REPORT OF THE

RADIOACTIVE WASTE SUBCOMMITTEE

OF THE

ENERGY AND NATURAL RESOURCES COMMITTEE

Pursuant to

Public Law 1979, Chapter 519

January 1, 1981

Subcommittee Members

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There is no method currently in use in the United States for permanent high level radioactive waste disposal. The first high level waste repository will probably be in a mined excavation in a stable geological formation such as salt, basalt, or granite. There are current Federal initiatives for siting such a facility, and Maine is a candidate state. Three factors appear to increase Maine's appeal as a host state:

1. favorable geology;
2. low population density; and
3. proximity to regions of high nuclear reactor density.

The Subcommittee recognizes that there is an increasing role for States in siting high level waste facilities. It therefore recommends that:

- The Governor participate in Federal efforts to site radioactive waste disposal facilities to the maximum possible extent, and that he should keep the Legislature fully informed on this issue.

The Maine Yankee Atomic Power Plant needs more interim spent fuel storage, and has applied to the Nuclear Regulatory Commission to expand its spent fuel storage capacity.

The Subcommittee recommends that:

- The Governor direct appropriate State agencies to participate in the Maine Yankee license amendment application. Agencies should use the provisions of 10 CFR §2.715(c) to participate in this application without having to take a position for or against the proposed spent fuel pool expansion.

II. Low Level Radioactive Wastes

There is a need for additional low level waste disposal capacity. New facilities may only be on State or Federal land, but could be operated by private contractors. Recent Congressional action

places the responsibility for low level waste facility siting on the States, encourages regional facilities, and authorizes interstate compacts for regional low level waste facilities. Such interstate compacts may restrict disposal to wastes generated with the compact states. The Subcommittee finds that Maine, and probably other New England states, have sites that may be suitable for low level waste disposal. Maine, however, produces relatively little waste compared to other states. The Subcommittee recommends:

- The Governor enter into discussions with other New England states about the possibility of dealing with low level radioactive wastes on a regional basis. These discussions should

  a) succinctly define low level radioactive wastes;

  b) examine alternatives other than land disposal; and

  c) include some Legislative representation and meaningful public participation in each state early in the process;

  d) consider with care Maine's commitment to enter regional compacts with states that generate far more radioactive wastes.

III. General Issues

The Subcommittee finds that there is little coordination among State agencies dealing with nuclear issues, and the Legislature has not had an active role in recent developments. It also finds that the legal status of the LD 1004, other Maine laws, and the laws of many other states will be affected by pending Judicial and Congressional action. The Subcommittee therefore recommends that:

- The Joint Standing Committee on Energy and Natural Resources appoint a standing Subcommittee to follow developments on nuclear

issues, and to keep the full Legislature apprised of these developments.

INTRODUCTION

During its First Regular Session, the 109th Legislature enacted LD 1004, AN ACT to Determine What Environmental Laws Apply to Radioactive Waste Materials, as Chapter 519 of the Public Laws of 1979. This Act prohibits the siting of federal radioactive waste storage facilities in Maine without prior Legislative approval. It also requires any person intending to construct or operate a temporary or permanent radioactive waste repository to notify the Board of Environmental Protection at least one year before starting any construction or operation. The Board is to hold a public hearing to determine whether the project is subject to the environmental laws of the State. Finally, the Act directs the Joint Standing Committee on Energy and Natural Resources to study radioactive waste disposal, and report to the 110th Legislature. Specifically, the Committee is directed to study:

1. the effects of the Act;

2. the methods actually in use or proposed to be used for the storage or disposal of radioactive waste materials in Maine;

3. the state of the art in treating, storing and disposing of radioactive waste materials; and

4. the amount and the type of radioactive waste materials generated, treated, stored or disposed of in Maine.

A subcommittee of seven from the Energy and Natural Resources Committee was appointed by the Legislative Council to conduct this study. The subcommittee reviewed current State and Federal laws, assembled data on radioactive waste generation and management, visited the Maine Yankee Atomic Power Plant and

the Health Physics Unit of the Maine Medical Center, participated in hearings on proposed Federal regulations for radioactive waste facilities, and analyzed other relevant information. This report is a summary of the subcommittee's findings.

CHARACTERIZATION OF RADIOACTIVE WASTES

Radioactive elements are inherently unstable, and spontaneously decay into more stable forms by emitting various particles from their atomic nuclei. Different elements decay, or disentegrate, at different rates, and emit different types of particles as they decay. There are 3 aspects of this decay that make radioactive materials difficult to manage. First, the particles of decay can cause great harm to all living organisms. In high doses these decay particles, or radiation, can kill living cells directly, while in lower doses it may cause cancer or genetic changes. Organisms must be protected, or shielded, from the radiation to prevent damage. Second, radioactive decay produces heat. Certain elements produce intense heat as they decay, and this increases the difficulty of managing wastes containing such materials. Finally, some radioactive materials continue their activity for long times, even thousands of years.

The intensity of radioactive decay is measured in units called curies. One curie of radioactive material produces 37 billion disentegrations per second. Generally, the more curies a material contains, the more heat and radiation it will produce. Small quantities of radioactive material are often measured in micro-curies, which are one millionth of a curie.

Since all radioactive materials are constantly decaying, the remaining amount of a particular radioactive material decreases with time. This is measured in units called half-lives, and is an important parameter to consider in the disposal of radioactive wastes. One half-life is the time required for half the atoms in a given amount of material to decay, or for the curie content to be reduced by one half. Half-lives range from fractions of seconds to many thousands of years for different elements. Half-lives and radioactivity are not directly

related; some very radioactive substances can have very short half-lives, while other elements emit low levels of radiation for long periods of time.

Radioactive wastes can result from a wide variety of activities, and the characteristics of these wastes range as well. While there is no comprehensive statutory characterization of radioactive wastes, the following categories are generally recognized.

1. High level wastes. These wastes are highly radioactive, require shielding to protect organisms from their radiation, and usually require some method of removing the heat they produce to keep their containers from melting. This type of waste includes spent fuel from the nuclear power industry, certain wastes from defense activities, and most wastes from spent fuel reprocessing. These wastes comprise a relatively small volume, but high activity, and are now being stored pending the development of a high level disposal technology.

2. Transuranic wastes. These are wastes that are contaminated with elements such as plutonium and uranium. The radioactivity is generally low penetrating, but very long-lived. This waste results predominantly from the fabrication of plutonium for weapons, to recycling for nuclear reactors, or from spent fuel reprocessing.

3. Low-level wastes. These wastes generally have low activity, less than one micro-curie per cubic foot, and the radioactive elements are relatively short-lived. The waste can result from any activity using nuclear material, including medicine, construction trades, and the nuclear power industry. Most of these materials lose much of their radioactivity within a few months or years; others in several hundred years. In general, low-

level wastes emit very little heat, and most require little or no radiation shielding for handling by people. Comparatively large volumes of this waste are generated, and the most common disposal technique is shallow land burial.

4. Uranium mill tailings. These wastes are the residues from uranium ore milling, and contains low concentrations of radioactive substances found in the natural ore. Large volumes of tailings are now stored at the site of origin in some Western states.

There are currently no uranium mill tailing wastes or commercial transuranic wastes in Maine. This report will deal only with the generation, treatment and disposal of commercial high-level (HLW) and low-level (LLW) radioactive wastes. The following table gives the half-lives of some of the radio-isotopes used in Maine.

Name	Symbol	Half-life
Colbalt-60	Co-60	5 years
Stromtium-90	Sr-90	28 years
Iodine-131	I-131	8 days
Iodine-125	I-125	60 days
Tritium-3	H-3	12 years
Carbon-14	C-14	5,700 years
Phosphorus-33	P-33	25 days
Techniciem-99	Tc-99	200,000 years
Sulfur-35	S-35	86 days
Cesium-137	Cs-137	30 years
Plutonium-239	Pu-239	24,000 years
Uranium-235	U-235	700,000,000 years
Uranium-238	U-238	4,500,000,000 years

STATE AND FEDERAL LAWS

Federal Laws

The federal government has, since the major revision of the Atomic Energy Act in 1954, long encouraged the development of nuclear technology. It has not, however, adequately addressed the waste disposal problem. This act is keystone of Federal nuclear policy, and states in part:

> (a) the development, use, and control of atomic energy shall be directed so as to make the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security; and
> (b) the development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise.

While somewhat modified by subsequent amendments this Act very clearly promotes the development of atomic energy, and preempts most State authority to accomplish this end.

An existing provision of Federal law relating specifically to nuclear wastes was enacted in 1978, and is quoted below.

> 42 USC §2021a. Storage or disposal facility planning
>
> (a) Any person, agency, or other entity proposing to develop a storage or disposal facility, including a test disposal facility, for high-level radioactive wastes, non-high-level radioactive wastes including transuranium contaminated wastes, or irradiated nuclear reactor fuel, shall notify the Commission as early as possible after the commencement of planning for a particular proposed facility. The Commission shall in turn notify the Governor and the State legislature of the State of proposed sites whenever the Commission has knowledge of such proposal.
> (b) The Commission is authorized and directed to prepare a report on means for improving the opportunities for State participation in the process for siting, licensing, and developing nuclear waste storage or disposal facilities. Such report shall include detailed consideration of a program to provide grants through the Commission to any State, and the advisability of such a program, for the purpose of conducting an independent State review of any proposal to develop a nuclear waste storage or disposal facility identified in subsection (a) of this section within such State. On or before March 1, 1979, the Commission shall submit the

report to the Congress including recommendations for improving the opportunities for State participation together with any necessary legislative proposals.

Current Federal initiatives based on this statutory authorization will be described later in this report.

Other important Federal legislation includes the following:

1. Public Law 93-438, "Energy Reorganization Act of 1974." This law established the Nuclear Regulatory Commission with powers to promulgate regulations for nondefense nuclear activities.

2. Public Law 95-95, "Clean Air Act Amendments of 1977." Under Section 110 of this law, which is the revised Section 112 of Public Law 91-604, "Clean Air Amendments of 1970," the Environmental Protection Agency is proposing the addition of radionuclides to the list of hazardous air pollutants. These amendments give States direct authority to regulate radioactive air emissions.

3. Public Law 93-523, "Safe Drinking Water Act." This law requires the Environmental Protection Agency to establish maximum permissable concentrations of nuclides in sources or potential sources of drinking water.

4. Public Law 94-580, "Resource Conservation and Recovery Act." Proposed regulatory Section 3001 for this law defines radioactive waste as a hazardous waste, and that waste not covered by the Atomic Energy Act of 1954 is subject to all of the requirements of Subsection (C) of this law.

5. Public Law 92-532, "Marine Protection, Research and Sanctuaries Act of 1972." This law prohibits the ocean disposal of radioactive waste without a permit.

6. Public Law 91-190, "National Environmental Policy Act of 1969." This is a general law that has the objective or protecting the environment from man-made contamination. Unless

excepted by the President for national security reasons, this law requires Federal compliance with State laws for major Federal actions, such as siting radioactive waste facilities, that significantly affect the quality of the human environment.

State Laws

The Maine Legislature has enacted a number of laws regulating atomic energy as an exercise of its traditional police powers. 10 MRSA Chapter 3 establishes policies for peaceful uses of atomic energy. Its express intent is to regulate these activities to the maximum extent consistent with Federal law.

10 MRSA §51. Declaration of policy.

> 1. Endorsement of Federal Act. The State of Maine endorses the action of the Congress of the United States in enacting the Atomic Energy Act of 1954 to institute a program to encourage the widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public; and therefore declares the policy of the State to be:
>
> > A. Cooperation. To cooperate actively in the program thus instituted; and
> >
> > B. Regulation. To the extent that the regulation of special nuclear materials, source materials and by-product materials, of production facilities and utilization facilities, and of other forms of radiation, and of persons operating such facilities may be within the jurisdiction of the State, to provide for the exercise of the State's regulatory authority so as to conform, as nearly as may be, to the Atomic Energy Act of 1954 and regulations issued thereunder, to the end that there may, in effect, be a single harmonious system of regulation within the State.

Five sections of State law deal specifically with radioactive wastes. 1 MRSA §15-A states:

> Notwithstanding any other provision of this chapter, this State does not consent to the acquisition by the United States Government, by purchase, condemnation, lease, easement or by any other means, of any land, building or other structure, above or below ground, in or under the waters of the State for use in storing, depositing or treating radioactive waste materials, except by prior affirmative vote of the Legislature.

10 MRSA §253 requires an affirmative finding by the Public

Utilities Commission that the United States Government has identified and approved a demonstrable technology for disposal of HLW prior to licensing new nuclear power plants.

10 M.R.S.A. §254(1) requires the State Public Utilities Commission determine case-by-case that a facility for high-level nuclear waste disposal is in actual operation, or will be in operation, at the time the nuclear power plant being certified requires the means for such disposal. Upon petition, 10 M.R.S.A. §255 requires the State Public Utilities Commission to conduct public hearings and make specific findings as to the existence of an identified and approved demonstrable technology for high-level nuclear waste disposal. Finally, 38 M.R.S.A. §361-D directs the State Board of Environmental Protection to investigate at public hearing any proposal to construct or operate a temporary or permanent radioactive waste depository, in order to determine whether the project will require a waste water discharge license, an air emission license or be subject to any of the other existing environmental laws administered by that Board.

The State has also enacted laws relating to utility rate-making, an area expressly delegated to the States by Federal law. An example of this regulation is 35 M.R.S.A. §13-A, which requires that any new electrical generating facility obtain a Certificate of Public Convenience and Necessity from the State, based upon a demonstration of the need for the power to be generated and the cost-effectiveness of the means chosen to generate that power. It is conceivable that the Public Utilities

Commission could deny this certificate because of anticipated costs of facility decommissioning or nuclear waste disposal.

Federal Preemption of State Authority

As indicated previously, the Federal Atomic Energy Act preempts certain State authority in areas related to atomic energy. Exactly how much State authority this Act preempts is a subject of much debate. There are two suits pending in the U.S. Ninth Circuit Court of Appeals (Pacific Legal Foundation vs. State Energy Resources Conservation and Development Commission and Natural Resources Defense Council; Pacific Gas and Electric Co. vs. State Energy Resources Conservation and Development Commission and National Resources Defense Council) testing how wide a preemptive swath is cut by the Atomic Energy Act. Because these suits would affect several of Maine's environmental and public utilities statutes, the State of Maine has filed amicus curiae briefs in both suits.

The Federal District Court judge's decision in one of these cases (Opinion, Findings of Fact and Conclusions of Law dated April 23, 1980 in D.C.E.D. Cal. Docket No. CV S-78-527-R) concludes that assorted provisions of California statutes regulating nuclear facilities are unconstitutional

> insofar as these sections or any of them...authorize or require defendants...to regulate or monitor the construction or operation of any nuclear power plant, or to deny certification of any nuclear power plant, or to deny any approval ..., or to condition or qualify any such certification or approval, insofar as such action is...with reference to... any aspect of the construction or operation of nuclear power plants that falls within the regulatory jurisdiction of the United States Nuclear Regulatory Commission...pursuant to

the Atomic Energy Act of 1954, as amended...or regulations, rules or guidelines promulgated pursuant to the Atomic Energy Act....(emphasis added)

If this were a correct analysis of federal law, States are precluded from any meaningful role in regulating most aspects of nuclear power without amendments to the Federal statutes.

There have been recent Congressional initiatives to establish radioactive waste disposal policy, and clarify the role of the States. The Nuclear Waste Policy Act (§2189), sponsored by Sen's. Johnson, Jackson, and others, is the first bill establishing nuclear waste policy to have ever passed either chamber of Congress. The measure emphasizes temporary storage at Federal away-from-reactor (AFR) storage, and enables States to block waste storage if either the House or Senate agrees. A competing bill in the House, the Atomic Energy Act Amendments of 1980 (H.R. 6390), sponsored by Rep. Udall, stresses permanent high-level waste disposal in geologic repositories. It also gives States more specific powers in reviewing nuclear facility siting. Numerous versions of these and other bills were considered, but a last-minute stalemate prevented final enactment of any measure dealing with HLW. Congress did enact a bill authorizing states to enter interstate compacts for regional LLW disposal facilities.

HIGH LEVEL RADIOACTIVE WASTES

Generation

High-level wastes are produced as a byproduct of nuclear weapons production and electrical generation by nuclear power plants. While the rate of waste generation from defense-related programs has been essentially constant, the nuclear power industry has grown rapidly in the last two decades. Measured in terms of cumulative radioactivity, the nuclear power industry has now produced more radioactive waste, and the annual generation rate will continue to grow as new power reactors come into operation.

The Interagency Review Group (IRG)[1] estimates that there are the following quantities of existing high level wastes in interim storage.

Defense HLW	9,400,000 cu. feet
Commercial HLW(other than spent fuel)	80,000 cu. feet
Commercial spent fuel	48,000,000 cu. feet

The rate at which spent fuel continues to accumulate obviously depends on the rate at which the nuclear power industry continues to expand. While the future of this industry is highly uncertain, facilities now under construction will approximately double the present capacity, and therefore double the rate of waste generation.

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(1) Report to the President. Interagency Review Group on Nuclear Waste Management, March, 1979.

All of the commercial HLW in Maine is produced at the Maine Yankee Atomic Power Plant in Wiscasset, Maine. The Maine Yankee Power Plant is a pressurized light water reactor, with an electrical generation capacity of 840 megawatts. The reactor core contains 217 fuel assemblies, and about 70 fuel assemblies are replaced each year in normal refueling. These 70 fuel assemblies weigh approximately 30 tons, have a total volume of about 1000 cubic feet, and initially contain about 9 billion curies of radioactivity. When these fuel assemblies are first removed from the reactor, they generate a large amount of heat, and are stored in a water bath kept at 140°F to remove this heat. Both the radioactivity and heat generation decline with time.

The Maine Yankee Plant has been operating since 1973, and has produced about 505 spent fuel assemblies as HLW. Thirty fuel rods from a spent fuel assembly were shipped to Batelle Columbus Laboratories in 1974 for testing. The balance of the HLW, totaling about 6000 cubic feet and 210 tons, are currently stored in the Spent Fuel Pool at the Maine Yankee Plant.

Waste Management

A. Interim storage

Almost all of the existing commercial HLW consists of spent fuel assemblies stored in spent fuel pools at the reactor sites where they were generated. The nuclear industry had originally expected that spent fuel would be reprocessed to recover the fissionable products. This would reduce the volume of the spent fuel, and would extend supplies of uranium fuel by about 35%. Since the industry expected that spent fuel would be shipped to reprocessors shortly after its generation, they designed spent fuel pools with only several years capacity.

A recent change in Federal policy has radically altered spent fuel storage requirements. Plutonium, a critical constituent of nuclear weapons, can be separated during fuel reprocessing. Because of this, and the U.S. commitment to the Nuclear Non-proliferation Treaty, President Carter in 1978 adopted a policy not to permit the development of a commercial fuel reprocessing industry. This change in policy does not affect the ultimate requirement for long term HLW disposal. Because reprocessing fuel does not remove the fission products that are the source of most of the radioactivity and heat generation, the IRG reports that the requirement for repository space is not sensitive to the decision to dispose of rather than reprocess the spent fuel. Another study[2] indicates "...that there are no dramatic advantages of one fuel cycle as compared with another [once-through versus reprocessing] in terms of the radiological hazards assocated with HLW." The change in policy does however, create an immediate spent fuel storage problem for utilities. The President anticipated the development of Federal Away From Reactor (AFR) storage by 1983, and final disposal in deep geological formations by 1988. Development of interim storage and final disposal facilities, however, is not proceeding as rapidly as anticipated.

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2 Report to the American Physical Society by the Study Group on Nuclear Fuel Cycles and Waste Management, 1979, P. VII-13.

The first HLW disposal facility is now not likely to be available for at least 15 years, so there is a need for interim storage of these wastes. Management of defense wastes will remain a Federal responsibility. Storage of commercial spent fuel, however, will primarily be the responsibility of the utilities. It is anticipated that limited government storage capacity will be developed. There are Congressional proposals pending that direct the DOE to establish an Away From Reactor (AFR) storage facility. This facility could accept limited domestic spent fuel, and foreign spent fuel when required by non-proliferation policies, until permanent disposal facilities are available.

In 1974 Maine Yankee foresaw that commercial fuel reprocessing would not be available, and that their spent fuel storage capacity would soon be exceeded. In 1975 they requested permission from the Nuclear Regulatory Commission (NRC) to redesign the storage capacity from its original specification of 318 to 953 assemblies by the installation of new high density storage racks. The modification was approved that year. Maine Yankee now believes that neither reprocessing nor interim or final waste disposal will be available through the 1980's. Thus, they perceive a need for Maine Yankee to pursue other alternatives for additional spent fuel storage space.

Table 1 projects the discharge/refueling schedule for Maine Yankee. This table shows the pool will be full by 1987, and to maintain room for emergency removal of the full core, the spent fuel storage capacity will effectively be exhausted by 1984. Because of this need for increased storage capacity, on September 18, 1979 Maine Yankee applied to the Nuclear Regulatory Commission to consolidate the spent fuel assemblies. This consolidation entails disassembling the existing spent fuel bundles,

and reassembling only the fuel rods or pins into a modified carrier that is externally similar to a standard fuel assembly. This consolidation would result in sufficient space in the spent fuel pool to operate Maine Yankee for about 8 additional years. In February, 1980 Maine Yankee proposed an additional change for closer fuel assembly spacing. Closer spacing would allow increased capacity for five to seven additional years of operation. If both these modifications are approved, Maine Yankee would have sufficient spent fuel storage capacity until about the year 2000. The amended application has recently been reopened for public comment, and is still pending before the NRC.

TABLE I

TABLE-PROJECTED MAINE YANKEE FUEL POOL CAPACITY REQUIREMENTS

FUEL CYCLE	YEAR	ASSEMBLIES DISCHARGED	STORAGE CELLS AVAILABLE	ASSEMBLIES IN STORAGE	AUGMENTED STORAGE REQUIRED
3	1977	73	592	361	
4	1978	72	520	433	
5	1980	72	448	505	
6	1981	73	375	578	
7	1982	72	303	650	
8	1983	72	231	722	
9	1984	73	217	736	59
10	1986	72	---	736	131
11	1987	72	---	736	203
12	1988	73	---	736	276
13	1989	72	---	736	348
14	1990	72	---	736	420
"	"	"		"	"
"	"	"		"	"
"	"	"		"	"
27	2005	73	---	736	1361
28	2006	72	---	736	1433
29	2007	72	---	736	1505
30	2008	73	0	953	1505

B. Ultimate Disposal

Six different technologies have been examined for the ultimate disposal of HLW:

1. placement in mined repositories;
2. placement in deep ocean sediments;
3. placement in very deep drill holes;
4. placement in a mined cavity in a manner that leads to rock melting;
5. partitioning of reprocessing waste, transmutation of heavy radionuclides, and geological disposal of fission products; and
6. ejection into space.

Of these six options, only placement in mined repositories is considered sufficiently understood to permit implementation in the near future. The IRG considers present scientific and technological knowledge adequate to identify potential mined repository sites for further investigation, and this will almost certainly be the technology used for the initial HLW repository.

While the details of the process have not yet been worked out, it is proposed that disposal in mined repositories will take three steps. The wastes would be solidified, then encased in steel cannisters, and finally implaced in a deep underground burial vault. The first step, solidification, consists of incorporating the wastes into a borosilicate glass. This glass is similar to Pyrex and is very resistant to dissolving. The glass mixture will then be encased in stainless steel cylinders about 1 foot in diameter and 12 feet long. These cylinders would then be transported to the repository site, and stored in sealed vaults cut into stable geological formations about 3000 feet deep. One year's wastes from a single 1000 MW nuclear power plant would go

into about 10 canisters, and the canisters would be buried about 30 feet apart. Therefore, each nuclear power plant would require approximately 10,000 square feet of storage area for each year of operation.

C. Federal initiatives for HLW disposal

On February 12, 1980 President Carter presented a comprehensive radioactive waste management plan to the Congress. This plan establishes the outline of a program for the mangement of all types of radioactive wastes. Specifically, it defines the role of state and local governments, revises the methods and timetable for establishing high level sites, and provides for the creation of federal interim Away From Reactor (AFR) storage of commercial wastes. In each of these three areas, the new plan could directly affect radioactive waste management in Maine.

Three steps have been proposed to strengthen the role of state and local governments in the waste management planning process. First, a State Planning Council was established by executive order. The council consists of 14 elected officials and 4 heads of federal executive agencies. Governor Reilly of South Carolina is the chairman. The council will advise the executive and legislative branches on state and local concerns about radioactive waste facility siting, construction, and operation. The council has met several times this year, and has adopted a number of resolutions on radioactive waste transportation and disposal. There were bills pending in Congress to permanently establish the council, but they did not pass before adjournment.

Second, the President established the principle of "consultation and concurrence" for siting high level waste facilities. Under this principle a host State for a waste facility will have a continuing role in Federal decision making. As a

result of this policy there have been several initiatives from the Department of Energy describing Federal efforts to evaluate geological formations in Maine as possible high level waste repositories. While an active dialogue between Federal, State, and local officials will implement "consultation," there is as yet little information on what will constitute State or local "concurrence".

Third, the Secretary of Energy has been directed to provide financial and technical assistance to States and other jurisdictions to facilitate participation in review and licensing proceedings.

Until recently, the search for a HLW facility was restricted to areas within four particular geological regimes. These regimes include salt domes and bedded salt deposits, volcanic tuffs, and basalt formations. The DOE has been actively engaged in exploration studies in these formations in Louisianna, Mississippi, Nevada, New Mexico, Texas, Utah, and Washington (see figure 1). The new siting policy calls for an expanded and diversified program of geological investigations. The major new category being considered is hard crystaline rocks, and in particular, granite formations.

The process of site exploration will be conducted in a series of 3 steps:

1. A broad National survey of various geologic media and of geohydrological provinces identified by the United States Geological Survey is undertaken. This phase is generally conducted through literature studies and review of available geologic and hydrologic maps. Work of this nature has been underway for several years.

2. Regions of interest (usually spanning several States) that have been identified are further screened through

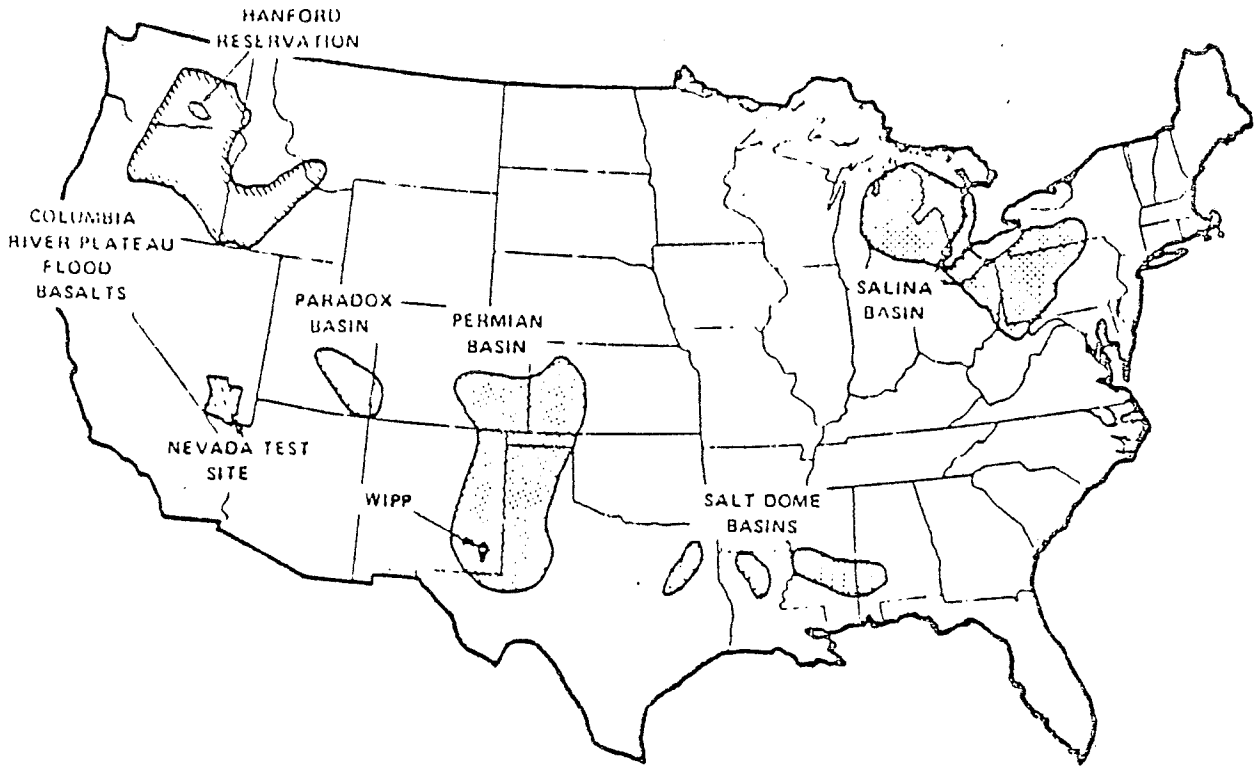

FIGURE 1. REGIONS HAVING BEEN STUDIED OR NOW UNDER STUDY FOR POSSIBLE TERMINAL STORAGE OF RADIOACTIVE WASTES. (Additional regions for study will be identified over the next few years.)

more detailed review and field mapping to select areas where more specific data collection including core drilling might be undertaken.

3. Data taken in area studies are evaluated to recommend specific locations which then require very detailed geophysical tests to assess their suitability as potential sites for future selection.

As part of the National survey of geologic media, a consulting firm for DOE, Dames and More[3], has completed a reconnaisance survey of granite terrain. Their recently released report identifies two major systems: the Appalachian system, and the southern edge of the Canadian Shield. The report contains a map of granite outcroppings, which identifies Maine and 16 other states as possible hosts for HLW disposal sites. (See Figure 2). While the Dames and Moore study is under technical review and revision the broad survey stage for HLW site selection is essentially complete. The second phase is expected to be completed around 1985. This will be the earliest that specific potential sites are identified. It is not expected that any site will be fully developed prior to the mid-1990's. For reasons of economy, these sites might accept both defense and commercial wastes. All commercial high level waste facilities will be licensed by the Nuclear Regulatory Commission, but Congressional debate continues on licensing military waste facilities.

(3) Crystaline Intrusions in the United States and Regional Geological Characteristics Important for Storage of Radioactive Wastes, ONWI-50, by Dames & Moore, Cincinatti, Ohio, December 1979.

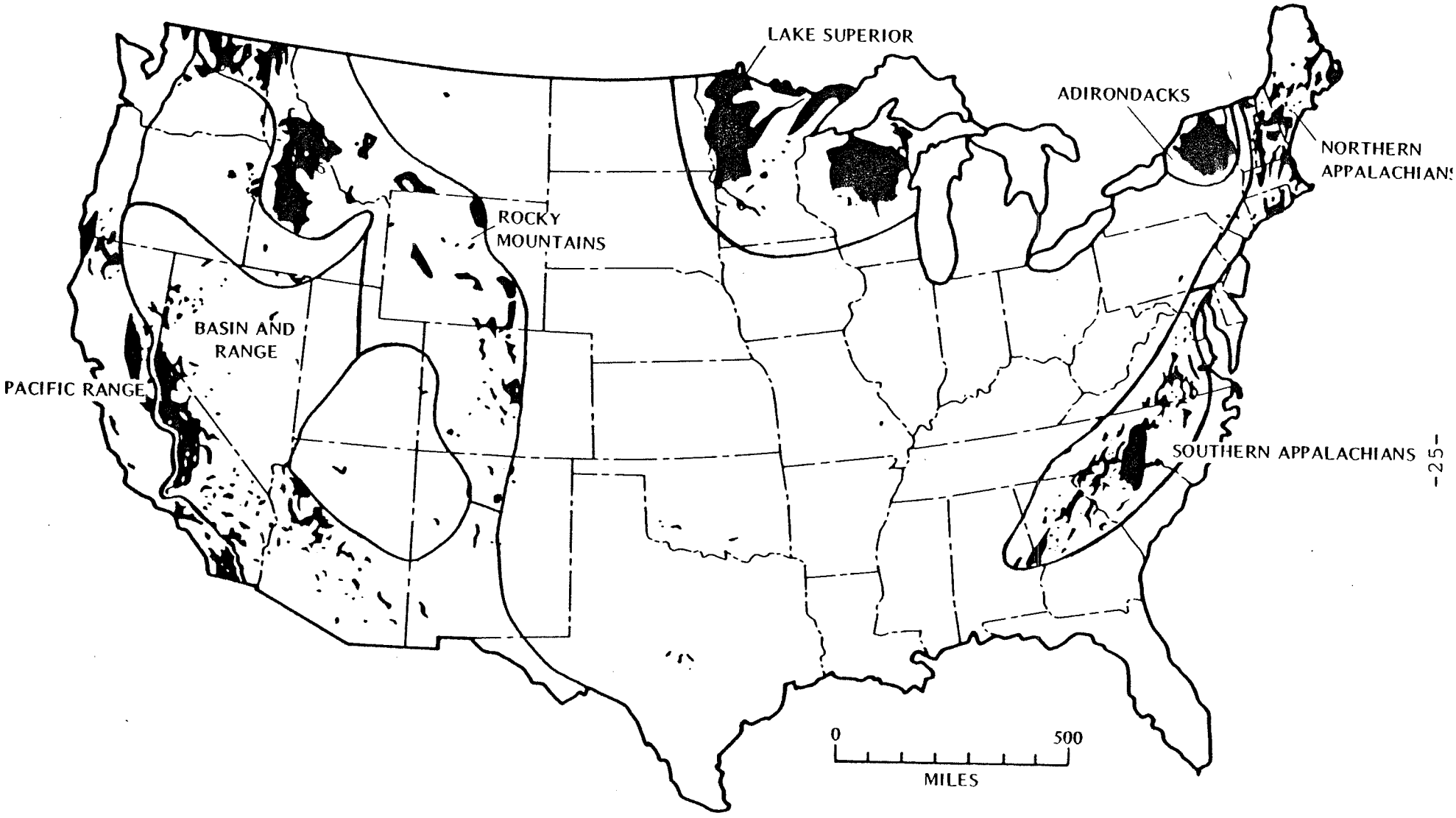

FIGURE 2. MAJOR REGIONS OF GRANITIC FORMATIONS

LOW LEVEL RADIOACTIVE WASTES

Generation

Low level radioactive wastes are produced by a wide variety of activities. Development of nuclear weapons, ship propulsion, and other defense applications have generated a total of about 50 million cubic feet of LLW. The first significant quantities of commercial LLW were produced in connection with the nuclear power industry in the early 1960's. Many industrial applications have been developed that generate LLW, include quality control techniques, measurement devices, smoke alarms, and many others. Nuclear materials are also used in many medical research, diagnostic, and therapeutic applications.

It is currently estimated[4] that commercial sources generate about 3.5 million cubic feet of LLW each year. Nuclear power plants generate about 45% of this volume; about 30% is generated by medical and research institutions; the remaining 25% is generated by industrial applications.

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(4) Understanding Low-Level Radioactive Waste, EGG-Idaho, Inc., Idaho Falls, Id, November, 1980.

There are currently 41 facilities in Maine that generate LLW. Twenty-nine facilities hold their LLW until the radioactivity has decayed to background levels. The wastes are then handled as ordinary solid wastes. Twelve other facilities generate LLW that must be shipped to commercial disposal facilities. The following table summarises the source of the LLW generated during the 18 month period from January, 1978 to June, 1979.

TABLE 2 . LOW LEVEL RADIOACTIVE WASTES GENERATED IN MAINE

January, 1978-June, 1979

Type of Facility	Curies	Volume in cubic feet
4 Hospitals	0.5	591
4 Laboratories	0.5	923
1 Industry	0.01	7
2 Universities	0.02	57
Maine Yankee	4144.74	20,599

Appendix C contains a more complete description of these wastes.

A pending NRC regulatory change, however, could dramatically reduce the need for commercial LLW disposal. On September 9, 1980 the NRC proposed changes to 10 CFR Part 20 on disposal of certain LLW containing tritium and carbon-14. These proposed changes would exempt certain medical wastes containing low levels of radioactive wastes from most disposal requirements. If adopted, this change would reduce by half the institutional wastes now shipped to LLW disposal facilities.

Waste Management[5]

Most radioactive materials in LLW have half-lives of the less than 30 years. Low-level radioactive materials require 5 to 10 half-lives to decay to levels that are generally accepted as safe. Therefore, about 300 years of solation are necessary to eliminate the radiological hazard from LLW. The most common method of accomplishing this is shallow land burial. Wastes are buried in shallow trenches, typically 40 feet wide at the top, 25 feet wide at the bottom, 20 feet deep, and 600 feet long. Waste containers are dumped into the trenches and covered daily with about 4 feet of dirt. Another 2 to 6 feet of soil, some of which may be compacted clay, are placed on top to form a cap. After the trenches are filled and capped, their locations are marked with permanent stone or metal markers indicating the locations as well as the volume and radioactivity of the buried material.

The first commercial LLW disposal site was opened near Beatty, Nevada, in 1962. In 1963, after another site (Maxey Flats) was opened near Morehead, Kentucky, the Atomic Energy Commission stopped accepting wastes from private industry. By 1971, six commercial sites had been licensed to dispose of low-level radioactive wastes. They were located at West Valley, New York; Morehead, Kentucky; Barnwell, South Carolina; Sheffield, Illinois; Beatty, Nevada; and Richland, Washington.

In the last 5 years, three of these six sites have closed. The West Valley and Maxey Flats sites closed in 1975 and 1977, respectively, as a result of operational problems related to water management. Because of poor trench design and site selection, rainwater collected in the trenches and became contaminated with

(5) Much of these materials have been exerpted from "Understanding Low Level Radioactive Wastes", EGG-Idaho, Nov., 1980.

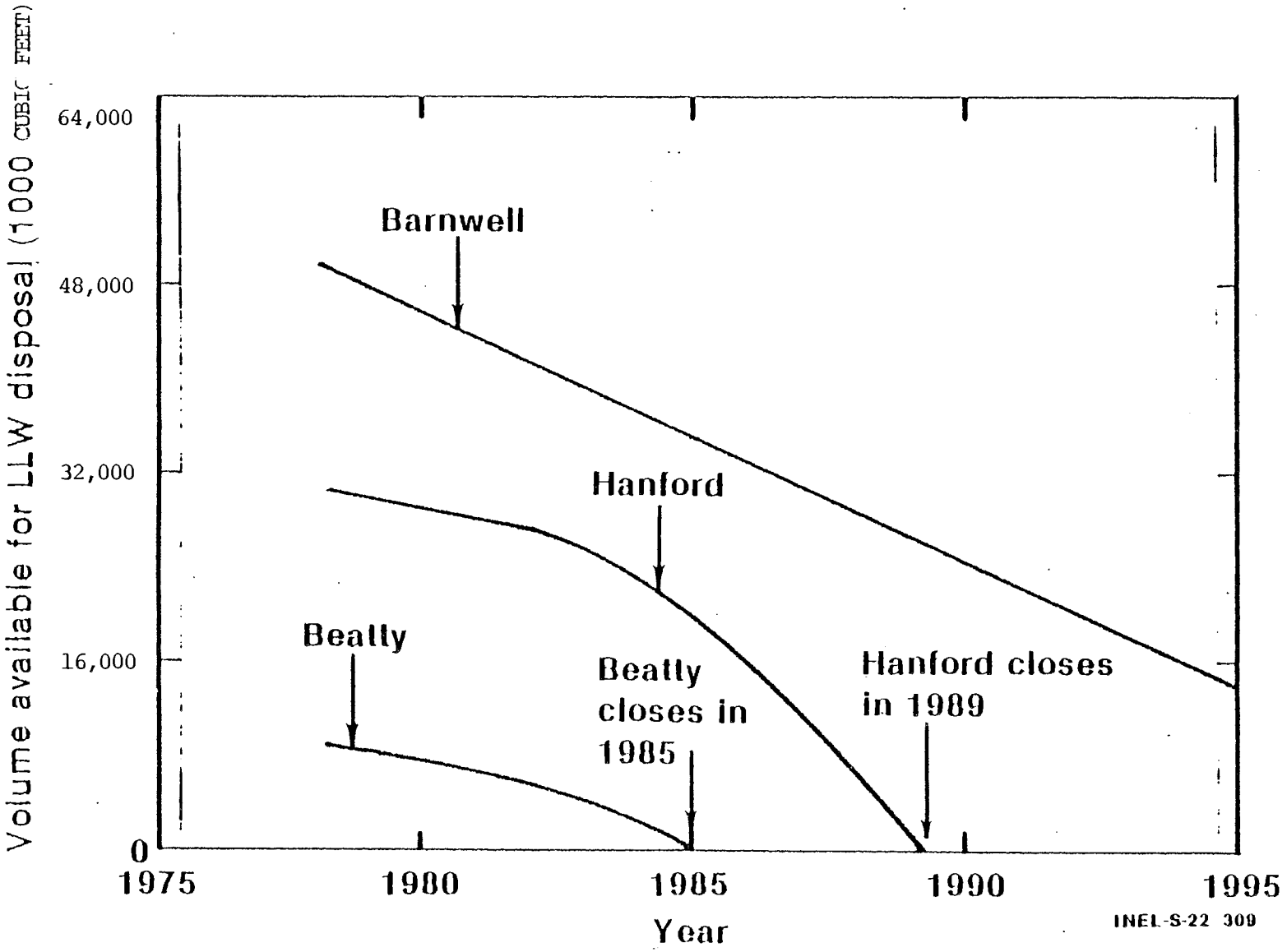
radionuclides. The rainwater had to be collected and processed to protect groundwater and surface-water systems.

Water management problems persist at both sites despite their closure. At Maxey Flats, the trench water continues to be processed in an evaporator. Remedial programs are under way at West Valley to minimize water infiltration into the trenches and provide for surface runoff. The only radionuclide that has migrated off the site at both locations is tritium. Tritium, which becomes part of the water molecules, has traveled limited distances beyond the site borders through surface and atmospheric waters. It has not been detected off the site in groundwater systems. At Maxey Flats, migration of other radionuclides has been greater than expected but still restricted to the site.

In 1978, the available trenches at the Sheffield site were filled, and the site operator applied to the Nuclear Regulatory Commission for a license for additional disposal space. Action on the application was delayed; hence, the site was closed in March, 1979 when the site operator withdrew the application.

The three sites that remain open are the Barnwell, Beatty, and Hanford facilities. Barnwell limits the amount of waste it will accept for disposal and is reducing this limit to 1.2 million cubic feet per year by 1982. Barnwell is not licensed to accept organic liquids; Beatty may accept the liquids if contained in scintillation vials. Hanford's license prohibits acceptance of organic liquids after December, 1982. After that date, medical and research institutions may have difficulty disposing of the organic liquid wastes they generate. Figure 3 projects the anticipated capacity of these facilities.

FIGURE 3



Projected Capacities of Active Commercial Disposal Sites Between Present and 1995

Several Maine institutions, particularly the Maine Medical Center, have expressed grave concerns about the availability of disposal sites. There may be a possibility that lack of facilities could eventually interupt cancer and other medical research and therapy.

Current Policy on LLW Facilities

The State Planning Council, as well as DOE, NRC, National Governors' Association and National Conference of State Legislatures, have all recommended that each state be responsible for low-level waste generated within its boundaries, and that states be authorized to enter into interstate compacts to meet this responsibility. Further, the President has expressed his desire to "work jointly with states, other government agencies, industry and other organizations, and the public, in developing national plans to establish regional disposal sites for commercial low-level waste."[6] While Federal planning grants and other assistance are available to states, States will have the responsibility for solving the low-level waste disposal siting problems.

In the waning hours of the 96th Congress, an Act entitled the "Low-Level Radioactive Waste Policy Act" was finally enacted. This Act establishes four provisions for LLW disposal. First, it states that each State is responsible for providing for the availability of capacity either within or outside the State for the disposal of LLW. Second, it states that LLW can be most safely and efficiently managed on a regional basis. Third, it enables States to enter into regional compacts to establish and operate regional LLW facilities. Finally, it allows interstate

(6) President Carter's address to Congress, February, 12, 1980.

compacts to restrict the use of regional facilities to members of the compact.

There have already been attempts to establish a regional LLW disposal site in New England. On January 3, 1979 the director of the Massachusetts Radiation Control Program solicited responses from the New England states on such a proposal. Legislators from each of the New England states met in Concord, New Hampshire on September 17, 1980 to discuss the need for LLW facilities. At this meeting, legislators identified a need for additional information in three broad areas; (1) generation of LLW in each of the New England States; (2)the economics of regional versus State facilities; and (3) the technical and geologic requirements for facility siting.

The following table summarizes commercial LLW generation in each of the New England states.

Table 3 Low-Level Radioactive Waste Shipped to Commercial Disposal Sites in 1978

Volumes in 1000 cubic feet

State	Commercial Power Reactor Waste	Institutional	Industrial	Govt's Military	Total
Connecticut	84	9.8	13.0	6	113
Maine	25	3.2	2.2	0	30
Massachusetts	77	24.4	18.2	0	119
New Hampshire	0	4.1	1.9	5.4	11
Rhode Island	0	4.0	1.6	0	6
Vermont	7	3.6	.7	0	11
Total	193	49.1	37.6	11.4	290

From this table it is evident that Maine produces a relatively small fraction (10%) of the regional LLW generation. New England LLW generation will increase as nuclear plants currently under construction are completed.

There is little information on the economic benefits of regional versus individual state LLW disposal facilities. Rough estimates from a recent study by EGG-Idaho under control to DOE is presented in table 4 . The assumptions for these calculations are explained in EGG-Idaho's report.[7] If these assumptions are accurate, regional facilities are far less costly than individual state facilities. The difference in total costs to the state of Maine are not as dramatic because of the low volume of waste generated. Incineration of LLW may be even less costly.

The technical requirements for new LLW disposal facilities are in a state of flux. On November 5, 1979, the NRC published a preliminary draft of 10 CFR Part 61, setting out the licensing procedures, performance objectives, and technical criteria for disposal of LLW. These rules have not been formally proposed, however, and it is not possible to predict the final requirements. Based on a preliminary review of the proposed requirement, the Maine State Geologist predicts that it may be possible to find a location in Maine that meets these technical criteria. Without further work, however, he can't fully evaluate Maine's potential for a LLW disposal facility. (See Appendix D.) The Subcommittee did not review information on the other New England states.

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(7) Understanding Low-Level Radioactive Wastes, EGG-Idaho, November, 1980.

Table 4 . Estimated Costs of Low Level Radioactive Waste Disposal (1980 dollars)

	Maine Facility (70,000 cu.ft./yr.	Regional Facility (1,200,000 cu.ft./yr.
1. Landfill Disposal		
Fixed costs		
Capital	$ 4,428,000	$ 7,010,000
Licensing	2,480,000	2,480,000
	$ 6,908,000	$ 9,490,000
Fixed costs (amortized over 20 year life)	$ 345,400/yr.	$ 474,500/yr.
Annual operating costs	$ 2,603,000/yr.	$ 5,870,000/yr.
Total annual costs	$ 2,948,400	$ 6,345,000
Disposal costs	$ 42.12/cu. ft.	$ 5.29/cu. ft.
2. Incineration		
Fixed costs		
Capital	$ 1,419,000	$ 4,980,000
Licensing	100,000	100,000
	$ 1,519,000	$ 5,080,000
Fixed costs (amortized over 20 year life)	$ 75,850/yr.	$ 245,000/yr.
Annual operating costs	$ 217,000/yr.	$ 1,242,000/yr.
Total annual costs	$ 292,950/yr.	$ 1,487,000/yr.
Disposal costs (for approx. 75% of total LLW; remainder would have to be landfilled)	$ 5.60/cu.ft.	$ 2.08/cu. ft.
3. Current Disposal Costs		
Barnwell, South Carolina		$ 6.00/cu. ft.
Hanford, Washington		$ 7.75/cu. ft.

STATE OF MAINE

JUN 7 1979

IN THE YEAR OF OUR LORD NINETEEN HUNDRED SEVENTY-NINE

H. P. 799 — L. D. 1004

AN ACT to Determine What Environmental Laws Apply to Radioactive Waste Materials.

Be it enacted by the People of the State of Maine, as follows:

Sec. 1. 1 MRSA § 15-A is enacted to read:

§ 15-A. Consent of Legislature for federal radioactive waste storage facilites

Notwithstanding any other provsion of this chapter, this State does not consent to the acquisition by the United State Government, by purchase, condemnation, lease, easement or by any other means, of any land, building or other structure, above or below ground, in or under the waters of the State for use in storing, depositing or treating radioactive waste materials, except by prior affirmative vote of the Legislature.

Sec. 2. 38 MRSA § 361-D is enacted to read:

§ 361-D. Radioactive waste facilities

1. Definitions. For the purposes of this section, unless the context otherwise indicates, the following terms shall have the following meanings.

A. "Permanent radioactive waste repository" means a facility, whether above or below the ground, where radioactive waste materials are to be stored or disposed of in such a way as to be permanently isolated from the biosphere.

B. "Radioactive waste material" means any solid, liquid or gas residue, including spent fuel assemblies prior to reprocessing, remaining after the primary usefulness of the radioactive material has been exhausted and containing nuclides that spontaneously disintegrate or exhibit ionizing radiations.

C. "Temporary radioactive waste repository" means only a facility which is used for the temporary storage or disposal of spent nuclear fuel elements or the by-products of reprocessing spent nuclear fuel elements.

2. Notification. Any person intending to construct or operate any temporary or permanent radioactive waste repository shall, at least one year prior to commencing any construction or operation, notify the board in writing of his intent and of the nature and location of the facility, together with any other information the board may require.

3. Hearing. Within 30 days of receipt of the notification, the board shall schedule a public hearing in the general area of the proposed project. At the hearing, the board, exercising its investigative authority and the police power of the State, shall solicit and receive testimony to determine whether the project will be subject to section 413, waste discharge licenses, section 590, air emission licensing, and any other laws administered by the board that may be applicable.

4. Findings. Within 90 days after the board adjourns any hearing held under this section, it shall make findings of fact and conclude that the project is or is not subject to each of the laws which were addressed at the hearing.

5. Exemption. This section shall not apply to the temporary storage of spent nuclear fuel elements at existing spent fuel element pools when these spent nuclear fuel elements are from the operation of existing nuclear generating facilities within this State.

Sec. 3. Report to Legislature. The Joint Standing Committee on Energy and Natural Resources of the 109th Legislature or its successor shall report to the 110th Legislature prior to February 14, 1981, the following:

1. The effects of this Act;

2. The methods actually in use or proposed to be used for the storage or disposal of radioactive waste materials in Maine;

3. The state of the art for treating, storing and disposing of radioactive waste materials; and

4. The amount and the type of radioactive waste materials generated, treated, stored or disposed of in Maine.

IN HOUSE OF REPRESENTATIVES, ... 1979

Read twice and passed to be enacted.

IN SENATE, ...1979

Read twice and passed to be enacted.

..... **President**

Approved..... 1979

.....**Governor**

APPENDIX B

CONSULTATION AND CONCURRENCE AND THE REPOSITORY SITING PROCESS

(Note: For clarity, this chart is simplified by focusing on the host state and the federal government. Ways of including other affected states, Indian tribes, and local governments will need to be developed before a C&C process can be completely defined.)

PHASE	KIND OF ACTIVITY	C&C: PRESENT PLANS
1. NATIONAL SCREENING	DEFINITION OF SCREENING CRITERIA. LITERATURE STUDIES TO COLLECT INFORMATION ON REGIONS THAT MAY CONTAIN CANDIDATE SITES. DEFINITION OF "REGIONS" OF INTEREST—MULTI-STATE, 1000'S OF SQUARE MILES.	DOE PLANS TO PROVIDE INFORMATION TO ALL STATES ABOUT ITS ACTIVITIES INCLUDING THE PROCESS FOR FINDING SITES AND THE C&C PROCESS.
2. PROVINCE/REGIONAL STUDIES	BROAD STUDIES FOCUSING ON GEOLOGIC REGIONS, INCLUDING LITERATURE SURVEYS, FIELD MAPPING, COOPERATION WITH STATE GEOLOGIC SURVEYS. DEFINITION OF "AREAS" OF INTEREST WITHIN STATE (100 TO 1000 SQUARE MILES).	DOE PLANS TO CONSULT WITH GOVERNORS, LEGISLATORS IN STATES WHERE IT WANTS TO WORK. DOE MODIFIES ITS STUDY APPROACHES AS NEEDED. WRITTEN AGREEMENTS POSSIBLE.
3. AREA STUDIES	FIELD WORK, INCLUDING DRILLING FOR CORE SAMPLES AT DIFFERENT SPOTS WITHIN THE AREA. DEFINITION OF "LOCATIONS" (UP TO 30 SQUARE MILES). SITE CHARACTERIZATION PLANS SUBMITTED TO NRC.	AS ABOVE, PLUS DOE MAKES AGREEMENTS WITH INDIVIDUAL STATES. DOE COMPLIES WITH PERMIT REGULATIONS FOR DRILLING, OTHER ACTIVITIES. DOE SHARES RESEARCH RESULTS WITH STATES, PROVIDES INFORMATION TO ANYONE INTERESTED, FUNDS STATE REVIEW GROUPS.
4. LOCATION STUDIES	DRILLING, SOCIOECONOMIC STUDIES, ENVIRONMENTAL STUDIES, SURVEYS OF PLANT AND ANIMAL POPULATION, METEOROLOGICAL STUDIES. DEFINITION OF SPECIFIC SITES (CA. 10 SQUARE MILES).	MOSTLY CONSULTATION STILL. DOE WILL SEEK ADVICE FROM STATES, HAVE LOCAL PRESENCE. FAIRLY SPECIFIC C&C AGREEMENT POSSIBLE, RESERVING STATE POWER TO CONCUR OR NOT.

CONSULTATION AND CONCURRENCE AND THE REPOSITORY SITING PROCESS
(Continued)

	PHASE	KIND OF ACTIVITY	C&C: PRESENT PLANS
5.	DECISION TO PROCEED WITH DETAILED SITE CHARACTERIZATION	DOE DECIDES THAT SITE IS READY FOR SEVERAL MILLION DOLLARS AND SEVERAL YEARS OF WORK PREPARATORY TO CONSIDERING IT FOR LICENSING. DOE SUBMITS DETAILED SITE CHARACTERIZATION REPORT TO NRC. DOE ACQUIRES ALL NECESSARY PROPERTY INTERESTS IN SITE.	DOE PLANS APPEAR TO CONCENTRATE ON NEXT DECISION POINT (SITE BANKING), BUT PRESENT DOE POLICY WOULD ALLOW STATE TO HALT DOE ACTIVITIES AT THIS POINT BY OBJECTING.
6.	DETAILED SITE CHARACTERIZATION	DOE COLLECTS ALL ADDITIONAL DATA ON A SITE NECESSARY FOR A LICENSE APPLICATION (INCLUDING SHAFT EXCAVATION AND AT-DEPTH TESTING, SAY PROPOSED NRC REGULATIONS).	DOE WORKS WITH STATE OVER SPECIFICATION AND COLLECTION OF ADDITIONAL DATA NECESSARY FOR LICENSE APPLICATION.
7.	SITE BANKING	DOE DECISION THAT A SITE IS READY FOR COMPARISON WITH OTHER SITES, AND WILL BE HELD UNTIL ENOUGH (4 TO 5) SITES ARE READY FOR SITE SELECTION. ENVIRONMENTAL IMPACT STATEMENT (EIS) ON DECISION ON SUITABILITY FOR BANKING. DEPARTMENT OF INTERIOR (DOI) DECISION ON LAND WITHDRAWAL.	STATE CONSENT IS IMPORTANT. PARTICIPANTS MUST REACH CONSENSUS ON THE SUITABILITY OF A SITE FOR BANKING, BASED ON ESTABLISHED TECHNICAL, ENVIRONMENTAL, AND INSTITUTIONAL CRITERIA.
8.	SITE SELECTION	SELECTION OF ONE SITE (FROM 4 TO 5 BANKED SITES) FOR LICENSE APPLICATION. PREPARATION OF SITE RECOMMENDATION REPORT (SRR) AND REVISED EIS.	STATE REVIEWS SITE RECOMMENDATION REPORT (AS DO OTHER FEDERAL AGENCIES). WHEN A CONSENSUS IS REACHED, SRR IS REVISED AND ISSUED AS A SITE SELECTION REPORT.
9.	LICENSE APPLICATION	PREPARATION OF LICENSE APPLICATION, PRELIMINARY SAFETY ANALYSIS REPORT, AND ENVIRONMENTAL REPORT FOR SUBMISSION TO NRC.	CONSULTATION WITH HOST STATE.

CONSULTATION AND CONCURRENCE AND THE REPOSITORY SITING PROCESS
(Continued)

PHASE	KIND OF ACTIVITY	C&C: PRESENT PLANS
10. NRC LICENSING PROCESS	NRC REVIEW OF LICENSE APPLICATION ACCORDING TO NRC REGULATIONS, AND DECISION TO AUTHORIZE (OR NOT TO AUTHORIZE) CONSTRUCTION.	STATE–FEDERAL INTERACTION NOW FOCUSES ON NRC. STATE ROLE DEFINED BY NRC REGULATIONS AS ADVISORY ONLY.
11. REPOSITORY CONSTRUCTION	REPOSITORY CONSTRUCTION, PLUS PREPARATION OF APPLICATION TO NRC FOR LICENSE TO OPERATE.	CONTINUED CONSULTATION WITH STATE. MITIGATION OF LOCAL SOCIOECONOMIC IMPACTS.
12. NRC LICENSING PROCESS	NRC REVIEW OF APPLICATION TO OPERATE, AND DECISION TO GRANT OR DENY DOE A LICENSE FOR THE REPOSITORY.	STATE ROLE DEFINED BY NRC REGULATIONS AS ADVISORY ONLY.
13. REPOSITORY OPERATION	DOE OPERATION OF REPOSITORY.	CONTINUED CONSULTATION WITH STATE.
14. REPOSITORY DECOMMISSIONING	DOE APPLIES TO NRC FOR PERMISSION TO CLOSE REPOSITORY. NRC DECISION.	NO SPECIFIC STATE ROLE DEFINED BY NRC REGULATIONS.

APPENDIX C

SHIPMENTS OF LOW-LEVEL RADIOACTIVE WASTES

Jan. 1978 -- July 1979

Activity	Volume	Curries	Elements
Hospitals			
Maine Medical Center Portland, Maine	3,870 gal.	.135 Ci	I-125, H-3, C-14
Mid-Maine Medical Center Waterville, Maine	330 gal.	.0024 S Ci	I-125
Augusta General Hospital	100 gal.	.000864 Ci	I-125, P-33
Bigelow Laboratory for Ocean Sciences West Boothbay Harbor	880 gal.	.125 Ci	C-14, H-3
Eastern Maine Medical Center	110 gal.	less than 1 Ci	Tc-99
Veterans Administration	110 gal.	?	
Laboratories			
Ventrex Laboratories 217 Read Street Portland, Maine	4,070 gal.	.196 Ci	I-125
Jackson Laboratory Bar Harbor	110 gal.	.025 Ci	H-3, C-14, P-22, S-35, Cr-55, I-125, Cd-10
Mt. Desert Island Biological Laboratory Salsbury Cove	1,950 gal.	.048 Ci	H-3, C-14
Universities			
University of Maine Orono	64 cu feet	.064 Ci	C-14, H-3, Cs-137

Historical Record of LLW Generation in Maine from Government and Nuclear Power Generation Facilities.

Portsmouth-Kittery Naval Shipyard

Year	Vol. (cu ft)	Curies
1974	7	4
1975	14	6
1976	6	7
1977	9	6
1978	6	2

MAINE YANKEE

YEAR	Vol (cu.ft.)	CURIES
1973	2364	3.248
1974	5641	831
1975	8164	1253
1976	6344	504
1977	6373	25729
1978	19874	4136
1979	12814	2772
1980	9202	4138

APPENDIX D

STATE OF MAINE

Inter-Departmental Memorandum

Date October 29, 1980

To John Bailey — Dept. Legislative Aids

From Walter A. Anderson, State Geologist — Dept. Maine Geological Survey

Subject LLW Potential in Maine

This memorandum is in response to your request for information on the likelihood that Maine might contain suitable sites for the secure disposal of low-level nuclear wastes (LLW). The central and coastal area of Maine is underlain by a marine clay, the Presumpscot Formation, deposited during the waning phase of the last glaciation, which is potentially a suitable environment for LLW management.

The Maine Geological Survey has mapped the general extent of the Presumpscot and it is known to contain both sand and impervious clayey segments. The thickness and lateral extent of these segments is not well defined. Likewise, little study has been given to the flow of ground water to and through the Presumpscot. An understanding of both the stratigraphy and hydrology of the formation as a whole is necessary to assess the suitability of any site for LLW in the area. The results of a geologic investigation to develop this understanding would also be valuable in the siting of other activities within the area of Presumpscot deposition, such as on-lot sewage disposal, land fills, and municipal water supplies.

We believe strongly that, without an area wide definition of the Presumpscot's suitability, an intelligent evaluation of the potential for LLW disposal in Maine cannot be made.

A geologic investigation and delineation of the isolation potential of the Presumpscot would be a key step in the development of a nuclear waste management policy for the state. We look forward to the opportunity to aid in its development execution.

WAA/sjs

APPENDIX E

Recently enacted legislation on low level radioactive waste disposal.

United States of America

Congressional Record

PROCEEDINGS AND DEBATES OF THE 96th CONGRESS, SECOND SESSION

Vol. 126 WASHINGTON, SATURDAY, DECEMBER 13, 1980 No. 177

Senate

(Legislative day of Thursday, November 20, 1980)

SHORT TITLE

SECTION 1. This Act may be cited as the "Low-Level Radioactive Waste Policy Act".

DEFINITIONS

SEC. 2. As used in this Act—

(1) The term "disposal" means the long-term isolation of low-level radioactive waste pursuant to requirements established by the Nuclear Regulatory Commission under applicable law.

(2) The term "low-level radioactive waste" means radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or byproduct material as defined in section 11 e. (2) of the Atomic Energy Act of 1954.

(3) The term "State" means any State of the United States, the District of Columbia, and, subject to the provisions of Public Law 96-205, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, the Northern Mariana Islands, the Trust Territory of the Pacific Islands, and any other territory or possession of the United States.

(4) For purposes of this Act the term "atomic energy defense activities of the Secretary" includes those activities and facilities of the Department of Energy carrying out the function of (i) Naval reactors development and propulsion, (ii) weapons activities, verification and control technology, (iii) defense materials production, (iv) inertial confinement fusion, (v) defense waste management and (vi) defense nuclear materials, (vii) defense security and safeguards, (all as included in the Department of Energy appropriations account in any fiscal year for atomic energy defense activities).

GENERAL PROVISIONS

SEC. 3(a). Compacts established under this Act or actions taken under such compacts shall not be applicable to the transportation, management, or disposal of low-level radioactive waste from atomic energy defense activities of the Secretary or Federal research and development activities.

(b) Any facility established or operated exclusively for the disposal of low-level radioactive waste produced by atomic energy defense activities of the Secretary or Federal research and development activities shall not be subject to compacts established under this Act or actions taken under such compacts.

LOW-LEVEL RADIOACTIVE WASTE DISPOSAL

SEC. 4. (a)(1) It is the policy of the Federal Government that—

(A) each State is responsible for providing for the availability of capacity either within or outside the State for the disposal of low-level radioactive waste generated within its borders except for waste generated as a result of defense activities of the Secretary or Federal research and development activities; and

(B) low-level radioactive waste can be most safely and efficiently managed on a regional basis.

(2)(A) To carry out the policy set forth in paragraph (1), the States may enter into such compacts as may be necessary to provide for the establishment and operation of regional disposal facilities for low-level radioactive waste.

(B) A compact entered into under subparagraph (A) shall not take effect until the Congress has by law consented to the compact. Each such compact shall provide that every 5 years after the compact has taken effect the Congress may by law withdraw its consent. After January 1, 1986, any such compact may restrict the use of the regional disposal facilities under the compact to the disposal of low-level radioactive waste generated within the region.

(b)(1) In order to assist the States in carrying out the policy set forth in subsection (a)(1), the Secretary shall prepare and submit to Congress and to each of the States within 120 days after the date of the enactment of this Act a report which—

(A) defines the disposal capacity needed for present and future low-level radioactive waste on a regional basis;

(B) defines the status of all commercial low-level radioactive waste disposal sites and includes an evaluation of the license status of each such site, the state of operation of each site, including operating history, an analysis of the adequacy of disposal technology employed at each site to contain low-level radioactive wastes for their hazardous lifetimes, and such recommendations as the Secretary considers appropriate to assure protection of the public health and safety from wastes transported to such sites;

(C) evaluates the transportation requirements on a regional basis and in comparison with performance of present transportation practices for the shipment of low-level radioactive wastes, including an inventory of types and quantities of low-level wastes, and evaluation of shipment requirements for each type of waste and an evaluation of the ability of generators, shippers, and carriers to meet such requirements; and

(D) evaluates the capability of the low-level radioactive waste disposal facilities owned and operated by the Department of Energy to provide interim storage for commercially generated low-level waste and estimates the costs associated with such interim storage.

(2) In carrying out this subsection, the Secretary shall consult with the Governors of the States, the Nuclear Regulatory Commission, the Environmental Protection Agency, the United States Geological Survey, and the Secretary of Transportation, and such other agencies and departments as he finds appropriate.