Agreement States. In states where license applications have been submitted, it has taken considerably longer than 15 months to conduct the technical review and reach a licensing decision. The following table shows states in which license applications have been submitted, and the status of the review.

The delay in reaching a licensing decision in California was due to the decision by the regulatory agency, the DHS, not to issue the license while the land transfer was pending. When it appeared that the land transfer issue would not be resolved in a timely manner, however, the DHS decided to issue the license.

In Nebraska and North Carolina a final licensing decision was delayed until resolution of technical issues raised by the licensing agencies. In both states, the license applicant was required to respond to formal interrogatories more extensively than they had anticipated. The key licensing issue in Nebraska centered on a possible wetland located on the site. The U.S. Army Corps of Engineers

Table 1. Status of license reviews.

State	License application submitted	Status
California	December 1989	License issued September 1993
Nebraska	July 1990	Review ongoing
Illinois	May 1991	Review inactive
North Carolina	December 1993	Review ongoing
Texas	March 1992	Review ongoing

determined that there is a wetland on the site and asked the site development contractor to "delineate," or map the boundaries, of the wetland. After extensive onsite testing, the site developer maintained that the wetland could not be delineated because they did not believe that the area in question is a wetland under Federal guidelines. In North Carolina, license reviewers sought better assurance that groundwater movement at the site was well understood. The North Carolina Low-Level Radioactive Waste Management Authority continued to conduct significant additional testing at the site.

In Illinois, the review of the license application was suspended when the Illinois Siting Commission rejected a site selected by the Illinois Department of Nuclear Safety. The application, however, was never formally withdrawn. The decision made by the Texas Low-Level Radioactive Waste Disposal Authority to submit parts of the application as they were completed rather than wait until the entire document was completed may have contributed to a prolonged review period.

New Decision Points Lengthen Site Development Processes

Upon enactment of the Amendments Act in 1985, it was generally accepted that the sequence of steps toward establishing a disposal facility for low-level radioactive waste were as follows:

- identifying a regional host state*;
- selecting candidate sites*;
- characterizing the site and preparing a license application;
- submitting the license application*;
- evaluating and reviewing the license application;

- if the application is approved, constructing the facility; and
- operating the facility*

* NOTE: The steps denoted with an asterisk (*) were adopted as site development milestones in the Amendments Act.

In the Amendments Act, the milestone for the beginning of facility operations followed submission of the license application by 12 months. Although 12 months is not an adequate amount of time to review the license application and to construct the facility, it shows that the Congress anticipated that disposal capacity would be provided within a relatively short time following approval of the application. The critical decision point, as understood in the mid-1980s, would be NRC or Agreement State agency approval or disapproval of the license application.

Over time, however, states have added a number of new critical decision points, some of which occur relatively late in the site development processes. The post-licensing steps imposed upon the California process are the most obvious, and are detailed elsewhere in this report. But other states also anticipate, and are even planning for, new decision processes that could significantly extend the schedule for the beginning of facility operation. These states and some of these decision points include:

CONNECTICUT—Before construction of the facility begins, the Connecticut Siting Council must issue a “certificate of public safety and necessity.” The process can take 12 to 18 months under state law. The applicant must also submit a copy of the NRC license application and environmental reports to the Council for review. The Council will evaluate the information through adjudicatory-style hearings.

MASSACHUSETTS—Massachusetts law requires that all regulations pertaining to development and operation of the disposal facility be in place before a site selection process begins.

NEW YORK—New York law specifies a separate process to select a disposal technology before initiating the site selection process. (In most states, competing conceptual designs for the facility are included as part of the evaluation of site development contractors.) The New York Siting Commission is required to prepare an environmental impact statement (EIS) in support of the preferred disposal method. After review by several panels, the EIS will be submitted to the Department of Environmental Conservation for approval.

PENNSYLVANIA—Once the site development contractor identifies three potentially suitable sites, the sites must be submitted to the Environmental Quality Board (EQB) for approval before site characterization can begin. The EQB evaluates the sites against the site requirements in the state regulations, and must make a determination that the “screening process has identified three of the best potential locations in this Commonwealth.”

CONCLUSIONS

From 1980 through 1993, a primary force driving states and compact regions toward the development of new disposal facilities was their desire to avoid the sanctions and enjoy the rewards implicit in the applicable statutes. In addition, there was a common view that the loss of access to disposal capacity in the sited compact regions could pose threats to public health and safety. With enactment of the Amendments Act in early 1986, more explicit incentives and sanctions were added. These included assessing penalty surcharges against industries in states that did not meet the site development milestones in the law, and requiring states without access to disposal capacity to take title to, and possession of, the waste after 1995.

Although the states with operating disposal sites were allowed to limit use of the sites to regional waste beginning January 1, 1993, South Carolina extended the interim access period by 18 months, allowing continued access to the disposal facility located in that state through June 30, 1994. Extended access was provided only to those states and compacts that the Southeast Compact Commission believed were making adequate progress toward establishing their own disposal facilities.

Since mid-1994, the desire to maintain access to operating disposal sites no longer served as an incentive to state governments and compact boards to continue their siting programs. As of July 1, 1994, 31 states outside the Southeast, Northwest, and Rocky Mountain Compact regions no longer enjoyed access to the operating disposal facilities, regardless of site development progress in their own regions. With the expiration of the site development milestones, and the striking of the "take title" provision by the U.S. Supreme Court, there are no further Federal incentives or sanctions, other than the congressionally derived power of compact regions to limit their disposal facilities to low-level radioactive waste generated within their respective regions. The United States Supreme Court stated:

"States may either regulate the disposal of radioactive waste according to Federal standards by attaining local or regional self-sufficiency, or their residents who produce radioactive waste will be subject to Federal regulation authorizing sited States and regions to deny access to their disposal sites. The affected States are not compelled by Congress to regulate because any burden caused by a State's refusal to regulate will fall on those who generate waste and find no outlet for its disposal, rather than on the State as a sovereign. A State whose citizens do not wish it to attain the Act's milestones may devote its attention

and resources to issues its citizens deem more worthy; *the choice remains at all times with the residents of the State, not with the Congress.*" (Emphasis added) (New York v. United States, et al., June 19, 1992, p.26.)

Nevertheless, even though states lost access to disposal capacity in mid-1994, their site development programs continued in much the same manner as before. This is probably because, aside from the Federal sanctions and incentives, the underlying motivation for establishing new disposal sites had always been the states' responsibility to provide services that rely on radioactive materials and to protect public health and safety and the environment. NRC and state regulatory agencies have long held that interim storage of low-level radioactive waste is unacceptable without definite plans for permanent disposal. This view is changing, however, and storage facilities are being designed for safety over the long term. Beginning in 1994, therefore, the level of effort by states and compact regions will probably be driven by their sense of the consequences of not having access to disposal capacity.

Close observers of low-level radioactive waste issues debate whether the level of progress made thus far by states and compact regions provides a basis for optimism. Persons involved in state efforts to develop the new disposal sites have pointed out in public meetings that states have made significant investments in the organizations and processes that will be needed to establish the new disposal sites. They note that, as a result of this effort, four license applications for new disposal facilities are currently under active review. Many others have not been as optimistic about the prospects for ultimate success in some of the states and compact regions. The Department of Energy continues to support constructive efforts by states and compact regions to develop safe and efficient systems for the disposal of low-level radioactive waste.

Appendix A

Individual State/Compact Reports

Appendix A

Individual State/Compact Reports

COMPACT REGIONS WITHOUT OPERATING DISPOSAL SITES

Six compact regions and one proposed compact between Texas, Vermont, and Maine, did not have access to an operating disposal facility beginning July 1, 1994. Brief descriptions of the compacts and host states' activities during 1994 are included in the sections listed below.

- Appalachian Compact (Pennsylvania)
- Central Compact (Nebraska)
- Central Midwest Compact (Illinois)
- Midwest Compact (Ohio)
- Northeast Compact (Connecticut and New Jersey)
- Southwestern Compact (California)
- Texas Compact (Texas)

APPALACHIAN STATES LOW-LEVEL RADIOACTIVE WASTE COMPACT

Background

Congress ratified the Appalachian States Low-Level Radioactive Waste Compact (the Appalachian Compact) in 1988. It consists of four states: Delaware, Maryland, West Virginia, and host State Pennsylvania. Pennsylvania's Department of Environmental Resources (DER) is responsible for contracting with, and licensing, a firm to site, develop, operate, and close the regional disposal facility. Chem-Nuclear Systems, Inc. (Chem-Nuclear), is DER's lead contractor for these activities.

Following the closing of the Barnwell, South Carolina, disposal facility on June 30, 1994, Appalachian Compact generators were storing their low-level radioactive waste. Certain high-volume, low-activity low-level radioactive waste continued to be exported to Envirocare of Utah.

Current Project Schedule

- Siting plan approved (completed August 1991)
- Three-stage disqualification screening process (November 1991, completed May 1994)
- Evaluation screening (September 1994, completion June 1995)
- Announcement of three potential sites (September 1995)
- Review/approval by Pennsylvania Environmental Quality Board (EQB) (Six months for EQB review)
- Characterization/selection single site (Start second quarter 1996; complete second quarter 1997)
- Submit license application (Mid-1997)
- License application review (18 months)
- Construction completion/site operational (Begin late 1998; operational late 1999)

Status of Facility Development

DER approved Chem-Nuclear's siting plan in August 1991. The company began a top-down screening process to identify three potentially suitable sites to submit to the state's EQB for review and approval. Chem-Nuclear completed a three-stage screening process in May 1994, which disqualified 75% of the state from further consideration for a disposal site. However, all 67 counties still contain eligible land.

With completion of the disqualification process, Chem-Nuclear began evaluation screening. During this process, the contractor applied preference criteria that were mathematically weighted by the responses to a public values survey. After completing the evaluation screening, Chem-Nuclear will recommend three suitable sites to the EQB for review and approval. Upon EQB approval, all

three sites will be characterized. After characterization is completed, Chem-Nuclear will recommend one of the three sites to the DER for licensing.

Concurrent with the screening process in Pennsylvania, the state and the contractor are focusing on outreach efforts designed to solicit volunteer communities. The Appalachian States Low-Level Radioactive Waste Compact Commission (the Appalachian Compact Commission) is promoting a Public Information Grant Program to help communities gather information about low-level radioactive waste disposal and the siting process.

As the siting process continues, the project will clearly cost more than initially expected. Early in 1995 Chem-Nuclear will reach its current contract limit of \$29,217,000. They have estimated that they will need from \$55 to \$90 million more to site and license the facility. The DER is examining several options for obtaining the additional funding.

Chem-Nuclear cited three areas that contribute to the significant cost increases: public involvement, site selection, and site characterization. Public involvement efforts, originally scheduled for a local focus of 15 months, have expanded to a statewide effort of 49 months. In addition, public demand for project information was greater than anticipated. Site selection was originally expected to take 15 months and cost \$3.4 million. Because additional documentation was required and processing more detailed and voluminous data was necessary, it is now scheduled to require approximately 60 months and \$21 million. Chem-Nuclear also noted that the three-stage disqualification process was not part of their original proposal. Finally, based upon characterization experiences in North Carolina and Illinois, Pennsylvania's original characterization cost estimates are too low and need to be increased.

Other Significant Activities

In December 1992, the Appalachian Compact Commission executed an agreement with the Southeast Interstate Radioactive Waste Management Commission for continued access to the disposal facility at Barnwell, South Carolina, through June 1994. The Appalachian Compact Commission viewed this agreement as a valid contract with another compact for disposal of all of the Appalachian

Compact region's low-level radioactive waste and subsequently requested the receipt of all surcharge payments from the Department of Energy (DOE). The Department issued a decision in the Federal Register on March 31, 1994 awarding to states and compact regions prorated surcharge payments. If states or compact regions were unable to provide disposal capacity after their contracts with Barnwell expired, then generators would receive rebates in monthly installments. The Federal Register Notice further stated that states and compact regions could receive additional payments if they provided disposal capacity anytime between July 1, 1994, and January 1, 1996. In June 1994, the Appalachian Compact Commission filed a complaint against DOE in the U.S. District Court for the Middle District of Pennsylvania to obtain all surcharge payments due.

The DER spent most of 1993 preparing its limited agreement application that will allow the DER, rather than the NRC, to regulate the compact's disposal facility. The DER was resolving comments on their application and planned to resubmit the application on April 1, 1995.

CENTRAL INTERSTATE LOW-LEVEL RADIOACTIVE WASTE COMPACT

Background

Congress ratified the Central Interstate Low-Level Radioactive Waste Compact (the Central Compact) in December 1985. The compact consists of five states: Arkansas, Kansas, Louisiana, Oklahoma, and host state Nebraska. The Nebraska Department of Environmental Quality (DEQ) and the Nebraska Department of Health (DOH) work together under the State of Nebraska Low-Level Radioactive Waste Program to review the license application. The site developer is US Ecology, Inc. (US Ecology).

Following the closing of the Barnwell, South Carolina, disposal facility on June 30, 1994, Central Compact generators were storing their low-level radioactive waste.

Current Project Schedule

- License application submitted (July 1990)
- Fourth-round reviewer comments submitted to US Ecology (October 31, 1994)
- Responses to reviewer comments complete (April 30, 1995)
- DEQ publishes "Draft Environmental Impact Analysis and the Draft Environmental Safety Report" (Not available)
- Facility operational (1998)

Status of Facility Development

The siting process began in 1988. US Ecology submitted a license application for a parcel of land in Boyd County near Butte, Nebraska, to the State of Nebraska Low-Level Radioactive Waste Program in July 1990. The license application is undergoing review. The public comment period on the license application officially closed August 4, 1992. The state forwarded its fourth and final round of comments to US Ecology for response on October 31, 1994.

In January 1993, the DEQ and DOH jointly issued a news release to announce their intent to deny US Ecology's license application, citing concerns about wetlands and surface water drainage. In August 1993, US Ecology submitted an amended license application that reduced the size of the site from 320 acres to 110 acres, to exclude wetlands that were within the original site boundaries. Upon review of the reconfigured boundaries, the DEQ and DOH withdrew their notice of intent to deny the application.

In 1993, the State of Nebraska sued the Central Compact seeking removal of the Butte site from consideration. The lawsuits alleged that community consent did not exist for locating the site there. Nebraska's 1988 enabling legislation discusses community consent as follows:

It is the intent of the Legislature that potential host communities are actively and voluntarily involved in the siting process. To the extent possible, consistent with the highest level of protection for the health and safety of the citizens of the state and

protection of the environment, the developer will make every effort to locate the facility where community support is evident.

Court determinations in December 1993 and June 1994 decided in favor of the Central Compact Commission and US Ecology.

US Ecology's early estimates to develop a site in Nebraska were lower than estimates received in 1994. Estimates for an operational site are now at \$125 to \$150 million.

Other Significant Activities

On February 3, 1995, the State of Nebraska, at Governor Nelson's request, filed two lawsuits against the Central Compact: One seeks to force the seating of two additional Nebraska representatives on the compact's governing commission; the other seeks to force the compact to release about \$900,000 in Federal surcharge rebate funds to the state. As of the writing of this report, no decision has been reached.

CENTRAL MIDWEST INTERSTATE LOW-LEVEL RADIOACTIVE WASTE COMPACT

Background

Congress ratified the Central Midwest Interstate Low-Level Radioactive Waste Compact (the Central Midwest Compact) in December 1985. It consists of two states: Kentucky and host state Illinois. The Illinois Department of Nuclear Safety (IDNS) is the regulator for the compact region's low-level radioactive waste disposal facility. Chem-Nuclear Systems, Inc. (Chem-Nuclear) is the facility developer and operator.

Following the closing of the Barnwell, South Carolina, disposal facility on June 30, 1994, Central Midwest Compact generators were storing their low-level radioactive waste.

In 1987, the IDNS began a site selection process that culminated in submission of a license application for a proposed site in Martinsville. In 1990, the Illinois Low-Level Radioactive Waste Management Act was amended to address public concerns about the role of IDNS as both site selector and facility regulator. The amendment created a three-member Illinois Low-Level Radioactive Waste Disposal Facility Siting Commission (Siting Commission) that was charged with making the final site selection decision. IDNS officially proposed the Martinsville site to the Siting Commission in January 1991. In October 1992, after extensive hearings, the Siting Commission voted to reject the Martinsville site. In December 1992, the Illinois General Assembly amended the Illinois Low-Level Radioactive Waste Management Act eliminating the provisions for the Siting Commission and the Siting Commission was disbanded. More than \$90 million had been spent on the siting process to that point.

Current Project Schedule

- New siting process begins (March 1993)
- Task group issues draft criteria (Not available)
- Public hearings on criteria (18 months)
- Illinois State Geologic Survey and State Water Survey identify at least 10 locations (18 months)
- Developer selects three sites (Not available)
- Task Group concurs with three sites (Not available)
- Developer conducts characterization and submits license application (Not available)
- License application approved (Not available)
- Facility operational (2001)

Status of Facility Development

In January 1993, Illinois enacted legislation to establish a new siting process and create the Illinois Radioactive Waste Task Group to develop new criteria for the disposal facility. The Task Group held its first meeting in January 1994, and expects to issue the siting criteria in 1995.

Following the issuance of the siting criteria, the Illinois State Geologic Survey and the State Water Survey will conduct a top-down screening of the state to identify at least 10 locations of at least 640 acres each. From these locations, Chem-Nuclear will select three sites. If the Task Group concurs that the three sites are likely to meet the siting criteria, then Chem-Nuclear will select one for full characterization.

Other Significant Activities

Congress recently approved amendments to the Central Midwest Compact that were designed primarily to clarify the authority of the compact over treatment and processing of low-level radioactive waste. The purposes of the amendments are: (a) to make the compact consistent with the Amendments Act of 1985 (the Central Midwest Compact was established before the Amendments Act and, as a result, there are some inconsistencies); (b) to clarify that the Central Midwest Compact has authority to enter interregional access agreements for storage and treatment; and (c) to make minor changes to the organization of the compact commission.

Low-level radioactive waste generated from the formerly DOE-owned U.S. Enrichment Corporation (USEC) in Kentucky has become a serious concern to the compact. Senator Wendell Ford introduced a bill in September 1994 to amend the Energy Policy Act of 1992 to require DOE to accept USEC's low-level waste for treatment or disposal. USEC would be required to reimburse DOE for increased costs incurred because of treatment and disposal of USEC waste.

In March 1993, the IDNS issued a report that addressed the need for temporary storage capacity between the June 30, 1994 closure of Barnwell and the end of 1999, the date an operational facility was expected. The report estimated a shortfall in storage capacity for 41 of 67 state generators for the period. In its report, IDNS recommended that the private sector be given the opportunity to develop the storage capacity because the State of Illinois does not have the statutory authority to develop a temporary storage facility. IDNS updated the March 1993 report in 1994. Results showed that a limited number of generators would have storage problems. During 1994, IDNS held workshops to discuss the development of private-sector storage.

In June 1993, the Central Midwest Compact Commission files suit to force the DOE to rebate to the state more than \$3,000,000 in surcharge fees. The commission argued that it had met its obligation under the Amendments Act by signing an interim access agreement that allowed its generators to use the Barnwell facility. On March 31, 1994, DOE issued a decision in the Federal Register, which provided that states and compacts that entered into contracts for access to Barnwell were eligible to receive 1993 rebates on a prorated basis. In July 1994, the court issued a decision that affirmed DOE's decision.

MIDWEST INTERSTATE LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT COMPACT

Background

The Midwest Interstate Low-Level Radioactive Waste Compact (Midwest Compact) consists of six states: Indiana, Iowa, Minnesota, Missouri, Ohio, and Wisconsin. Illinois was a member until it withdrew and formed the Central Midwest Compact with Kentucky. In July 1991, the compact revoked the membership of Michigan, the region's first designated host state, after the governor of that state made a number of statements indicating his opposition to developing a site. A study conducted for the Midwest Compact Commission also indicated that Michigan's enabling legislation contained site criteria so restrictive that it would likely have eliminated the entire state from consideration. With Michigan out of the compact, Ohio, which had earlier been named first alternate host state, became the host for the regional disposal facility.

Pending legislation will authorize Ohio to seek Agreement State status from the NRC and allow the Ohio Department of Health to license and regulate the new facility. Also, the legislation would amend the Midwest Compact and create an Ohio Low-Level Radioactive Waste Facility Authority to oversee the siting process.

Following the closing of the Barnwell, South Carolina, disposal facility on June 30, 1994, Midwest Compact generators were storing their low-level radioactive waste.

Current Project Schedule

The project schedule is unknown at this time, although Ohio has indicated that a facility could be in operation approximately 9 years after enactment of enabling legislation by the Ohio General Assembly.

Status of Facility Development

Two panels established by the governor and legislative leaders, the Blue-Ribbon Commission on Siting Criteria, and the Low-Level Radioactive Waste Advisory Committee, concluded a series of public hearings and delivered recommendations in September 1993. The Blue Ribbon Commission provided recommendations on siting criteria and other issues. The Advisory Committee provided recommendations on disposal technology, facility design, selection of a developer/operator, licensing, community compensation and benefits, public involvement, and other issues.

Based largely on the recommendations of the Blue Ribbon Commission and the Advisory Committee, enabling legislation was introduced in the Ohio General Assembly in November 1994. In March, 1995, the legislation was approved by the Ohio Senate and is now pending in the Ohio House. The enabling legislation consists of four parts: amendments to the Midwest Compact, establishment of a disposal facility siting process, detailed siting criteria based upon Federal licensing regulations and the Blue Ribbon Commission report, and authorization for Ohio to become an Agreement State and regulate the regional disposal facility. The bill would also establish a nine-member Ohio Low-Level Radioactive Waste Facility Authority that would oversee the siting process. Following approval by the Ohio General Assembly, the amendments to the compact must be enacted by the legislatures of the other member states and submitted to Congress for approval.

Other Significant Activities

At its June 1994 meeting, the Midwest Compact Commission approved a resolution establishing a maximum capacity for the first regional disposal facility of 2,250,000 ft³. Ohio's statutory

obligation will be to operate a disposal facility for twenty years, or until the capacity is reached, whichever occurs first.

In June 1994, the Midwest Compact Commission extended a contract with the Ohio State University Research Foundation through December 1994 to continue educational outreach activities. The contract included activities such as distributing fact sheets, giving presentations, leading workshops, and establishing a hotline for questions from county extension agents, the public, and the media.

In a July 1994 letter to state newspapers, Ohio Governor George Voinovich reaffirmed his commitment to developing a regional low-level radioactive waste disposal facility for the Midwest Compact. Voinovich stated, "As Governor, it is my duty to deal responsibly with the issue of low-level radioactive waste disposal and to discharge our obligation to the Midwest Compact."

In November 1994, the Midwest Compact's Advisory Committee on Preliminary Waste Acceptance Criteria and Waste Information and Tracking adopted recommendations on waste acceptance criteria and an annual generator report. The waste information and tracking system will provide the Midwest Compact Commission and Ohio with data on the amount and characteristics of stored waste and will use the Idaho National Engineering Laboratory Low-Track system for data entry and reporting.

Under legislation enacted by Congress in 1992, the Portsmouth Gaseous Diffusion Plant in Ohio, and a similar plant in Kentucky, were leased to the U.S. Enrichment Corporation. Disposal of low-level waste resulting from operation of the plants by the Corporation was assumed to be the responsibility of the Midwest Compact. Ohio and the Midwest Compact oppose acceptance of this waste for disposal and informed the DOE Secretary of their opposition at a June 1994 meeting. The Midwest and Central Midwest Compact Commissions intended to seek Federal legislation in 1995 to clarify that disposal of this waste is not a state responsibility.

NORTHEAST INTERSTATE LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT COMPACT

Background

Congress consented to the Northeast Interstate Low-Level Radioactive Waste Management Compact (the Northeast Compact) in December 1985. In addition to Connecticut and New Jersey, the original member states included Delaware and Maryland, who withdrew in 1986 and joined the Appalachian Compact. In 1987, the Northeast Interstate Low-Level Radioactive Waste Commission (the Northeast Compact Commission) designated both member states as hosts for regional low-level radioactive waste disposal facilities. Each state established a program to develop disposal capacity for waste generated within its state.

Following the closing of the Barnwell, South Carolina, disposal facility to out-of-compact generators on June 30, 1994, Northeast Compact generators were storing their low-level radioactive waste.

Connecticut

The Connecticut Hazardous Waste Management Service (the Service) is responsible for selecting a site, technology, and developer for the state's low-level radioactive waste disposal facility. The Connecticut Siting Council is responsible for issuing a certificate of public safety and necessity for the facility. Connecticut is not an Agreement State; therefore, the NRC is the regulator.

In 1991, following a top-down screening of the state, the Service selected three candidate sites to undergo characterization, all within two miles of each other. In May 1992, a law was enacted requiring the Service to terminate the first siting process and develop a new siting plan. The new legislation also directed the Service to revise its management plan and evaluate a plan for a temporary storage facility.

Connecticut's Current Project Schedule.

- Management plan adopted (April 1993)
- Volunteer community identified (Not available)
- Statewide site-screening begins if volunteer not found (1997)
- Facility operational (2001)

Status of Connecticut's Facility Development. In April 1993, the Connecticut legislature approved the new management plan that featured a volunteer approach for siting a facility. The plan provides for an evaluation of the voluntary siting approach if the volunteer plan does not produce a suitable site within two years. The Service filed a two-year extension for the voluntary siting process with the General Assembly in February 1995. As of this writing, no decision has been made. During 1994, the Service continued to implement the volunteer siting approach, determining that it would invite towns to participate in the voluntary siting approach after the three following activities were completed.

The first activity is to set the minimum site size for a site for the facility. This is scheduled for completion in November 1995. The second activity is to prepare administrative procedures to carry out a volunteer approach. The Service began drafting the procedures in 1994 and expects to complete them in July 1995. The last activity is to conduct the Service's public information and public involvement efforts.

New Jersey

The New Jersey Low-Level Radioactive Waste Disposal Facility Siting Board (the Board) is the agency responsible for siting a low-level radioactive waste disposal facility in New Jersey. The NRC is responsible for regulating the facility.

In 1990, the Board adopted final siting criteria and the methodology for applying those criteria. By 1992, the Board had begun a reexamination of the entire siting process and asked the Radioactive Waste Advisory Committee (the New Jersey Advisory Committee) to study the feasibility of pursuing a volunteer siting process. In December 1992, acting on the recommendation of the New Jersey

Advisory Committee, the Board unanimously adopted the approach of seeking a volunteer community as an alternate site identification method and suspended the previous statewide screening process.

New Jersey's Current Project Schedule.

- Siting Plan adopted (February 1995)
- Facility operational (2001)

Status of New Jersey's Facility Development. During 1993, the Board continued its outreach program to involve the public in designing the voluntary plan. In January 1994, the Board passed a resolution accepting the New Jersey Advisory Committee's recommendation to use a voluntary siting plan. During the remainder of the year, the Siting Board and Advisory Committee invited public comment on the Proposed Voluntary Siting Plan. On February 2, 1995, the Siting Board adopted the report, *New Jersey's Voluntary Plan for Siting a Low-Level Radioactive Waste Disposal Facility*.

Other Significant Activities

In 1994, the Northeast Compact Commission began updating its Regional Management Plan. The plan includes updates of low-level radioactive waste volume and activity figures; a history of the Commission's host state decision; and a description of interim low-level radioactive waste management in the region.

Member states advised the Northeast Compact Commission that they believe generators will be able to temporarily store their low-level radioactive waste until at least 1999. In Connecticut, a Temporary Storage Facility Plan analyzed the need for the state to develop such a facility and documented that no need existed for such a facility in Connecticut. The Connecticut Department of Environmental Protection's annual survey revealed that Connecticut generators can store their waste on site until at least 1999.

In New Jersey, the Board surveyed generators about low-level radioactive waste management, including plans for interim and onsite storage. Generators assured the Board that they are prepared

for safe interim management and storage of low-level radioactive waste. The New Jersey Department of Environmental Protection is developing a memorandum of understanding with the NRC for inspection of generators' interim storage.

SOUTHWESTERN LOW-LEVEL RADIOACTIVE WASTE DISPOSAL COMPACT

Background

Congress ratified the Southwestern Low-Level Radioactive Waste Disposal Compact (the Southwestern Compact) in November 1988 between Arizona and California. North Dakota and South Dakota joined the following year.

The California Department of Health Services (DHS) is responsible for managing and regulating the site. US Ecology, Inc., (US Ecology) is responsible for siting, developing, and operating the disposal facility.

Current Project Schedule

- License application submitted (October 1989)
- License application approved (September 1993)
- Construction complete (six months after legal/administrative issues resolved)
- Facility operational (1996-1998 depending on litigation schedule)

Status of Facility Development

After a site selection process that emphasized local public involvement, US Ecology identified three potential sites in southeastern California; these were all on Federal land in the Silurian, Panamint, and Ward Valleys. US Ecology submitted a license application in October 1989 for the preferred site in Ward Valley, about 20 miles west of Needles, California. Following review of the

license application, DHS issued a disposal facility operating license to US Ecology in September 1993.

Two issues at the Ward Valley site have delayed development of a disposal facility. They are the land transfer from the U.S. Bureau of Land Management (BLM) to the State of California, and completion of the Federal Endangered Species Act biological consultation process on the desert tortoise, an endangered species.

Land Transfer. The Ward Valley site is on Federal land managed by the BLM under the Department of the Interior. In August 1993, Secretary of the Interior Bruce Babbitt notified Governor Pete Wilson that he would postpone his decision to sell the land to California pending the outcome of additional public hearings, which he requested that the state conduct on Interior's behalf.

In October 1993, two lawsuits were filed in state court claiming, among other things, that an adjudicatory hearing was required by California law before DHS issuance of an operating license. One suit was filed by the Fort Mojave Indian Tribe, Southern California Federation of Scientists, Los Angeles Physicians for Social Responsibility, and the Committee to Bridge the Gap. The second suit, filed by the City of Needles, was later withdrawn based on a formal agreement with the California Radioactive Materials Management Forum (Cal Rad Forum), an association of organizations that use radioactive materials, who agreed to support state legislation to provide financial siting incentives to the town.

Meanwhile, staff from the Secretary of the Interior's office and DHS continued planning for the hearings. In November 1993, however, the Interior Secretary notified the governor that he was postponing further action pending final resolution of the litigation.

At a December 1993 press conference, U.S. Senator Barbara Boxer of California released a report by three US Geological Survey (USGS) employees (Wilshire report), which alleged "significant potential" for radioactive contamination of the groundwater and eventual contamination of the Colorado River. Both DHS and US Ecology took strong issue with the report. They noted that the report had not been subject to the normal internal USGS review process and that the authors had

relied upon faulty and incomplete information to support their conclusions. Additionally, they noted that the report was submitted long after the licensing decision had been made.

In February 1994, Senator Boxer repeated her request to Secretary Babbitt that the work of the three USGS geologists be expanded and subjected to a thorough and objective scientific review. In March 1994, Secretary Babbitt asked the National Academy of Sciences (NAS) to review the issues raised in the Wilshire report and to report its findings in December 1994.

In May 1994, the Superior Court combined the two lawsuits and issued a decision dismissing all the allegations raised in the lawsuit. The Court ruled, however, that the licensing decision should be reexamined because of the "new analysis" presented in the Wilshire report. DHS submitted a petition to reconsider its directive, along with technical information addressing the issues raised in the Wilshire report. The court declined to retry the case. Currently, all aspects of the Court's decision are being appealed to the Second District Appellate Court.

Desert Tortoise. Because the desert tortoise is a threatened species, DHS, with assistance from the Desert Tortoise Working Group, submitted a plan to the BLM and the U.S. Fish and Wildlife Service (USFWS) in 1990 to mitigate impacts of the site on the tortoise. The plan included installation of several miles of tortoise-proof fencing along Interstate 40 to eliminate road kills, which is a major cause of mortality for tortoises in that portion of Ward Valley.

The USFWS issued a favorable biological opinion in November 1990. Subsequently, two organizations sued the agency to designate a critical habitat for the tortoise. In February 1994, the USFWS designated critical habitat, which included the site of the proposed disposal facility. The listing requires the BLM to seek another biological opinion from the USFWS based on critical habitat issues.

At a NAS panel meeting in August 1994, a scientist presented information on tortoise diseases and argued that their habitat should not be fragmented by projects like the Ward Valley disposal facility. Project opponents have threatened to sue the Department of the Interior if it transfers the land to DHS for the facility.

Other Significant Activities

DHS is initiating a program to inventory low-level radioactive waste stored at generators' facilities, as part of a pilot program developed by DOE's National Low-Level Waste Management Program.

A bill establishing a \$12 per cubic foot surcharge on waste disposal to benefit the City of Needles and the Needles Unified School District has been introduced into the California Legislature with the support of US Ecology and the Cal Rad Forum.

Californians for Ward Valley, a broad-based grass roots organization, has been organized to provide information to citizens, the media, and elected officials on the project.

TEXAS LOW-LEVEL RADIOACTIVE WASTE DISPOSAL COMPACT

Background

The Texas legislature established the Texas Low-Level Radioactive Waste Disposal Authority (Texas Authority) in June 1981. The Texas Authority is responsible for developing a disposal facility for low-level radioactive waste generated within the state. Licensing and regulating the facility are the responsibility of the Texas Natural Resource Conservation Commission.

Although it acted for years as a "go-it-alone" state, Texas approved legislation in 1993 that authorized the state to enter a compact with Maine and Vermont. Maine and Vermont enacted the necessary legislation in 1994. The Texas Compact must receive congressional approval before it goes into effect. Congress did not approve the Texas Compact during the 1994 Congressional session and it was resubmitted in January 1995.

Texas and Vermont had contracts in place with the Southeast Compact Commission for access to the Barnwell, South Carolina, facility through June 30, 1994. Since then, generators in Texas and Vermont have been storing their waste. Maine was eligible for access through June 30, 1994, but

chose not to enter a contract with the Southeast Compact Commission. Maine generators have been storing their waste since January 1, 1993.

Current Project Schedule

- Site selected (1992)
- License application submitted (1992)
- Final site characterization studies submitted (December 20, 1993)
- Review of license application and site characterization completed (Spring 1996)
- Facility construction begins (Spring 1997)
- Facility operational (Early 1998)

Status of Facility Development

Texas first began a siting process in 1982. The Texas Authority was characterizing a site in Hudspeth County near the town of Fort Hancock. Neighboring El Paso county and several other plaintiffs sued the Texas Authority in 1987 to prevent location of a disposal facility at the Fort Hancock site. In early 1991, the court ruled in favor of the plaintiffs and ordered the Texas Authority to cease characterization of the Fort Hancock site and to restore the site to its prestudy condition.

Later in 1991, the Texas legislature passed a law that directed the Texas Authority to select and characterize a site within a 400-square mile area in eastern Hudspeth County, about 40 miles to the east of the Fort Hancock site. In 1992, the Texas Authority purchased a potential site (known as the Faskin ranch site) near the town of Sierra Blanca, began site characterization, and submitted a license application. Final site characterization studies were provided to the Texas Natural Resource Conservation Commission in December 1993. Review of the characterization information and license application is expected to be complete in spring, 1996. Meanwhile, design work is being completed on an interchange at the interstate highway for improved access to the site.

Other Significant Activities

The Maine legislature voted in early 1994 to shut down the Maine Authority as of June 30, 1994. The Maine Authority did not assess its generators after the June 30 date.

Although Vermont voted to enter the Texas Compact, one lawsuit concerning previous development of a disposal facility within the state was not resolved until 1994. State legislation in 1990 directed the Vermont Authority to characterize a site at the Vermont Yankee Nuclear Power Station in the Town of Vernon and to screen the town of Vernon to identify potential sites. Battelle Memorial Institute conducted a characterization of the Vermont Yankee site in late 1990 and 1991. In September 1991, the Vermont Authority voted to stop work at the site because unfavorable conditions, most involving groundwater, were identified. In May 1992, the Vermont Authority sued Battelle Memorial Institute seeking recovery of more than \$1,000,000 spent on unnecessary characterization of the Vermont Yankee site. They argued that a significant portion of the characterization could have been avoided if the contractor had reported information suggesting the existence of wetlands on the site. In May 1994, the Vermont Authority and Battelle Memorial Institute reached a settlement during trial.

UNAFFILIATED STATES PLANNING TO CONSTRUCT LOW-LEVEL RADIOACTIVE WASTE DISPOSAL FACILITIES

Massachusetts, Michigan, and New York, though unaffiliated with a compact region, plan to construct low-level radioactive waste disposal facilities. These states are not members of compacts and cannot take advantage of the provision in the Amendments Act of 1985 to restrict the use of their facilities to generators in other states. This section discusses the progress these states made during 1994 toward providing disposal for their low-level radioactive waste.

MASSACHUSETTS

Background

In 1987, the Massachusetts Low-Level Radioactive Waste Management Board (the Board) was established to site, construct, and operate a disposal facility within the state "if necessary." In February 1994, the Board determined that a disposal capacity shortfall existed in Massachusetts and voted to proceed with a site selection program. The Board also voted to continue discussions with other states and compacts regarding possible out-of-state solutions.

The Board is responsible for selecting a site for the state's low-level radioactive waste disposal facility. Assuming Massachusetts is granted Agreement State status by NRC, the state's Department of Public Health will be the regulator of the facility.

Massachusetts had a contract in place with the Southeast Compact Commission, which allowed generators in the Commonwealth to use the disposal facility at Barnwell, South Carolina, through June 1994. Following the closing of the Barnwell, South Carolina, disposal facility on June 30, 1994, Massachusetts generators were storing their waste.

Current Project Schedule

- Site selection process begins (February 16, 1994)
- Site selected (1998-99)
- Site license submitted (1999)
- Facility operational (2001)

Status of Facility Development

In December 1993, the Board adopted a Low-Level Radioactive Waste Management Plan. The plan details options for long-term management of waste; recommendations for waste minimization, and policies and procedures for interim onsite storage. The plan also recommends the segregation of short and long-lived radioisotopes to enhance retrieval in the future.

On February 16, 1994, the Board voted to begin the siting process for an in-state disposal facility. The siting process includes three stages of technical screening and a Volunteer Sites Program. In addition, the Board voted to continue to seek an agreement with another state or regional compact for the disposal of Massachusetts' low-level radioactive waste. A previous action by the governor approved \$45 million in bonds that can be spent toward either in-state or out-of-state options for management of low-level radioactive waste.

During 1994, the Board, the Department of Environmental Protection, and the Department of Public Health developed regulations affecting the establishment of a disposal facility within the state. In January, the Board adopted two sets of regulations. One set implements the policies for managing low-level radioactive waste adopted in the Management Plan. The other regulations establish criteria for selecting a company that would operate a disposal facility. In February, the Department of Environmental Protection adopted regulations that define the methods that the Board will use for selecting a site. In March, the Department of Public Health adopted licensing, operational, and minimization regulations. These regulations also include minimization plans to encourage generators to reduce or eliminate the use of radioactive materials or to use those with shorter half-lives.

In 1995, the Board began conducting a statewide mapping and screening program to exclude areas unsuitable for a disposal facility. This exclusionary screening is the first stage of a three-stage technical screening program.

Other Significant Activities

Massachusetts has applied to NRC for Agreement State status. Approval is expected to be granted by the end of 1995.

In 1991, the legislature passed a law allowing the Board to charge Massachusetts generators fees to fund part of the Board's administrative costs. In June 1992, a Massachusetts company sued the Board challenging the validity of its authorization to levy assessments. In July 1993, the Massachusetts Superior Court upheld the constitutionality of the Board's assessments. In August 1993, the generator appealed the decision to the State's Supreme Court. As of March 1995, a decision was still pending.

MICHIGAN

Background

From December 1985 until July 24, 1991, Michigan was a member state of the Midwest Compact. Michigan was identified as the host state for the compact region in June 1987.

Michigan initiated a siting process, but siting criteria prescribed by state law were so restrictive that a site meeting the criteria could not be found. As a result, the Midwest Compact Commission revoked Michigan's membership in the Midwest Compact for failing to discharge its host state obligations. Subsequently, Michigan stopped all siting efforts.

In November 1990, Michigan was denied access to the disposal facilities at Barnwell, South Carolina, Beatty, Nevada, and Richland, Washington, because it did not meet Federal milestones in

the Amendments Act. Low-level radioactive waste generators in Michigan have been storing their waste since November 1990.

Current Project Schedule

- Develop volunteer siting process (mid-1995)
- Site operational (Not available)

Status of Facility Development

In December 1994, legislation that was introduced in 1992 to amend the siting law was adopted. The legislation reconstitutes the Low-Level Radioactive Waste Research and Education Institute's Board of Governors and charges the board with making recommendations to the governor and the Michigan Authority on disposal options, waste management options, and a volunteer community siting process. The amendments also broaden the Michigan Authority's role in monitoring onsite storage and pursuing waste minimization initiatives. The legislation requires the Board to develop a volunteer siting process by mid-1995.

Other Significant Activities

In April 1993, the Michigan Authority released a storage report that assessed the capacity of its generators to store low-level radioactive waste. Results indicated that most generators had the capacity to store their waste through 1995. A subsequent study by DOE in 1993 and inspections by NRC confirmed that most waste generators do not face a storage capacity crisis.

In November 1993, the Michigan Authority released a report, developed by Battelle Memorial Institute, that evaluated the state's siting criteria to determine if any site within the state could meet the requirements. The report concluded that the criteria were too restrictive to permit siting a facility within the state. As of March 1995, the Michigan Authority had not proposed revisions to the criteria.

NEW YORK

Background

In 1986, the New York State legislature passed the Low-Level Radioactive Waste Management Act and established the Low-Level Radioactive Waste Siting Commission (the New York Siting Commission). The New York Siting Commission is responsible for evaluating and selecting a disposal method and site for a disposal facility. Under Agreement State status with the NRC, the New York Department of Environmental Conservation (DEC) is responsible for licensing the facility. The New York State Energy Research and Development Authority (NYSERDA) is responsible for constructing and operating the facility.

New York generators could send their low-level radioactive waste to the Barnwell, South Carolina, facility through June 30, 1994. Following the closing of the Barnwell, South Carolina, disposal facility, New York generators were storing their waste.

In September 1989, the New York Siting Commission announced five potential sites. In 1990, opposition led the governor to suspend siting activities in order to reevaluate the siting process.

Current Project Schedule

- Select disposal method (mid-1995)
- Conceptual approval of preferred disposal method (early 1996)
- Site screening and selection (Not available)
- Site characterization (Not available)
- Submit license application (August 1998)
- Facility construction and operation (January 2001)

Status of Facility Development

Following the evaluation of the siting process, the New York State Low-Level Radioactive Waste Management Act was amended in 1990. The amendment provides for (a) more public participation, (b) independent scientific technical review of work, and (c) selection of a disposal method before the continuation of site screening activities. The New York Siting Commission prepared reports in 1994 to help them in identifying the preferred disposal method and developing a set of generic site characteristics.

The law requires the New York Siting Commission to identify any method-specific site selection criteria that would be associated with its preferred disposal method. To enable objective comparisons of alternative methods, the New York Siting Commission issued a Generic Site Characteristics Report in June 1994. The report evaluates the soils and bedrock that are available in the state for siting a disposal facility using near-surface and mined repository disposal methods.

The design concepts and evaluations of alternate methods will depend upon the projected volume, activity, and isotope makeup of the waste that will be placed in the disposal facility. These elements constitute the source term. In 1994 the New York Siting Commission completed an update to the 1990 Source Term Report. The final report is expected in mid-1995. These data will also be used to support the selection of the preferred method.

Form and packaging of waste will affect the design and could affect the performance of alternative disposal methods. To address these issues, the New York Siting Commission issued a waste form and container report. The report evaluated available commercial waste packaging and processing technologies; identified problem waste forms and containers; and recommended ways to mitigate container problems.

Following a decision by DEC to accept the preferred method, the New York Siting Commission is required to select a site. After site selection, detailed assessments that evaluate conditions at the site and in the surrounding area must be done. In December 1994, a Generic Site Characterization Plan

was accepted by the New York Siting Commission. The report sets forth the types of characterization studies required for any site, based on Federal and state laws and regulations.

Other Significant Activities

In 1990, the citizens in the Town of Ashford, where the West Valley Nuclear Service Center is located, passed a resolution requesting the legislature to lift the state ban on low-level radioactive waste disposal in the town. The resolution sought to make the West Valley site available for site characterization studies. Two bills that would authorize consideration of a low-level radioactive waste disposal facility at West Valley remained before the state legislature as the session ended in 1994. As of publication, no action has been taken on these and other legislative proposals to revise the state's low-level radioactive waste siting program. Included among these proposals are the Siting Commission's program to provide support for communities willing to be considered as possible locations for low-level radioactive waste disposal facilities.

In November 1993, NYSERDA released the results of a study on the storage of low-level radioactive waste. The study concluded that 20% of the generators in the state could store waste at their facilities for a minimum of 10 years, while 34%, primarily medical facilities and hospitals, could store waste less than one year. The study also concluded that establishing a separate, centralized facility for Class A low-level radioactive waste generated by medical and academic institutions was not economically viable. In 1994 the New York Siting Commission stated that storage space was dwindling for a number of facilities, especially medical institutions in larger metropolitan areas. As a result, some institutions are curtailing research and procedures that have low-level radioactive waste by-products.

UNAFFILIATED STATES NOT PLANNING TO CONSTRUCT LOW-LEVEL RADIOACTIVE WASTE DISPOSAL FACILITIES

New Hampshire, Rhode Island, the District of Columbia, and Puerto Rico are not affiliated with a compact. These states (the District of Columbia and Puerto Rico are considered states under the Amendments Act) have no plans to develop low-level radioactive waste disposal facilities, because they generate such small amounts of waste that it is not economically feasible. In the District of Columbia, the urban configuration prevents establishment of a facility. These states continue to pursue the goal of entering contracts or compacts with states or compact regions that have, or will have, operating disposal facilities.

NEW HAMPSHIRE

In 1989, the state contracted with the Rocky Mountain Board for disposal of New Hampshire's nonreactor low-level radioactive waste at the Beatty facility in Nevada. The contract expired on December 31, 1992. Because of its noncompliance with the site development milestones in the Amendments Act, New Hampshire was ineligible for access to the Barnwell, South Carolina facility through June 30, 1994. As of January 1, 1993, New Hampshire low-level radioactive waste generators were storing their waste.

RHODE ISLAND

Similarly, Rhode Island entered a contract with the Rocky Mountain Board for disposal of low-level radioactive waste in Nevada. The contract expired on December 31, 1992. Rhode Island was also ineligible to enter contract arrangements for disposal access to the Barnwell facility because of its noncompliance with milestones in the Amendments Act. As of January 1, 1993, Rhode Island low-level radioactive waste generators were storing their waste.

DISTRICT OF COLUMBIA

The urban configuration and heavy population density of the District of Columbia made it impossible to build a low-level radioactive waste disposal facility within its borders. Consequently, the District did not comply with the site development milestones in the Amendments Act. Although out of compliance, the District disposed of its low-level waste from 1987 through 1992 under a special contract with the Rocky Mountain Compact. In October 1993, the District entered a contract with the Southeast Compact for access to the Barnwell, South Carolina, facility for disposal of its waste through June 1994. Without access to disposal, the District's low-level radioactive waste generators are using one of four options: onsite storage, separation of decayable isotopes, compaction by a broker and storage by a broker, or use of radionuclides with shorter half-lives, where possible.

By virtue of having secured burial privileges with Barnwell from October 1993 to June 1994, the District contends that it is entitled to a prorated portion of the surcharge rebates collected from 1990 through 1992. DOE believes that, since Nevada opted not to collect surcharges and forward 25% of this amount to DOE, then the District is due no rebate.

PUERTO RICO

Because Puerto Rico did not meet the site development milestones in the Amendments Act, it has been denied access to the low-level radioactive waste disposal facilities in Nevada, South Carolina, and Washington since 1987. Puerto Rico's low-level radioactive waste generators produce fewer than 10 ft³ per year of waste. The generators continue to store their waste.

COMPACT REGIONS WITH OPERATING DISPOSAL SITES

Two compact regions, made up of 16 states, had operating low-level radioactive waste disposal facilities through 1994. These facilities are in Richland, Washington and Barnwell, South Carolina. The Barnwell facility was scheduled to close, but legislation passed in South Carolina in June 1992 allowed the facility to remain open through December 31, 1995 to regional generators, and to generators outside the region through June 1994. The Richland facility serves as the regional disposal facility for the Northwest compact region and, by contract, the Rocky Mountain compact region. Although the Rocky Mountain Compact does not have an operating disposal facility, it is included in this section because it has long-term access to the Richland facility through the contract signed in 1992 with the Northwest Compact Committee. These compact regions and host states include the Northwest Compact (Washington), Rocky Mountain Compact, and Southeast Compact (South Carolina).

NORTHWEST INTERSTATE COMPACT ON LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

Background

Congress consented to the Northwest Interstate Compact on Low-Level Radioactive Waste Management (Northwest Compact) in 1985. The compact includes eight states: Alaska, Hawaii, Idaho, Montana, Utah, Oregon, Wyoming, and host state Washington. US Ecology, Inc. (US Ecology) has operated the commercial low-level radioactive waste disposal facility at DOE's Hanford facility near Richland, Washington, since 1965. The land is leased to the State of Washington and, in turn, leased to the company for waste disposal. The Washington State Department of Health is responsible for regulating the disposal facility. Management of the facility's contractual arrangements with the state is the responsibility of the Department of Ecology.

As provided by the Amendments Act, the Northwest Compact closed its borders to out-of-region wastes as of January 1, 1993. A disposal access agreement between the Northwest and Rocky Mountain Compacts was signed in October 1992, allowing the three Rocky Mountain Compact states to use the Washington facility after January 1, 1993.

The state does not plan to close the currently operating regional disposal facility. There are no plans to develop a new disposal site in the region.

Other Significant Activities

Current items of interest to the Northwest Compact Committee (the Committee) include managing the compact region's mixed waste streams and access for large-volume, very low-activity cleanup wastes at the Envirocare facility in Utah. State representatives to the Low-Level Radioactive Waste Forum have supported the idea of DOE accepting commercially generated mixed waste. However, other state representatives involved in Federal Facility Compliance Act efforts are not proponents of the idea. Should DOE accept commercial mixed waste, the Hanford facility would be one candidate site for its disposal.

In 1991, the Northwest Compact Committee passed a Resolution and Order to provide for disposal for high-volume, minimally contaminated, cleanup wastes that were unanticipated when Congress passed the Amendments Act in 1985. After 1991, several companies approached the Committee for access to the Envirocare facility based on the Resolution and Order. The requests came about because of misunderstandings regarding the Committee's intent when they approved the Resolution and Order. The Committee clarified its language at a meeting in May 1994. The clarifying language made it clear that cleanup waste, from any type of reactor, comprising soil, asphalt, and other soil-like media not associated with the vessel and surrounding buildings was allowed access to Envirocare. Operational or routinely generated waste was prohibited. The language also required export approval by the state or compact region in which the waste was generated.

During 1994, US Ecology met with interested parties to agree on a rate structure for its 1996 rate filing to the Washington Utilities and Transportation Commission (UTC). The meetings were held as part of a 1994 settlement agreement approved by the UTC that arose from a judicial appeal of US Ecology's 1992 rate case and related issues in the first semiannual rate adjustment proceeding in 1993.

The UTC directed US Ecology to convene a meeting of interested parties to try to develop a consensus on an acceptable rate structure for the Company's required 1996 rate filing. The meeting will file a status report in the spring of 1995 outlining the areas in which a consensus has been reached. The meeting will continue to work to reach consensus over issues in dispute until May 31, 1995, the date by which the company is required to file its rate case.

In December 1994, the Committee agreed with a proposal from the Rocky Mountain Compact to exclude naturally occurring and accelerator-produced (NARM) waste from the 6,000 ft³ cap imposed by the contract. This agreement allows the Committee to treat NARM waste the same regardless of where it is generated.

ROCKY MOUNTAIN LOW-LEVEL RADIOACTIVE WASTE COMPACT

Background

Congress consented to the Rocky Mountain Low-Level Radioactive Waste Compact (Rocky Mountain Compact) in December 1985. The compact includes three states: Colorado, New Mexico and Nevada. In June 1993, a previous member state, Wyoming, changed compact affiliations by exercising a standing option to join the Northwest Compact. The regional disposal facility near Beatty, Nevada, closed in December 1992.

In March 1990, the governor of Washington signed a bill that allowed for a contract with the Rocky Mountain Low-Level Radioactive Waste Board to accept the Rocky Mountain Compact's waste after 1992. Therefore, the Rocky Mountain Compact does not plan to establish a disposal facility for

the region. The contract contains limitations on the quantity of waste required to be accepted at the Richland facility.

Other Significant Activities

In 1994, the Rocky Mountain Board and the Northwest Compact Committee approved an amendment that NARM waste would be excluded from the annual volume cap contained in the contract between the two compacts.

In 1994, the Rocky Mountain Board instituted seven enforcement actions against those who exported waste from the compact without authorization. Settlement agreements were reached with six of the violators. One case went to hearing, which resulted in a determination that a violation had occurred.

SOUTHEAST INTERSTATE LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT COMPACT

Background

Congress consented to the Southeast Interstate Low-Level Radioactive Waste Management Compact (Southeast Compact) in January 1986. The compact includes eight states: Alabama, Florida, Georgia, Mississippi, Tennessee, Virginia, current host state South Carolina, and designated host state North Carolina.

In September 1986, the Southeast Compact Commission designated North Carolina to be host to the compact region's disposal facility following closure of the Barnwell facility. In 1987, North Carolina enacted legislation that created the North Carolina Low-Level Radioactive Waste Management Authority (North Carolina Authority). The North Carolina Authority is charged with siting, building, leasing or operating, and closing the North Carolina disposal facility. Chem-Nuclear Systems, Inc. (Chem-Nuclear), will develop and operate the new facility.

The terms of the compact provided that the disposal facility operated in Barnwell County, South Carolina, which is also operated by Chem-Nuclear, would serve as the regional disposal facility through December 31, 1992. Because of delays in establishing the succeeding host facility in North Carolina, South Carolina agreed to extend access to the Barnwell facility for regional waste generators. In June 1992, the South Carolina General Assembly approved keeping the Barnwell disposal facility open on a regional basis through December 31, 1995, and open from January 1, 1993, through June 30, 1994, to out-of-region low-level radioactive waste.

Current Project Schedule

- License application submitted (December 1993)
- Issuance of Operating License [Summer of 1997 (North Carolina Authority estimate)]
- Facility operation [1998 (North Carolina Authority estimate)]

Status of Facility Development

The North Carolina Authority characterized two candidate sites and prepared a license application for each, one in Richmond County and one in Wake County. In December 1993, the North Carolina Authority submitted the license application for the Wake County site to the Division of Radiation Protection in the Department of Environment, Health, and Natural Resources. Since both sites appeared to be equivalent from a safety standpoint, the Wake site was chosen over the Richmond County site primarily because development of the Wake site would cause the relocation and disruption of fewer people.

The Division of Radiation Protection has publicly commented about the complexity of the site and has requested more information that will require additional hydrogeological studies, estimated to cost between \$12 and \$25 million. Assuming the outcome of the work is favorable and the North Carolina Authority continues pursuing an operating license, the additional work will push back the estimated target date for opening the site to 1998.

As of January 1995, the Southeast Compact Commission had authorized payment to North Carolina of \$63 million of funds collected from southeast generators to fund site development. In January 1995, the Southeast Compact Commission voted to approve an additional \$5.4 million to cover "critical testing" through September 1995. Critical testing will enable the North Carolina Authority to decide whether to conduct the rest of the work. The North Carolina Authority also hired an independent consultant to assess the hydrogeology of the site to decide whether additional investment in the site is warranted. As a result mainly of schedule pressures, however, characterization work at the site will commence in early 1995 before completion of the consultant's report.

Other Significant Activities

In 1994, the South Carolina Department of Health and Environmental Control issued comprehensive rules to cover extended storage of waste. With the planned closure of the Barnwell disposal site, waste generators in the State of South Carolina would be required to store their waste. The rules are believed to be the first set of state regulations that address waste storage as a separate waste management activity. Because storage of waste in the past had been done only to provide a collection point in route to disposal, most Federal and state regulations have not included comprehensive requirements for licensing waste storage facilities.

Appendix B

Low-Level Waste Disposal Data

Appendix B

Low-Level Waste Disposal Data

The data in the figures and tables in Appendix B are from DOE's Low-Level Radioactive Waste Allocation Monitoring System, which is a compilation of disposal data furnished by regulatory agencies of the sited States of Nevada, South Carolina, and Washington. Therefore, the volume totals are consistent with the data furnished by the same entities in their monthly reports to DOE's surcharge escrow account. The volumes reported in these tables "see through" low-level radioactive waste shippers, brokers, and processors, to ensure the waste volumes are attributed to the state or compact region in which the waste was actually generated. Although these data are furnished by the state agencies, they are subject to ongoing verification by these agencies and may be adjusted slightly after the time they are compiled in this report.

Disposal Volumes and Activity Level of Low-Level Radioactive Waste Received by Commercial Disposal Facilities

In 1994, the two operating disposal sites at Barnwell, South Carolina, and Richland, Washington, received 858,681 ft³ of low-level radioactive waste, with a radioactivity level of 751,379 Ci, according to information reported by regulatory agencies of the two sited states (see Figure B-1). Figures B-2 through B-15, and the accompanying tables summarize the compact regions' and nonmember states' low-level radioactive waste received by the commercial disposal sites.

Disposal Site	1988 (ft ³)	1989 (ft ³)	1990 (ft ³)	1991 (ft ³)	1992 (ft ³)	1993 (ft ³)	1994 (ft ³)
Barnwell, SC ^a	931,758	1,103,151	788,537	789,681	829,608	605,443	733,935
Beatty, NV ^b	92,694	114,420	59,479	160,269	514,725	Closed	Closed
Richland, WA	403,398	408,291	295,299	419,212	397,988	186,832	124,746
Total (ft ³)	1,427,850	1,625,862	1,143,315	1,369,162	1,742,321	792,275	858,681

Disposal Site	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)	1994 (Ci)
Barnwell, SC ^a	218,902	725,164	443,594	611,348	815,974	611,785	745,301
Beatty, NV ^b	8,691	42,678	11,323	29,679	90,206	Closed	Closed
Richland, WA	32,068	99,026	92,985	158,784	93,923	31,124	6,078
Total (Ci)	259,661	866,868	547,902	799,811	1,000,103	642,909	751,379

a. Site closed to out of region waste on June 30, 1994.

b. Site closed on December 31, 1992.

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly.

Figure B-1. Volume of waste and activity received by operating disposal facilities (1988 through 1994).

Volume percentage of Barnwell waste Volume percentage of Richland waste

Disposal	Total volume (ft ³)	Compact Region	Percent of waste volume (1994)
Barnwell, SC ^a	733,935	Appalachian	8.2
		Central	3.7
		Central Midwest	8.4
		Midwest	4.1
		Northeast	4.8
		Southeast	47.6
		Southwestern	7.6
		Nonmember	15.6
Richland, WA	124,746	Northwest	85.2
		Rocky Mountain	14.8

a. Site closed to out of region waste on June 30, 1994.

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly.

Figure B-2. Breakdown of disposal facility waste by compacts and nonmember states.

State/compact	Total	Volume to Beatty ^a (ft ³)	Volume to Richland (ft ³)	Volume to Barnwell ^b (ft ³)
Appalachian	60,343	0	0	60,343
Central	26,972	0	0	26,972
Central Midwest	61,557	0	0	61,557
Midwest	30,191	0	0	30,191
Northeast	35,238	0	0	35,238
Northwest	106,269	0	106,269	0
Rocky Mountain	18,477	0	18,477	0
Southeast	349,493	0	0	349,493
Southwestern	55,824	0	0	55,824
District of Columbia	562	0	0	562
Maine	2,940	0	0	2,940
Massachusetts	19,486	0	0	19,486
Michigan	0	0	0	0
New Hampshire	0	0	0	0
New York	82,583	0	0	82,583
Puerto Rico	0	0	0	0
Rhode Island	0	0	0	0
Texas	5,880	0	0	5,880
Vermont	2,863	0	0	2,863
Total	858,681	0	124,746	733,935

a. Site closed on December 31, 1992.

b. Site closed to out of region waste on June 30, 1994.

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly.

Figure B-3. Breakdown of nation's waste by compact or nonmember state.

**Volume percentage breakdown of nation's
waste by compacts and nonmember states**

Compact	Number of states	Total (ft ³)	Percent of national totals, including non-member states
Appalachian	4	60,343	7.0
Central	5	26,972	3.1
Central Midwest	2	61,557	7.2
Midwest	6	30,191	3.5
Northeast	2	35,238	4.1
Northwest	8	106,269	12.4
Rocky Mountain	3	18,477	2.1
Southeast	8	349,493	40.7
Southwestern	4	55,824	6.5
Total	42	744,364	86.6

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly.

Note: Only generators from the Northwest, Rocky Mountain, and Southeast Compacts had disposal access for all of 1994. With the exception of Maine, New Hampshire, Rhode Island, Michigan, and Puerto Rico, all others had access to disposal until June 30, 1994.

Figure B-4. Breakdown of nation's waste by compacts and nonmember states.

Volume percentage by disposal facility

Volume percentage by source

Disposal Site	Non-Utility	Utility	Total
Barnwell, SC ^a	392,618	341,313	733,931
Beatty, NV ^b	0	0	0
Richland, WA	88,021	36,729	124,750
Total	480,639	378,042	858,681

a. Site closed to out of region waste on June 30, 1994.

b. The Beatty disposal site located in Nevada closed December 31, 1992.

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Figure B-5. Breakdown of nation's waste by disposal facility and source.

Volume percentage by state

Volume percentage by source

State	Non-Utility	Utility	Total
Delaware	375	0	375
Maryland	5,706	2,715	8,421
Pennsylvania	6,530	44,935	51,465
West Virginia	82	0	82
Total	12,693	47,650	60,343

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Note: Appalachian Compact region generators had access to disposal through June 30, 1994.

Figure B-6. Appalachian Compact region's low-level radioactive waste received by the commercial disposal sites in 1994.

Volume percentage by state

Volume percentage by source

State	Non-Utility	Utility	Total
Arkansas	32	6,226	6,258
Kansas	219	1,762	1,981
Louisiana	74	15,558	15,632
Nebraska	38	2,596	2,634
Oklahoma	467	0	467
Total	830	26,142	26,972

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Note: Central Compact region generators had access to disposal through June 30, 1994.

Figure B-7. Central Compact region's low-level radioactive waste received by the commercial disposal sites in 1994.

Volume percentage by state

Volume percentage by source

State	Non-Utility	Utility	Total
Illinois	7,535	53,689	61,224
Kentucky	333	0	333
Total	7,868	53,689	61,557

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Note: Central Midwest Compact region generators had access to disposal through June 30, 1994.

Figure B-8. Central Midwest Compact region's low-level radioactive waste received by the commercial disposal sites in 1994.

Volume percentage by state **Volume percentage by source**

State	Non-Utility	Utility	Total
Indiana	1,623	0	1,623
Iowa	344	2,835	3,179
Minnesota	311	1,621	1,932
Missouri	3,186	2,711	5,897
Ohio	2,414	9,254	11,668
Wisconsin	276	5,616	5,892
Total	8,154	22,037	30,191

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Note: Midwest Compact region generators had access to disposal through June 30, 1994.

Figure B-9. Midwest Compact region's low-level radioactive waste received by the commercial disposal sites in 1994.

Volume percentage by state **Volume percentage by source**

State	Non-Utility	Utility	Total
Connecticut	3,417	93,209	12,737
New Jersey	7,347	15,154	22,501
Total	10,764	24,474	35,238

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Note: Northeast Compact region generators had access to disposal through June 30, 1994.

Figure B-10. Northeast Compact region's low-level radioactive waste received by the commercial disposal sites in 1994.

Volume percentage by state

Volume percentage by source

State	Non-Utility	Utility	Total
Alaska	44	0	44
Hawaii	1,900	0	1,900
Idaho	27	0	27
Montana	10	0	10
Oregon	21,914	10,265	32,179
Utah	5,849	0	5,849
Washington	53,978	12,281	66,259
Wyoming	206	0	206
Total	83,928	22,546	106,474

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Figure B-11. Northwest Compact region's low-level radioactive waste received by the commercial disposal sites in 1994.

Volume percentage by state

Volume percentage by source

State	Non-Utility	Utility	Total
Colorado	3,406	14,183	17,589
Nevada	280	0	280
New Mexico	402	0	402
Total	4,088	14,183	18,271

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Figure B-12. Rocky Mountain Compact region's low-level radioactive waste received by the commercial disposal sites in 1994.

Volume percentage by state

Volume percentage by source

State	Non-Utility	Utility	Total
Alabama	479	13,715	14,194
Florida	587	11,390	11,977
Georgia	1,503	17,925	19,428
Mississippi	1,032	6,096	7,128
North Carolina	10,859	19,848	30,707
South Carolina	39,975	21,285	61,260
Tennessee	152,091	2,210	154,301
Virginia	33,848	16,650	50,498
Total	240,374	109,119	349,493

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Figure B-13. Southeast Compact region's low-level radioactive waste received by the commercial disposal sites in 1994.

Volume percentage by state

Volume percentage by source

State	Non-Utility	Utility	Total
Arizona	396	7,904	8,300
California	42,046	5,412	47,458
North Dakota	61	0	61
South Dakota	5	0	5
Total	42,508	13,316	55,824

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Note: Southwestern Compact region generators had access to disposal through June 30, 1994.

Figure B-14. Southwestern Compact region's low-level radioactive waste received by the commercial disposal sites in 1994.

Volume percentage by state

Volume percentage by source

Michigan, New Hampshire, Puerto Rico, and Rhode Island each have 0% volume.

State	Non-Utility	Utility	Total	Percent of national totals
District of Columbia	562	0	562	< .1
Maine	2,940	0	2,940	.3
Massachusetts	7,027	12,459	19,486	2.3
Michigan	0	0	0	0
New Hampshire	0	0	0	0
New York	57,277	25,306	82,583	9.6
Puerto Rico	0	0	0	0
Rhode Island	0	0	0	0
Texas	1,553	4,327	5,880	.7
Vermont	66	2,797	2,863	.3
Total	69,425	44,889	114,314	13.2

Data obtained from the DOE Manifest Information Management System, reported from the disposal site operators of Richland, Washington, and Barnwell, South Carolina, as of February 20, 1995. State/regional waste volume totals are subject to ongoing verification and may be adjusted slightly. The utility classification is based on assignment of classification to individual generators from disposal site operators. The non-utility classification originates from assignment of codes from the Standard Industrial Classification Manual. The utility classification is taken to be commercial power generators.

Note: Maine, Michigan, New Hampshire, Rhode Island, and Puerto Rico did not have disposal access in 1994.

Figure B-15. Nonmember states' low-level radioactive waste received by commercial disposal sites in 1994.

Appendix C

Department of Energy Assistance to States and Compact Regions Under the Low-Level Radioactive Waste Policy Amendments Act of 1985

Appendix C

Department of Energy Assistance to States and Compact Regions Under the Low-Level Radioactive Waste Policy Amendments Act of 1985

To help the Department of Energy (DOE) fulfill its responsibilities under the Low-Level Radioactive Waste Policy Amendments Act of 1985 (the Amendments Act), the National Low-Level Waste Management Program (NLLWMP) provides technical assistance to aid the states and compact regions in fulfilling their responsibilities under the Amendments Act. The NLLWMP provided assistance in five areas during 1994: Technical Coordination, Technical Modules, Direct Technical Support, Data Systems, and DOE Support.

Technical Coordination

The NLLWMP coordinates the exchange of low-level radioactive waste management information among states, compact regions, Federal agencies, low-level radioactive waste generators and brokers, and legislators. Listed below are the major technical coordination efforts from 1994.

- Annual DOE Conference on Low-Level Radioactive Waste Management

The NLLWMP organized and presented the 16th Annual DOE Low-Level Radioactive Waste Management Conference on December 13-15, 1994, in Phoenix, Arizona. In 1994, the NLLWMP also formed a partnership with the University of Idaho to co-sponsor the annual conference. This partnership will reduce DOE costs and improve collaboration with the university.

Two hundred fifty-two individuals representing DOE-Headquarters, management and operations contractors, state and regional compacts, special-interest groups, universities, nuclear utilities, and low-level radioactive waste consultants attended. The conference

provided an opportunity for professionals involved in managing both commercial and DOE low-level radioactive waste to discuss items of mutual concern. Conference evaluation results showed that the conference continues to meet its objectives through a focus on low-level radioactive waste management. The conference provides opportunities for detailed discussion and interaction among a community of diverse experts, who are working toward a common goal. Conference attendees state that conference objectives cannot be achieved effectively through any other forum in a cost-effective manner that would also meet the range of technical and institutional needs for the national low-level radioactive waste disposal mission.

The NLLWMP distributed the conference proceedings for the second year on disk rather than as a paper report, resulting in a cost savings. In 1994, the NLLWMP also placed the proceedings on the Internet via a home page accessible through Mosaic, thus providing international access to the proceedings.

- Host State Technical Coordinating Committee

The Host State Technical Coordinating Committee (TCC) provides an opportunity for state representatives to discuss technical issues associated with low-level radioactive waste management. The group also discusses priorities for research and development activities. The NLLWMP funds the TCC and moderated three meetings in 1994. The meetings addressed the new Nuclear Regulatory Commission (NRC) Branch Technical Position on concentration averaging, methods for verifying compliance with waste acceptance criteria, procedures for operating a waste disposal facility, and waste stability and retrievability.

- Low-Level Radioactive Waste Forum

The Forum is an association of state and compact region representatives formed to help carry out the Amendments Act. The Forum held four meetings in 1994. A DOE grant to the State of Washington supports the administration of the Forum. In 1994, the NLLWMP made the Forum notes and announcements available to special-interest groups.

Technical Modules

The NLLWMP develops, compiles, organizes, and documents related research and industry data into information modules. The modules are in the form of reports, handbooks, plans, or bulletins. In 1994, the NLLWMP issued the eleven technical reports, one technical bulletin, and one brochure discussed below.

- *Comparative Approaches to Low-Level Radioactive Waste Management Facility Development*, DOE/LLW-199. This report is the first volume of a planned multi-volume set. It describes the activities of nine states to select site locations for new disposal facilities for low-level radioactive waste. The report discusses quantitative techniques used in top-down screening, approaches for delineating units of land for comparison, and issues involved in excluding land from further consideration. The report compares different positions taken by siting organizations on public acceptance, land use, and land availability when selecting a site. Later volumes will address public participation, community compensation and benefits, and how states and compact regions have organized and funded their siting programs.
- *Lessons Learned Report on Activities of the Illinois Low-Level Radioactive Waste Disposal Facility Siting Commission*, DOE/LLW-196. This report includes lessons based on the findings and decisions of the Illinois LLW Disposal Facility Siting Commission on the suitability of a site in Martinsville, Illinois. This information might be helpful to others who may become involved in the siting and approval processes for low-level radioactive waste disposal facilities.
- *Annotated Bibliography on the Performance of Concrete and Other Container Materials*, DOE/LLW-211. This bibliography lists publications about the performance and integrity of concrete and other materials for low-level radioactive waste containers. The publication also discusses the performance of plastics and polyethylene, metals, barriers, packages, high-integrity containers, and other types of containers.

- *Directions in Low-Level Radioactive Waste Management: A Brief History of Commercial Low-Level Radioactive Waste Disposal*, DOE/LLW-103, Revision 1. This report presents a history of commercial low-level radioactive waste disposal in the United States. The report overviews the history of six commercially operated disposal facilities.
- *Use of Engineered Soils and Other Site Modifications for Low-Level Radioactive Waste Disposal*, DOE/LLW-207. This report examines engineered barriers and their ability to enhance the long-term performance of a low-level radioactive waste disposal facility.
- *Low-Level Radioactive Waste Radionuclide Reports*, DOE/LLW-121 through 125. These five reports provide a chemical and radiological overview of the radionuclides commonly found in commercial low-level radioactive waste. The five radionuclides addressed are tritium, cesium-137, strontium-90, nickel-59, and plutonium-241. Topics discussed include the radiological and chemical characteristics of individual radionuclides, waste streams in which the radionuclides are present, and the behavior of the radionuclides in the disposal environment.
- *Model Tracking System for Low-Level Radioactive Waste Disposal Facilities: License Application Interrogatories and Responses*, DOE/LLW-206. This report describes a model tracking system for the interrogatories (questions, requests for information, comments) and responses received by an agency for a disposal facility application.
- *Low-Level Radioactive Waste Technical Bulletin*. The bulletin, "Low-Level Radioactive Waste Disposal Technologies Used Outside the United States," describes concepts for disposal studied by other nations. The bulletin provides information to states and compacts about available international technologies.
- The NLLWMP issued the brochure "What is Commercial Low-Level Radioactive Waste?" This brochure is a public information tool for states and compact regions to use. The brochure describes what commercial low-level radioactive waste is and how it is generated.

Direct Technical Support

The NLLWMP provides direct technical support by responding to specific requests, supplying technical expertise through liaisons, conducting workshops, and providing support for performance assessments. Direct technical support efforts completed in 1994 include those listed below.

- State-Specific Requests

The NLLWMP provides resources for states and compact regions to help resolve specific technical and institutional issues. In 1994, the NLLWMP responded to several requests including:

- preparing a cost comparison study of disposal options for the State of Massachusetts;
- reviewing a request-for-proposal for a site selection contractor for the State of Massachusetts;
- developing a video about low-level radioactive waste for the State of New Jersey;
- arranging for three scientific experts for the National Academy of Science hearings on California's Ward Valley Site; and
- participating in the development of a document entitled *Low-Level Radioactive Waste: A Legislator's Guide*, with the National Council of State Legislatures.

- Program Liaison

Program liaison activities include providing technical expertise to help states and compact regions conduct and review low-level radioactive waste management activities. NLLWMP liaisons maintain contact with state and compact region representatives to identify needs and monitor progress of new disposal facility development. In addition, the NLLWMP

provides information to Congress, states, compact regions, Federal agencies, and the public as requested.

- Workshops

NLLWMP staff conducted 22 workshops in 1994. NLLWMP staff designed many of these workshops to meet special state and compact region needs. A list of the workshops conducted follows.

- (2) Biomedical and Mixed Waste
- (1) Communicating Radiation Issues
- (2) Communications Working Sessions
- (2) Conflict Resolution
- (1) Mixed Waste
- (1) Performance Assessment
- (2) Project Management
- (1) Providing Testimony
- (2) Public Meetings Skills
- (1) Quality Assurance
- (2) Temporary Storage
- (1) Transportation
- (2) Waste Minimization

- Performance Assessment

In 1994, the NLLWMP provided interagency coordination for performance assessment, including

- Performing screening calculations for a zero order modeling of a hypothetical, generic, humid, southeast low-level radioactive waste site.

- Joint sponsorship with the NRC, TCC, and the Conference of Radiation Control Program Directors E-5 Committee, to conduct a workshop on the NRC's Draft Branch Technical Position on Performance Assessment.

Data Systems

The NLLWMP provides data management tools to states and compacts for determining low-level radioactive waste disposal volumes and waste characteristics for past and current years.

Communications software and user assistance are available by phone.

- **Data Acquisition**

The Manifest Information Management System provides a data base of information from low-level radioactive waste shipping manifests covering shipments received at the two active commercial disposal sites in the United States: Barnwell, South Carolina, and Richland, Washington. Customized and predefined reports are available through the system using personal computers with NLLWMP-supplied software. The Manifest Information Management System contains shipment data starting with January 1986 through the current month. Data are available within 45 days following the last day of the reporting month.

- **Customer Support**

Program staff responded to over 100 requests for information from the Manifest Information Management System in the past year. NLLWMP staff also sent the Manifest Information to Oak Ridge National Laboratory for inclusion in *The Integrated Data Base for 1994 Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics*. This report provides summary information for low-level radioactive waste, both commercial and governmental. Information found in Appendix A is extracted from the Manifest Information Management System.

- The NLLWMP developed the PC-based "Low-Track" software to help states and compact regions track stored low-level radioactive waste. NLLWMP staff demonstrated the use of the software at several state and compact meetings.
- Report Publication

NLLWMP staff published the *1993 State-by-State Assessment of Low-Level Radioactive Wastes Received at Commercial Disposal Sites* (DOE/LLW-205). This is an annual report of waste disposed of, by state, at the commercial disposal facilities. The report contains volume and activity totals by waste class within generator categories for each state.

DOE Support

The NLLWMP provides support to DOE on low-level radioactive waste management issues. In 1994, NLLWMP staff performed the following supporting tasks:

- The NLLWMP staff continued to support DOE's distribution of surcharge rebate funds by preparing procedures for disbursement of funds, transmittal letters, evaluation sheets, and other documentation to ensure accurate and timely distribution. Significant activities associated with this task included the following:
 - Review of the Federal Register Notice on the eligibility and availability of surcharge rebate funds
 - Providing information to DOE for response to a lawsuit filed by the Central Midwest compact challenging the DOE decision on the disbursement of funds
 - Distribution of over 2,000 notices to eligible parties containing information and forms to apply for rebates
 - Evaluation of 144 requests for the disbursement of funds to eligible parties.

- Prepared the *1993 Annual Report to Congress on Low-Level Radioactive Waste Management Progress*. This document, required by the Amendments Act, summarizes national low-level radioactive waste management practices and progress toward development of new disposal capacity.
- Prepared the report entitled *Summary of Expenditures of Rebates from the Low-Level Radioactive Waste Surcharge Escrow Account for Calendar Year 1993*.
- Prepared the *National Low-Level Waste Management Program Final Summary Report of Key Activities and Accomplishments for Fiscal Year 1994*.
- Prepared the *Assistance Available Through the National Low-Level Waste Management Program*, DOE/LLW-68T.
- Provided support to the National Governors' Association/DOE Federal Facilities Compliance Act Task Force on the states' proposal that DOE accept commercially generated mixed waste.
- Published *Identification of Permit and Waste Acceptance Criteria Provisions Requiring Modification for Acceptance of Commercial Mixed Waste*, DOE/LLW-198.
- Published *National Institutes of Health: Mixed Waste Stream Analysis*, DOE/LLW-208.
- Distributed 7,600 documents in response to special requests and an additional 4,000 documents to a standard distribution list for new NLLWMP documents.
- Supported EM-50 in exploring options for cooperative environmental restoration projects with Taiwan.
- Reviewed and commented on a briefing for the Assistant Secretary of Policy on commercial low-level radioactive waste status.

- Prepared slides and a white paper on national low-level radioactive waste disposal activities for the Secretary of Energy.

Appendix D

State and Compact Region Addresses

Appendix D

State and Compact Region Addresses

Many state agencies are involved in low-level radioactive waste management activities. Following are addresses of organizations that may be able to provide additional information on activities within their states or compact regions.

Appalachian States Low-Level Radioactive Waste Compact Region

Appalachian States Low-Level Radioactive Waste Commission
207 State Street
Harrisburg, Pennsylvania 17101-1103
(717) 234-6295

Division of Nuclear Safety
Bureau of Radiation Protection
Department of Environmental Resources
Commonwealth of Pennsylvania
P.O. Box 8469
Harrisburg, Pennsylvania 17105-8469
(717) 787-2163

Central Interstate Low-Level Radioactive Waste Compact Region

Central Interstate Low-Level Radioactive Waste Compact Commission
1033 O Street, Suite 530
Lincoln, Nebraska 68508
(402) 476-8247

Department of Environmental Quality
State of Nebraska
301 Centennial Mall South
Lincoln, Nebraska 68509-8922
(402) 471-3380

Central Midwest Interstate Low-Level Radioactive Waste Compact Region

Illinois Department of Nuclear Safety
1035 Outer Park Drive
Springfield, Illinois 62704
(217) 785-9900

Midwest Interstate Low-Level Radioactive Waste Management Compact Region

Midwest Interstate Low-Level Radioactive Waste Compact Commission

336 North Robert, Room 1303

St. Paul, Minnesota 55101-1507

(612) 293-0126

Division of Environmental Health

State of Ohio

246 North High Street, 7th Floor

Columbus, Ohio 43266

(614) 644-6811

Ohio Environmental Protection Agency

1600 Water Mark Drive

PO Box 1049

Columbus, Ohio 43266-0149

Northeast Interstate Low-Level Radioactive Waste Management Compact Region

Northeast Interstate Low-Level Radioactive Waste Commission

703 Hebron Ave.

Glastonbury, Connecticut 06033

(203) 633-2060

Connecticut Hazardous Waste Management Service

50 Columbus Blvd. 4th Floor

Hartford, Connecticut 06106

(203) 244-2007

Connecticut Department of Environmental Protection Monitoring Radiation Division

State of Connecticut

79 Elm Street, P.O. Box 5066

Hartford, Connecticut 06102-5066

(203) 566-5134

New Jersey Low-Level Radioactive Waste Disposal Facility Siting Board

State of New Jersey

44 South Clinton Ave., Station Plaza III, 7th Floor, CN-410

Trenton, New Jersey 08625-0410

(609) 777-4247

New Jersey Department of Environmental Protection & Energy

Radiation Protection Programs

State of New Jersey, CN-415

Trenton, New Jersey 08625-0415

(609) 987-6389

Northwest Interstate Compact Region on Low-Level Radioactive Waste Management

Northwest Interstate Compact on Low-Level Radioactive Waste Management
Department of Ecology
State of Washington
P.O. Box 47600
Olympia, Washington 98504-7600
(206) 407-7106

Rocky Mountain Low-Level Radioactive Waste Compact Region

Rocky Mountain Low-Level Radioactive Waste Board
1675 Broadway, Suite 1400
Denver, Colorado 80202
(303) 825-1912

Southeast Interstate Low-Level Radioactive Waste Management Compact Region

Southeast Compact Commission for Low-Level Radioactive Waste Management
21 Glenwood Ave., Suite 207
Raleigh, North Carolina 27603
(919) 821-0500

North Carolina Low-Level Radioactive Waste Management Authority
116 West Jones Street, Suite 2109
Raleigh, North Carolina 27603
(919) 733-0682

Bureau of Radiation Health
Department of Health and Environmental Control
State of South Carolina
2600 Bull Street
Columbia, South Carolina 29201
(803) 734-4700

Southwestern Low-Level Radioactive Waste Disposal Compact Region

Southwestern Low-Level Radioactive Waste Commission
601 North 7th Street, P.O. Box 942732-MS 396
Sacramento, California 94234-7320
(916) 323-3019

District of Columbia

Service Facility Regulation Administration
Department of Consumer and Regulatory Affairs
District of Columbia

614 H Street, N.W., #1014
Washington, DC 20001
(202) 727-7190

Massachusetts

Low-Level Radioactive Waste Management Board
Commonwealth of Massachusetts
100 Cambridge Street, Room 903
Boston, Massachusetts 02202
(617) 727-6018

Michigan

Low-Level Radioactive Waste Authority
Department of Commerce
State of Michigan
P.O. Box 30004
Lansing, Michigan 48909-7504
(517) 335-0430

New Hampshire

Office of the Governor
State of New Hampshire
State House
Concord, New Hampshire 03301
(603) 271-2121

Department of Environmental Services
State of New Hampshire
6 Hazen Drive
Concord, New Hampshire 03301
(603) 271-3503

New York

New York State Energy Office
Two Rockefeller Plaza
Albany, New York 12223
(518) 473-4377

New York State Low-Level Radioactive Waste Siting Commission
Two 3rd Street
Troy, New York 12180
(518) 271-1585

New York State Energy Research and Development Authority
Two Rockefeller Plaza
Albany, New York 12223
(518) 465-6251

Puerto Rico

Environmental Quality Board
Commonwealth of Puerto Rico
P.O. Box 11488
San Turce, Puerto Rico 00910
(809) 767-8056

Rhode Island

Office of Environmental Coordination
Department of Environmental Management
State of Rhode Island
83 Park Street
Providence, Rhode Island 02903
(401) 277-3434

Texas

Texas Low-Level Radioactive Waste Disposal Authority
7701 North Lamar Boulevard, #300
Austin, Texas 78752
(512) 451-5292

APPENDIX E

VOLUME REDUCTION, STORAGE, TRANSPORTATION, AND COST CONSIDERATIONS OF LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

APPENDIX E

Volume Reduction, Storage, Transportation, and Cost Considerations of Low-Level Radioactive Waste Management

This appendix provides an overview of various aspects of volume reduction, interim storage, and transportation of low-level radioactive waste (LLW) that are specified by Section 7(b) of the Low-Level Radioactive Waste Policy Amendments Act of 1985. However, information on some specific topics, such as the proportion of disposed waste that has been volume reduced and the projected interim storage requirements for the following year, is neither currently collected by the Department nor is it available from individual states and compacts. As this information becomes available, it will be included in subsequent annual reports.

Low-Level Radioactive Waste Volume Reduction. Since DOE began providing this report to Congress, the volumes of low-level radioactive waste disposed has decreased through a combination of waste minimization and volume reduction activities. However, as generators rushed to dispose of as much of their waste as possible before the only nationally available disposal site at Barnwell, South Carolina, closed on June 30, 1994, total disposal volumes for the year rose slightly above those for 1993.

During 1994, generators continued to use several volume reduction processes that include compaction, incineration, metal melting, decontamination, and sorting/drying. Some of these processes can be applied at the place of generation, while others lend themselves to large-scale, offsite service centers. Although volume reduction techniques can significantly decrease the volume of low-level radioactive waste requiring storage or disposal and improve the form of the waste for disposal, these techniques do not change the amount of radioactivity in the waste.

Economics drives most decisions involving volume reduction. When combined with waste minimization, volume reduction helps generators minimize the LLW management costs of storage, transportation, and disposal. Although it is impossible to determine how much disposed waste has been volume reduced, gross estimates of the cost and volume reduction capabilities of some commonly used processes are shown in Table B-1.

Table B-1. Estimates of cost and volume reduction factors for selected technologies^a

	<u>Cost^b</u>	<u>Volume Reduction Factor</u>
Super Compaction	1-2	4-8:1
Incineration	4-10	70-100:1
Melting	2-3	Recycle (restricted)
Decontamination	1-3	Recycle (unrestricted)
Sorting/Drying	0.5-1.5	N/A

a. This information was obtained through informal discussions with representative LLW processors and provides only generic cost and volume reduction information that is characteristic of the broad processing technologies listed. Actual costs and volume reduction depends upon the characteristics of the specific wastes being processed and negotiations with individual processors.

b. Cost shown is \$/cubic foot for super compaction and incineration, and \$/pound for metal melting, decontamination, and sorting/drying.

Interim Storage of Low-Level Radioactive Waste. During 1994, most generators in states and compact regions with access agreements with the Southeast Compact Commission, disposed of their waste at the South Carolina facility. Some generators chose to store their waste because of concerns about potential liabilities (the volume of waste stored for this reason is unknown). Based on 1994 disposal data, at least 46% of all LLW waste generated (all waste except that generated in the Northwest, Rocky Mountain, or Southeast Compact regions) had to be stored after June 30, 1994, because no new disposal facilities were available. (If work progresses with no undue delays, Texas and California could open new disposal facilities as early as 1997.) All storage facilities must be licensed by either the Nuclear Regulatory Commission or state regulators. Currently, private companies will not accept waste for interim storage because they do not have confidence in the projected disposal costs and opening dates for new disposal facilities. Some companies are, however,

accepting waste for “storage for decay” purposes. Typically such companies will accept only LLW containing radionuclides with half-lives of 90 days or less and charge from \$30-50 per cubic foot.

Inter-regional Shipments of Low-Level Radioactive Waste for Processing. As noted above, generators have anticipated not having access to disposal facilities after 1994 and the prospect of significant disposal cost increases once new facilities open. In addition, some states and compact regions have encouraged or required waste minimization and volume reduction practices.

To facilitate such practices, several State and compact region officials have entered into agreements that require the return of all radioactive wastes to the sender after processing. To ensure this happens, waste shippers, brokers, and processors must maintain extremely accurate methods of tracking waste. At the end of 1994, the following States and compact regions had entered into these agreements: **Maine, Massachusetts, Michigan, New York, Texas, Vermont; and the Appalachian, Central, Central Midwest, Midwest, Northeast, Northwest, Rocky Mountain, and Southwestern** compact regions.

As currently structured, these agreements do not unduly restrict access to centralized processing facilities in other regions.

Relationship of Disposal Costs and Generation of Low-Level Radioactive Waste. The increasing cost of disposal due to the graduated surcharge system of the Act provides ample evidence that the volume of LLW decreases as the disposal price increases. Higher disposal prices provide financial incentives to find ways to reduce both the generation and volume of waste prior to disposal.

In addition to waste volume, radioactive content is a major factor in determining disposal costs because of its impact on the special procedural and design considerations that are used to ensure safe waste handling and disposal. These considerations range from relatively simple handling procedures and deeper disposal depth, to complex disposal

structures and monitoring devices. Currently, disposal facilities collect a graduated surcharge based on the radioactive content of the waste, allowing site operators to collect fees that reflect these additional costs. It is expected that increasing the surcharge on radioactivity will cause a reduction in the content of the radioactive content of the waste similar to the volume reductions caused by the graduated surcharge system of the Act.