

Chapter 4
EXISTING POLICY, LAW AND
ORGANIZATION

Having considered the character of radioactive waste in chapter 2 and the range of strategic decisions involved in waste management in chapter 3, we are now in a position to analyze in some detail the existing situation in the U.S. regarding radioactive waste management and regulation. First, the policy goals are briefly discussed. Next, the organizational structure for management, regulation, and research and development related to radioactive waste is analyzed. Finally, the existing situation regarding implementation of radioactive waste policy is described.

Goals

Present statements of the basic policy goals of radioactive waste management vary somewhat according to the federal government agency concerned. The statements of EPA and ERDA to date have focused mainly on technological safety objectives. EPA's position is that

Waste management means containment of radioactive materials until they have decayed to innocuous levels. The objectives that EPA has are to minimize exposure to present and future populations and to avoid dilution into the biosphere.¹

ERDA's is similar: ". . . the effective management of nuclear wastes in a manner which effectively protects man and his environment . . ."² With respect to commercial HL waste in particular, "[ERDA's] objective is to provide multiple terminal storage sites on time to receive solidified waste without inhibiting the power industry."³ ERDA is, of course, also committed to continue the nu-

clear weapons production and naval nuclear propulsion programs. ERDA has acknowledged the importance of broad public participation in the selection of technological options, so that the options ultimately chosen will gain broad public acceptance.⁴

NRC has set forth the broad goals of its regulatory efforts in these terms:

1. Isolation of radioactive wastes from man and his environment for sufficient periods (in some cases hundreds or thousands of years) to assure public health and safety and preservation of environmental values.
2. Reduction to as low as reasonably achievable:
 - a) Risk to the public health both from chronic exposure associated with waste management operations and possible accidental releases of radioactive materials from waste storage, processing, handling or disposal.
 - b) Long-term social commitments (land-use withdrawal, resource commitment, surveillance requirements, committed site proliferation, etc.)⁵

In contrast to ERDA, NRC has expressed interest in attaining certain social, economic, and environmental as well as technical goals. The NRC staff has organized a task force to assess policy issues and to recommend for the Commission's consideration a statement of generally acceptable goals and objectives for the management of nuclear wastes. The draft task force report reflects concern with matters like the institutional arrangements required for waste management, economic impacts, the foreclosure of future options, time frames for action, distribution of hazards and benefits, the uncertainties which will plague decisionmaking, and public involvement in waste management decisions.⁶

Organizational Overview

To carry out waste management goals a set of institutional arrangements is required. The overall organization must include capacities for three generic functions: waste management itself, regulation of waste management to assure safety, and research and development to improve both management and regulation. "Waste management" is the actual performance of physical and administrative tasks required for the proper short and long-term handling of radioactive materials. These activities include temporary storage, treatment, packaging, transportation, and retrievable storage or permanent disposition. Retrievable storage and permanent disposition may be termed "long-term" activities, while all others are "short-term," regardless of when they occur. Current management responsibilities can be described by considering in turn each of the four categories of post-fission waste, based on type and origin within the scope of this report: (1) commercial HL waste; (2) military HL waste; (3) commercial TRU waste; and (4) military TRU waste. Responsibility for management is variously divided between ERDA and private industry depending on the type and origin of post-fission wastes. The regulatory function includes basically three types of activities: setting general criteria and specific standards, licensing or approving various managerial activities (e.g., siting, construction, and operation of facilities), and monitoring and enforcement related to ongoing operations. Again depending on the type and origin of post-fission waste, primary responsibility for regulation is divided among NRC, ERDA and certain states. Superimposed upon the primary regulatory responsibilities of several "non-nuclear" agencies, which

derive their jurisdiction from legislation on transportation or the environment. Contrasted with the complexity of institutions involved in management and regulation, a single agency, ERDA, sponsors or conducts the great bulk of radioactive waste research and technology development.

Management

The Atomic Energy Act of 1954⁷ and the Energy Reorganization Act of 1974⁸ split managerial responsibilities between ERDA and licensees of NRC or Agreement States.⁹ ERDA personnel, however, do not actually operate ERDA's waste management facilities: this work is done almost entirely by ERDA contractors subject to ERDA management policies. Thus, when this report refers to ERDA or federal "management," it implies such a two-tiered managerial arrangement.

Commercial HL waste is to be managed by licensees until it is delivered to ERDA facilities for final disposition. Under current regulations licensees must solidify liquid HL waste no later than 5 years after its generation and must transfer it to an ERDA repository no later than 5 years after its solidification.¹⁰ Thus short-term responsibilities (temporary storage, treatment, packaging, transportation) fall upon private industry and long-term responsibilities, (retrievable storage or permanent disposition) fall upon the federal government. Responsibility for management of military HL waste resulting from weapons production and naval nuclear propulsion programs is comprehensively vested in the federal government. DOD is a relatively minor manager of military

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waste, since it must handle spent fuel elements from naval reactors for only limited periods of time, until they are transferred to ERDA. DOD does not manage HL waste from weapons production, since ERDA itself produces plutonium for weapons; it is during plutonium recovery that weapons HL waste is generated.¹¹

The present law and NRC regulations allow private industry licensees to have short- and long-term management responsibilities for commercial TRU waste. Regulations proposed by the AEC and inherited as proposals by NRC would alter this situation for the long-term, however. The proposed regulations could prohibit burial of any transuranic waste and require licensees to transfer all transuranic waste to federal (i.e., ERDA) facilities within five years of generation.¹² Resolution of certain technical and economic problems with the proposed regulation plus the preparation of an Environmental Impact Statement on it are necessary before promulgation. All but one of the six commercial low-level waste burial sites now in operation have suspended TRU waste burial.¹³

Most military TRU waste is managed within the federal government by ERDA in the long-term and by ERDA and DOD in the short-term. Again, DOD manages relatively small amounts of TRU waste from weapons component assembly and naval propulsion programs, which it transfers to ERDA as soon as possible within its own operational and national security commitments. It should also be noted that several commercial operators inherited some buried military TRU waste when they took over sites which had previously been run by the AEC. At least one commercially operated burial site (at Hanford) continues to receive military TRU waste from nuclear navy operations.¹⁴

Regulation

The body of radioactive waste regulation is still in the early stages of development. This should be borne in mind throughout the following discussion.

Criteria and Standards

Basically, authority to promulgate radiation safety criteria and standards applicable to radioactive material is vested in the federal government. ¹⁵ NRC and ERDA have authority, derived from the Atomic Energy Act of 1954 and the Energy Reorganization Act of 1974, to establish license criteria and standards for protection against radiation. ¹⁶ EPA, however, also has a claim in this area. When it was created in 1970, it received, among other powers, the authority of the Federal Radiation Council, which was then abolished, to

. . . advise the President with respect to radiation matters, directly or indirectly affecting health, including guidance for all Federal agencies in the formulation of radiation standards and in the establishment and execution of programs of cooperation with States.¹⁷

The 1970 Reorganization Plan also transferred from AEC to EPA the responsibility for

" . . . establishing generally applicable environmental standards for the protection of the general environment from radioactive material. As used herein, standards mean limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment outside the boundaries of locations under the control of persons possessing or using radioactive material.¹⁸ (emphasis added)

EPA has relied to date upon this latter language, which excludes from EPA radiation standard-setting both ERDA and licensee activities

which are located geographically within the possessor/user's facility. (Thus EPA has jurisdiction to set exposure standards for transport of wastes.) Some EPA statements, however, indicate an attempt to expand its standard-setting authority to reach within the boundaries of NRC-licensed or ERDA facilities by reviewing NRC's and ERDA's own standards for protection against radiation under the authority of its "guidance" mandate.¹⁹ This would create regulatory redundancy and perhaps conflict. So far EPA has not tried to alter the nuclear agencies' standards for operations.

Licensing/approval activities are the central function of post-fission waste regulation, and they present the most complicated aspect of the present situation. While NRC and ERDA have general licensing/approval duties within their respective areas of jurisdiction, several other institutions, within and outside of the federal government, have claims of varying strength for additional, occasionally overlapping, authority to license as well. Before discussing these additional institutions, we will outline current allocations of regulatory authority between NRC and ERDA for the various regulatory activities aside from standard-setting, and identify some of the uncertainties that exist within each category.

Siting HL and TRU Waste Facilities

Siting requirements adopted to date concern mainly land ownership. ERDA's practice is to purchase, rather than to lease, land for its use; thus ERDA waste management facilities are and will be located on federally-owned land. "[D]isposal of high-level radioactive fission product waste material will not be permitted

on any land other than that owned and controlled by the Federal
 Government." ²⁰ Current NRC regulations, on the other hand, re-
 quire applicants for low-level waste burial licenses to provide
 an environmental analysis of the proposed site ²¹ and allow burial ²²
 only on land which is owned by the federal or a state government.
 Reprocessing plants and temporary storage facilities for HL waste
 may be located on privately-owned property. ²³ Whereas TRU waste
 disposal can now take place on State or Federal land, proposed
 regulations would limit it to property owned by the U.S. govern-
 ment. ²⁴ Further siting requirements are being developed by the
 Office of Nuclear Material Safety and Safeguards within NRC. The
 role of other federal and state agencies in siting is discussed
 further below.

Facilities Construction and Operation: HL Waste

NRC has sole authority to license commercial HL waste manage-
 ment facilities and operations. Moreover, section 202(3) of the
 Energy Reorganization Act of 1974 subjects any ERDA facility han-
 dling commercially-generated HL waste to NRC licensing. It would
 even appear that ERDA research and development facilities using
 commercially generated HL waste are subject to NRC licensing. ²⁵
 ERDA is not planning to use commercial HL waste in its pilot plants
 for demonstration of a permanent waste repository; ERDA may thus
 avoid NRC licensing. ²⁶ ERDA is now grappling with the problem of
 obtaining a suitable quantity and composition of waste similar
 to commercial HL waste for use in its demonstration projects.

ERDA contractors are responsible for day-to-day management
 of military HL waste, as noted above. These are supervised, in

a management sense, and regulated for safety assurance, by ERDA through the terms of its contracts. ERDA manual chapters on waste management (which give very general guidance),²⁷ standards for protection against radiation,²⁸ reporting of occurrences,²⁹ etc., are incorporated by reference into the contract terms. The ERDA approval of contractor operations is obviously not as publicly open as NRC approval of its licenses. But this type of ERDA self-regulation is specifically authorized by the Atomic Energy Act of 1954.³⁰ The approach may be justifiable on national security grounds in part. At any rate, for the short-term, ERDA exercises regulatory control over its own military HL waste.

For the long-term, section 202(4) of the Energy Reorganization Act gives NRC licensing authority over the following ERDA facilities:

. . . Retrievable surface storage facilities and other facilities authorized for the express purpose of subsequent long-term storage of high-level radioactive waste generated by the Administration, which are not used for, or are part of, research and development activities.³¹

Thus NRC clearly must license the long-term disposition of both commercial and military HL waste. However, the statutory language raises a number of definitional issues such as the meanings of "long-term," "subsequent," and "high-level radioactive wastes." The meaning of this section has been raised in a petition to NRC challenging ERDA's planned construction of several new waste storage tanks without NRC licensing.³² Resolution of this question is important with regard to NRC's regulatory authority over a large segment of the existing waste inventory. Two major points

should be stressed in explaining the division of authority created by this provision of existing law.

First, it has been generally accepted that (AEC) military HL waste that existed at the time the Energy Reorganization Act was enacted, located at such federal reservations as Hanford, Savannah River, and Idaho Falls, is not subject to NRC licensing. This is notable partly because some of the waste in question has been stored at these ERDA facilities since the 1940s. Some have asserted that anything longer than 30 years constitutes long-term storage.³³ More significantly, ERDA has for some time been solidifying liquid HL waste in place within storage tanks to prevent further leakage. The result of this action, as discussed in chapter 3, is that ultimate removal of this solidified HL waste for transfer to NRC-regulated long-term storage facilities may prove prohibitively expensive.³⁴ ERDA may thus retain "long-term" regulatory authority over military HL waste as long as it remains solidified in tanks which existed prior to the passage of the Energy Reorganization Act. ERDA cannot, however, avoid NRC regulation of additional long-term storage facilities. If ERDA is faced with leaks in any new tanks for temporary storage, and it adopts a solidification strategy again as an emergency management measure, NRC may be able to step in as a licensor. But at such a late stage NRC will have been excluded from the siting and construction decisions, which are perhaps the most crucial steps in the licensing process.

Nevertheless, NRC's basic licensing authority over the permanent disposition of military HL waste, which obviously includes the promulgation of safety criteria for acceptance of waste at a

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permanent repository, could give it substantial indirect control over at least some aspects of short-term ERDA management (e.g., form of waste, type of packaging). This would not, however, enable NRC to exercise short-term monitoring and enforcement with regard to ERDA wastes, nor to establish a schedule for ERDA waste treatment in preparation for transfer to a permanent waste repository.

The second major point is that in a similar way the exclusion of ERDA research and development facilities from NRC licensing may deny NRC meaningful safety regulation of several permanent waste storage facilities. Having sited, constructed, and demonstrated a pilot plant without an NRC license, ERDA may then declare it capable of operating as a permanent repository. NRC will have been shut out again from the original siting and construction decisions.

Facilities Construction and Operation: TRU Waste

The 1959 Amendments to the Atomic Energy Act of 1954 made provision for states to regulate commercial low-level waste operations within their boundaries under the Agreement States program. Pursuant to these provisions, NRC essentially delegates this part of its regulatory power to states desiring this authority and conforming to the Commission's standards. But it retains the authority to suspend or revoke an Agreement if the public health or safety is threatened. The suspension power has never been exercised thus far. Pursuant to the Agreement States program, certain states wholly or partially regulate all but one of the six currently operating commercial burial facilities at Barnwell, S.C.; Beatty,

Nev.; Hanford, Wa.; Moorehead, Ky.; and West Valley, N.Y. (The Sheffield, Ill. site is under exclusive federal jurisdiction.)³⁷

Proposed regulations prohibiting shallow land burial of TRU waste and shifting long-term management of such waste from private operators to ERDA would take this aspect of regulatory authority out of the Agreement States and place it once more in the federal government. It would be logical for NRC to have this role, in light of its parallel long-term regulatory responsibilities for commercial HL waste. However, existing law expressly provides for NRC licensing of long-term storage of HL waste only.³⁸ Apparently, NRC is tending toward simplifying the defined categories of radioactive waste into high- and low-level only.³⁹ If necessary, NRC might indirectly exercise control over long-term TRU waste repositories by setting design criteria for sites and receiving facilities in requirements for transport by NRC licensees of TRU waste to permanent repositories. A more straightforward solution to this ERDA-NRC jurisdictional problem would seem to require legislation.

NRC is currently rethinking the radioactive waste aspects of its Agreement States program. Discussion between NRC staff members and State government radiation control officials has begun.⁴⁰ Such reconsideration is taking place in an environment of waning state financial capacity, and increasing controversy about low-level burial sites. Apparently, many states would willingly rid themselves of the expense and responsibility of this phase of radioactive waste regulation.

ERDA has sole regulatory authority over military TRU waste. DOD regulates the short-term management of TRU waste generated by weapons component assembly or naval nuclear propulsion programs at

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DOD facilities themselves, but this waste is transferred eventually to ERDA.

No definition of "high level radioactive waste" is supplied by the Energy Reorganization Act itself. However, at the time the Act was passed, the term would already not have included TRU.⁴¹ Nonetheless, current practice and proposed regulations view trans-uranic waste with considerable concern since, as discussed in chapter 3, quantities of plutonium contained in low-level and high-level wastes generated by commercial plutonium recycle will be roughly equal.⁴² Yet the existing U.S. regulatory structure does not provide firm assurance of NRC regulation of either commercial or military TRU waste.

NRC efforts now underway in the area of waste regulation include:

- 1) development of a regulatory waste management program;
- 2) establishment of a confirmatory research program to support regulatory and licensing activities in waste management;
- 3) classification of the types of nuclear wastes;
- 4) development of specifications for the types of solids which are acceptable forms for HL waste;
- 5) review of requirements for the disposal of low-level waste at commercial burial grounds; and
- 6) coordination of activities with state and local governments and other federal agencies.

Transportation

Charged by a series of legislative enactments culminating in 1975, DOT shares responsibility with the nuclear agencies for insur-

ing safe transport of hazardous radioactive materials in commerce. Recognizing their common jurisdiction, DOT and AEC in 1973 entered into a Memorandum of Understanding allocating regulatory duties in this area.⁴⁵ The Memorandum recognizes DOT's general authority to develop safety standards for packaging by shippers and handling by carriers, but allows AEC to develop criteria for packages of Type B, large quantity, and fissile materials. Each agency further pledges to enforce the other's standards when monitoring parties under its jurisdiction and to exchange information prior to issuing new regulations in this area. The Memorandum was signed before the AEC split into NRC and ERDA. It is now applicable to both, since the AEC specifically imposed the same regulatory obligations for transport upon both its licensees and its license-exempt contractors. ERDA has acknowledged its obligations by carrying forward the relevant AEC manual chapter into its own body of manual chapters, which is by standard practice incorporated by reference into all ERDA shipper contracts.⁴⁶ NRC likewise has adopted without significant variation that part of previous AEC regulations pertaining to the packaging of radioactive material for transport.⁴⁷ Both nuclear agencies also require shippers to follow a registration and approval procedure that parallels DOT regulations for the shipment of non-radioactive hazardous materials.⁴⁸ As was indicated above, all waste shipments outside ERDA or NRC facilities must also meet EPA's generally applicable standards for protection of the environment against radiation.⁴⁹

There is one exception to the federally dominated scheme of regulation. In the case of transportation of wastes containing less than critical mass quantities of special nuclear materials within

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Agreement States, neither DOT nor NRC have jurisdiction. State laws and regulations apply. But all Agreement States require packaging to comply with DOT standards.⁵⁰

Current federal transportation and packaging regulations, in effect since 1968, are virtually identical to the regulations adopted by the IAEA in 1961. The IAEA, however, revised its regulations in 1973. ERDA and NRC are now considering revisions in response to these changes by the international organization. A number of recent radioactive waste transport incidents have sparked controversy. Also, most of the state nuclear power initiatives that have been proposed include provisions on transportation. In response, NRC has committed itself to a program of emergency response planning, environmental impact assessment, and risk analysis.⁵¹

Monitoring and Enforcement

The Atomic Energy Act of 1954 grants both agencies ample authority for monitoring and enforcement.⁵² Monitoring consists mainly of screening required reports, auditing managers' inventories, and inspecting sites. Enforcement involves the punishment of violators and ordering remedial safety actions, particularly during emergencies. NRC has general regulations governing these activities,⁵³ and ERDA conditions its contracts on adherence to manual chapters with similarly general requirements.⁵⁴ If a contractor cannot be convinced to comply with manual chapter standards, ERDA may rescind the contract and, if necessary, confiscate the facility.

It is unclear, however, how ERDA manual chapters compare in legal weight with regulations such as those formulated by NRC and published in the Code of Federal Regulations. From ERDA's standpoint as a regulator the question is unimportant, since it can exert contractual pressures on its managers. But the issue may be important to an intervenor seeking a court order against ERDA requiring it to enforce its own standards.

DOT has general monitoring and enforcement authority re-
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 garding radioactive waste transport. Maritime shipments of
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 wastes are subject to Coast Guard inspection and enforcement.
 ERDA shipments are exempt from Coast Guard regulatory jurisdiction
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 if accompanied by ERDA personnel. The FAA's present role in
 waste shipment regulation is negligible and will probably remain
 so; neither NRC nor ERDA contemplates the use of air shipment in
 waste management operations.

Federal-State Relations

The role of individual states in waste management regulation is an issue of increasing importance. This issue underlies much of the previous discussion.

A number of states have already challenged the notion of exclusive federal jurisdiction over radioactive waste management regulation. Several of the state nuclear initiatives which have been proposed, including the much publicized but recently defeated California Proposition 15, have contained provisions regarding waste management. The California Legislature has enacted several laws which are intended to impose much milder conditions on nuclear power development in the state than were contained in Proposi-

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tion 15. One of these recently enacted laws prohibits any nuclear power plant land use in the state or certification by the State Energy Resources Conservation and Development Commission until

the commission finds that there has been developed and that the United States through its authorized agency has approved and there exists a demonstrated technology or means for the disposal of high-level nuclear waste.⁵⁸

Michigan's Governor informed ERDA during the 1976 summer, in response to ERDA investigation of disposal sites in the state, that

... before any further negotiations, discussions, or binding decisions or contracts are made, I, as Governor, must be assured in writing that a disposal site will not be selected without approval of the state.⁵⁹

Also this summer, Connecticut passed legislation prohibiting the transportation of commercial radioactive waste within or through its boundaries unless the Connecticut Commissioner of Transportation has first issued a permit authorizing its shipment. The law includes strong inspection and enforcement provisions, including civil fines of up to \$10,000 for each violation.⁶⁰

The federal government is constitutionally established as a government of limited powers. All authority not delegated in the U.S. Constitution is expressly reserved to the several states by the 10th Amendment. In general, the states retain broad authority to legislate and to regulate activities within their respective borders in order to assure public health and safety. Land use is also a subject that is traditionally considered within primary state control. Therefore, state regulation of radiological hazards in general, and radioactive waste in particular, would clearly be appropriate and necessary, but for two qualifications. The first

qualification is that, under the Commerce Clause, state regulation⁶¹ must not constitute an undue burden on interstate commerce; the second is that, under the Supremacy Clause, state regulation⁶² must not conflict with valid federal legislation or regulation. Of the two, the preemption issue is more important in view of the existing federal legislation and regulatory scheme. Based on the pervasiveness of congressionally mandated federal regulation of radioactive waste management, as previously discussed, and the congressional intent expressed in legislative histories of the relevant acts, it is reasonable to conclude that current federal law (including the Agreement States program) would preempt attempts to regulate radioactive waste operations for the purpose of controlling radiological hazards.⁶³ Such a conclusion is supported⁶⁴ by Northern States Power v. Minnesota in which the U.S. Supreme Court affirmed the 8th Circuit Court of Appeals holding that the AEC-prescribed limits on radioactive effluents from nuclear power plants preempt state regulation, and that states cannot impose more stringent radiological standards.

However, state land use controls which in effect zone out radioactive waste operations from certain areas may still be valid, depending on the purpose of the exclusion and the specific character of the activity excluded. Probably, a state or locality, acting pursuant to state law, could control the siting of reprocessing and fuel fabrication plants, including temporary radioactive waste storage facilities, as part of a broader scheme to control industrial⁶⁵ development and the siting of major industrial facilities. State disapproval of a site for a nuclear facility must rest on grounds

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other than the potential radiological hazard involved. On the other hand, a state or locality probably could not affect the siting of a permanent radioactive waste repository, which is legally required to be on federal land, presently owned or acquired.⁶⁶

Finally, federal safety regulation would preempt state efforts to regulate transportation of radioactive waste to the extent the state's concern is based on safety issues.

The operational reality of federal-state relations in any field is framed by the law, but it is influenced decisively by politics and economics. Whether or not state regulation would be eventually declared federally preempted and hence invalid in a court test, the governor, legislature or people of a state can in many ways effectively resist any activity within the state's borders that is authorized or directed by the federal government. This is true of the location of military installations, such as the Navy's Project Sanguine (now Project Seafare),⁶⁷ and of radioactive waste repositories, such as the AEC's salt formation near Lyons, Kansas.⁶⁸

States interested in participating in the regulatory decision-making process will probably be able to exert their greatest influence at the site-approval stage of a federal licensing process. As long as state claims do not represent pretextual attempts to bar outright these facilities, states must be allowed to assert reasonable influence in siting and other regulatory decisions that will affect the non-radiological safety and welfare of local communities. How serious federal-state conflicts over regulatory jurisdiction with regard to radioactive waste will grow is unclear at this time. Political pressures will doubtless play as forceful a role as legal precedent in the ultimate resolution of whatever conflicts arise.

International Regulation

Activities involving radioactive waste may occur within or beyond the limits of national jurisdiction. Moreover, radioactive waste operations within one nation may have effects beyond that nation's jurisdiction, either in another nation or in an area outside the jurisdiction of any nation, such as the high seas, the deep seabed, Antarctica or in space. Radioactive waste management activities occurring or having effects beyond U.S. jurisdiction may, if conducted by U.S. nationals, be subject to U.S. regulation, or regulation by other affected nations, or various forms of international regulation, or all three concurrently. The international ramifications of radioactive waste are important to consider especially in view of existing practices regarding ocean dumping of low-level waste and future options for seabed and ice sheet disposal of HL waste.

Nationally, under the Marine Protection, Research, and Sanctuaries Act of 1972,⁶⁹ EPA has authority to issue permits for the transportation of all materials (except dredged material, which is the jurisdiction of the Secretary of the Army) for the purpose of dumping them in the territorial waters of the United States.⁷⁰ Dumping of HL waste is specifically prohibited,⁷¹ but the dumping of TRU waste is not. (The U.S. government has nonetheless enforced a moratorium on TRU waste dumping since 1970).⁷² Neither EPA nor ERDA has yet publicly interpreted "dumping" to include the deep seabed emplacement option, but the agency staffs are now reconsidering the matter. EPA has claimed that it does have licensing jurisdiction over such action.⁷³ Both the meaning of dumping and EPA's assertion of jurisdiction are subject to dispute, and may

require Congressional or judicial clarification.

As a brief digression at this point, it is worth mentioning that EPA has parallel authority to control fresh water pollution through a different permit-issuing program under the Federal Water Pollution Control Amendments of 1972.⁷⁴ HL waste "discharge" is prohibited.⁷⁵ No one of course contemplates using U.S. fresh waters for post-fission waste disposal purposes, but the prevention of radionuclide migration from temporary storage facilities or permanent repositories to aquifers is one of the primary technological goals of radioactive waste management. EPA has not, however, demonstrated any intention to license radioactive waste facilities on land. It has in fact maintained that NRC and ERDA have sole jurisdiction over discharges of source, by-product, and special nuclear materials, a position recently affirmed by the Supreme Court.⁷⁶ It is not clear what effect, if any, this decision will have on EPA's claim for permit-issuing power over possible ERDA deep seabed emplacement, where again only source, by-product, and special nuclear materials are present.

Internationally, the U.S. is a party to a number of multilateral agreements relating to U.S. radioactive waste policy. Two have major significance. The 1958 United Nations Law of the Sea Convention on the High Seas,⁷⁷ applying to all parts of the sea not included in the territorial waters of a nation, provides the foundation for modern international attempts to protect the maritime environment. The High Seas convention makes it the general duty of nations to exercise "reasonable regard to the interests of other states in their exercise of the freedom of the high seas."⁷⁸ Three more specific obligations apply directly to the problem of marine

pollution: 1) nations are to promulgate their own regulations so as to prevent pollution "from the exploitation and exploration of the seabed and its subsoil";⁷⁹ 2) "taking into account" any international regulations, nations "shall take measures to prevent pollution of the seas from the dumping of radioactive waste";⁸⁰ and 3) nations have a duty to "cooperate with the competent international organizations [here, the IAEA] in taking measures for the prevention of pollution of the seas or air space above."⁸¹ These High Seas Convention obligations are by no means stringent. Obviously, the U.S. and other nations can choose to interpret the "reasonable regard" standard strictly or loosely and then behave accordingly. The requirements to take into account international regulations and to cooperate with IAEA, however, imply at least consultation with IAEA prior to implementing deep seabed emplacement of HL waste. (Ocean dumping of TRU waste is apparently not considered an acceptable U.S. option, although other nations are continuing to dump low-level waste and it is not clear whether some of this waste is TRU contaminated.)

In 1975 the London Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter⁸² entered into force. It prohibits, except in the case of emergencies at sea and other emergencies for which no other solution is feasible, "dumping" of HL waste at sea.⁸³ An appropriate national authority is required to monitor ocean dumping of low-level radioactive waste; reports on each dump must be made to it.⁸⁴ Regional cooperation is encouraged, but enforcement is specifically a national matter.⁸⁵ The "emergency" exceptions have been criticized as possibly allowing parties a means of exempting themselves from the dumping prohibition. While the parties probably did not intend "dumping" to include deep seabed

emplacement, the issue is not closed due to subsequent treaty interpretations.

The United States is also a party to the 1959 Antarctic Treaty,⁸⁶ which specifically prohibits the "disposal" of radioactive waste in Antarctica.⁸⁷ Each of the parties is entitled to designate observers, who have complete freedom of access at all times subject only to the jurisdiction of their nation, to monitor compliance with this ban.⁸⁸ The parties further agree "to exert appropriate efforts, consistent with the Charter of the United Nations," to insure that no one engages in radioactive waste disposal in the Antarctic.⁸⁹ Hence, international treaty law clearly prohibits use of the Antarctic ice sheet as a permanent repository for HL waste to parties to the Treaty. However, the existing treaty expires in 1989⁹⁰ and, the ice sheet disposal option will probably be considered in negotiating any extension.

The outcome of the current Law of the Sea Conference may also affect the prospects for seabed disposal. The Informal Single Negotiating Text, which is the basis of the negotiations, contains provisions which would clarify and reinforce existing international legal norms affecting marine pollution generally. The Text would establish an International Seabed Authority to regulate development of seabed resources. Although primarily concerned with resource development, the competence of the Authority would seem necessarily to extend to seabed disposal of radioactive waste, at least to the extent of assuring non-interference of any proposed disposal activity with existing or possible future seabed resources exploration, development or production activity.

Finally, other governments may specially object to any U.S. disposal of radioactive waste of military origin in an area beyond its national jurisdiction. The motive for such an objection may be general concern with the impact on the environment or political concern with the military origin of the waste involved.⁹¹

Research and Development

The Energy Reorganization Act left ERDA with principal research and development authority for military and commercial radioactive waste technology.⁹² NRC and EPA conduct essentially confirmatory research and studies aimed at improving the quality of their regulations. NRC recognizes ERDA's broader research capabilities and must necessarily rely on much of the data furnished by ERDA without confirmation. Such a separation is important so that NRC, as an independent regulatory agency, does not find itself in a position where it is being asked to license technology it developed itself.⁹³

ERDA's Fiscal Year 1977 budget reflects the dramatically growing Congressional concern over finding technological answers for radioactive waste management problems. The combined military and commercial programs have received a three-fold increase in funds from approximately \$30 million to about \$90 million.⁹⁴ Commercial waste programs within this budget have been expanded by a factor of five, from about \$12 million to over \$60 million.⁹⁵ ERDA summarizes the priorities in its budget as follows:

The ERDA FY 1977 commercial waste budget is keyed to providing input for decisions on reprocessing, waste forms and storage modes for high-level radioactive waste. The selection of specific sites and development of repositories for terminal storage is considered the major item in a greatly expanded ERDA Fiscal Year 1977 waste budget. For earlier necessary or desirable

waste management activities, technology is either in use or considered well developed, i.e. the basic technical principles are clearly understood and data needed for design are available. Efforts to reduce these principles to practice, especially in high-level liquid waste solidification, are also the subject of expansion in the FY 1977 budget. All of the foregoing effort has been keyed to the expected needs of the nuclear fuel cycle industry.⁹⁶

ERDA, then, plays the role of principal researcher, in addition to its roles as major manager, and self-regulator of most of its own management activities. Since "research and development" in the Atomic Energy Act includes demonstration projects,⁹⁷ ERDA also has the authority to demonstrate the feasibility of ultimate deep geologic disposal (the present favored technology). ERDA decisions made in these four areas seem insulated from NRC regulatory control. Yet they profoundly affect the direction of the national waste management effort and policy-making in this area.

Implementation

The Federal Energy Resources Council, in cooperation with several agencies, including the nuclear ones, recently issued a status report on waste management, in which it listed four requirements for proper implementation:

- The thorough reviews mandated by the National Environmental Policy Act.
- The promulgation and satisfactory compliance with generally applicable environmental standards and criteria issued by the Environmental Protection Agency.
- Compliance with licensing criteria and requirements of the Nuclear Regulatory Commission.
- Opportunities for full public participation.⁹⁸

The National Environmental Policy Act⁹⁹ (NEPA) is an omnipresent federal policy-making mechanism. It requires every federal

agency to prepare an Environmental Impact Statement (EIS) in connection with" . . . every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment. . . ."100 Each EIS must contain ". . . a detailed statement by the responsible officials on--

- (i) the environmental impact of the proposed action,
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
- (iii) alternatives to the proposed action,
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented."101

It must be prepared in consultation with and must include the comments of ". . . any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved."

NEPA does not require agency rectification of environmental harm from a proposed project. But any EIS not prepared in accordance with the above requirements may be deemed "inadequate" by a court. An agency may then be required to draft a new EIS. EIS's, when published, become part of the public record. EPA, sometimes in conjunction with the Council on Environmental Quality, reviews and comments on all EIS's.¹⁰² Public sentiment and/or EPA ratings can be important factors in Congressional decisions to fund agency proposals or in court hearings on whether or not to enjoin agency actions.

All operations in the back of the nuclear fuel cycle which are federally licensed or contracted for constitute "Federal actions,"

as does the promulgation of regulations designed to control these operations. The question of which contemplated actions are "major" and likely to "significantly" affect the environment are more complicated. But it is clear that, prior to implementation, ERDA and NRC must prepare "generic" EIS's for their respective management and regulatory programs in regard to radioactive waste.

ERDA's present time schedule for implementing commercial waste management technologies assumes that commercial reprocessing may start as early as late 1977. In addition,

--[T]he ERDA waste management program is currently directed at meeting the following targets: high level waste solidification technology available for startup of the commercial plants in 1983; at least one terminal storage plant ready to receive waste beginning in 1985; technology for handling other wastes from the back end of the fuel cycle available for industrial adoption by 1979; and, finally, technology available by 1984 for package transporting and handling spent fuel, in the event it is later determined not to re-process or otherwise recycle plutonium and/or uranium.¹⁰³

The above schedule allows 6 years, rather than 5, for solidification. Thus, either an adjustment in ERDA's schedule or a revision of NRC regulations is necessary. The ERDA schedule is keyed to a NRC decision on plutonium recycle in 1977.¹⁰⁴

To meet the schedule, NRC must complete its Generic Environmental Impact Statement on the Use of Recycle Plutonium in Mixed-Oxide Fuel in LWR's (GESMO), complete an extensive public hearing on the subject, and issue final regulations governing the licensing of commercial reprocessing plants. The health, safety, and environment section of GESMO was scheduled for completion on August 30 of this year. The safeguards supplement should be issued within a few months. The current GESMO schedule has thus already slipped several months behind what was originally proposed.

ERDA's EIS on commercial HL waste management is to follow GESMO. Completion of a draft for public comment is currently set for the spring of 1977, but there may well be some slippage in this schedule.

Federal decision-making concerning reprocessing and recycling suffered a recent setback in NRDC v. NRC.¹⁰⁵ In that case, the Second Circuit Court of Appeals set aside an NRC order allowing construction and other preparatory work to begin on a New York mixed-oxide fuel fabrication plant. The court noted that NRC had adopted an interim licensing procedure to maintain commercial momentum in recycling while its GESMO was incomplete. This procedure, it found, failed to satisfy NEPA, specifically because of the inadequate treatment of alternatives to plutonium recycle and of hazards of theft, diversion, and sabotage.¹⁰⁶

There is a further criticism of GESMO and the issues as presently framed in the NRC plutonium recycle decisional process: the GESMO will not fully discuss environmental impacts since it will not itself include a complete discussion of how the radioactive waste from recycling operations will be safely managed.¹⁰⁷ Nor are the radioactive waste EIS's now under preparation to be considered along with GESMO in the commercial reprocessing decisional process.

Other legal developments during the summer of 1976 have made radioactive waste an important unresolved issue in the commercial power reactor licensing process. In July the D.C. Circuit Court of Appeals ordered NRC to reconsider the Vermont Yankee reactor operating license and the procedure used to issue the license.¹⁰⁸ NRC's generic approach to evaluating radioactive waste hazards for individual reactors was held to be ineffective, "incremental decisionmaking" precluded by NEPA; and NRC's calculation of waste

hazards as "insignificant" in reactor operations was termed "arbitrary and capricious," because its procedures for so determining were insufficient and because it had not provided any support for such an evaluation.¹⁰⁹

On the same day, the D.C. Circuit Court of Appeals ruled that the Commission must undertake "consideration of waste disposal and other unaddressed fuel cycle issues, and restrike the cost-benefit analysis" in the reactor licensing proceedings for the Consumers Power Midland Plant in Michigan.¹¹⁰ The primary holding of this case required the inclusion in the licensing proceedings of energy conservation as an alternative to the proposed construction of a new power plant. The court required the NRC to take the initiative in analyzing these subjects rather than passively reacting to the issues when they are raised by intervenors in licensing proceedings.

The Natural Resources Defense Council (NRDC) then filed a petition with the NRC requesting the adoption of rules for the implementation of the Vermont Yankee and Midland decisions.¹¹¹ On August 16, in response to the petition, the NRC reopened the rulemaking proceeding on the Environmental Effect of the Uranium Fuel Cycle.¹¹² It suspended issuance of any new full-power operating licenses, construction permits, or limited work authorizations at least until the promulgation of an interim rule on the matter. The earliest possible date of such promulgation was cited as December, 1976. In short, a national moratorium on nuclear power growth is in effect.

By about September 30 NRC plans to have completed a new environmental survey on the probable contributions to the aggregate

environmental effects of a nuclear power reactor that are attributable to the reprocessing and waste management stages of the fuel cycle. It remains to be seen exactly what sort of consideration of the reprocessing and waste management issues at the reactor licensing stage will be deemed adequate and not "incremental."

ERDA has said very little to date about implementation schedules for management of ERDA's military waste. (Congressional hearings are scheduled for later this year on the subject.)¹¹³ NRDC petitioned NRC in July, 1975 to license ERDA's proposed construction of several new HL waste storage tanks at Hanford and Savannah River and a calcined solids storage facility at Idaho Falls.¹¹⁴ NRC denied this petition, taking the position that it had no statutory authority to license these facilities since they were not intended for long-term storage. ERDA has denied the legal necessity of preparing an EIS on these facilities on the grounds that they do not constitute major federal actions within the meaning of NEPA. It claims that its consideration of these new facilities in its reports on waste operations at these three sites is enough.

The NRDC has recently petitioned NRC to adopt interim regulations governing disposal of low-level radioactive waste (including TRU waste) and to prepare a programmatic EIS on this aspect of waste management.¹¹⁵ NRC has not yet issued a disposition of this petition. NRC's waste classification effort could conceivably redefine HL waste to include some or all TRU waste. In any case, NRC promulgation of the 1974 AEC proposed TRU waste regulation must await action on the above petition.

On the horizon is the EIS which will be necessary for the planned pilot federal HL waste repository. ERDA intends to incorporate

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this demonstration in its programmatic statement on commercial HL waste management. Nevertheless, as discussed above, ERDA seems to be planning to use HL waste from non-commercial sources in its demonstrations, thereby avoiding the necessity of NRC licensing of such demonstrations.

A reconsideration of the "demonstration" value of pilot plants for permanent repositories, mentioned above, might be used to accelerate implementation. Basically, an elimination of some "demonstration" time could reduce the time required for implementation of a full-scale repository.

Important events on the federal implementation of a radioactive waste management program are set forth in the Energy Resources Council status report, included as Appendix A to this chapter. It is important to note, however, that the schedule of dates now appears unrealistically optimistic.

Conclusions

The U.S. inventory of radioactive waste has two sources -- commercial and military nuclear activities. Though military wastes presently comprise by far the greatest proportion of the most toxic waste, the future management challenges are comparable in their overall importance, though the difficulties differ somewhat.

1. In their statements of basic policy goals, federal officials have thus far adopted a primarily technological perspective. "Safe management" has essentially meant "isolation and containment." More recently, policy makers have mentioned, however tangentially, other factors such as risk/cost analysis, institutional stability, public confidence, consolidation of management responsibilities, and inter-agency and international coordination. NRC is leading the

effort to reformulate goals to embrace non-technological as well as technological criteria.

2. The present institutional organization for achieving radioactive waste policy goals has basically three functions: management, regulation, and research and development. Overall management responsibility is divided between the private industry (licensees of NRC and/or of Agreement States) and the federal government (ERDA and its contractors). Commercial HL waste is to be managed in the short-term by licensees and in the long-term by ERDA. Military HL waste is solely a federal responsibility; ERDA manages plutonium production facilities that create HL waste, and DOD is responsible for managing spent fuel elements from naval propulsion programs until they are turned over to ERDA. Commercial TRU waste is presently managed by licensees in the short- and long-term. NRC has proposed regulations, however, that will shift long-term management responsibility to ERDA. Present military TRU waste is managed solely by the federal government, primarily by ERDA.

3. Within the federal government, the landscape of regulatory authority appears rather cluttered. It is composed mainly of NRC and ERDA, but other federal agencies, state governments, and international bodies also have regulatory claims, though some are of uncertain legitimacy or reach. Primary authority for setting criteria or standards for management operations rests with NRC and ERDA in their respective areas of regulatory responsibility. EPA intrudes on this scene, however, with its authority to set generally applicable environmental standards for radiation exposure and to give guidance to all federal agencies in the formulation of radiation standards.

The heart of regulatory activity in waste management is the licensing/approval function. Responsibility for licensing commercial HL waste operations rests solely with NRC. This authority appears to cover, indirectly, any ERDA research and development storage facility that receives commercial HL waste.

Military HL waste management is approved in the short-term by ERDA, which conducts its monitoring and enforcement activities through contractual, rather than regulatory mechanisms. For the long-term, NRC has licensing authority encompassing military HL waste storage facilities not used for research and development, excluding ERDA facilities existing at the time the Energy Reorganization Act of 1974 became effective. Thus ERDA retains regulatory authority over its then-existing facilities despite the continued absence of plans to transfer the military HL waste solidified in place at Hanford and Savannah River to ERDA planned, NRC-regulated permanent repositories.

Also, ERDA approves its own site selection, construction and operation of research and development storage facilities; yet here the strong possibility exists that ERDA will ultimately designate some of these sites as successfully-demonstrated final repositories and will then submit them to NRC for licensing, thereby avoiding any timely NRC control over site selection and pre-construction design.

Regulatory authority over commercial TRU waste is exercised by NRC or delegated, wholly or in part, by NRC to Agreement States. The present scheme would be altered, however, by proposed NRC regulations requiring all short-term managers to transfer their TRU waste

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to ERDA for long-term management; ERDA or NRC (it is not clear which) would then acquire long-term regulatory authority. If these regulations are adopted, NRC could, if it desired, implement a short-term regulatory strategy which might effectively give it control over long-term regulation. Such a strategy, however, would not infringe upon ERDA's current regulatory jurisdiction over military TRU waste, where ERDA has undisputed short- and long-term authority.

Overlapping the regulatory authorities of NRC and ERDA is DOT's responsibility to insure the safe transport in commerce of hazardous radioactive materials. Cooperative arrangements between DOT and AEC (applicable now to both ERDA and NRC) divide responsibilities for establishing criteria for packaging and handling waste and allot sole responsibility for licensing of waste transport to the nuclear agencies, who agree to enforce their respective standards and applicable DOT ones as well.

4. The states' authority to regulate waste management operations is basically preempted by the federal government. Though challenges are continuing, the existing law is that states may only regulate non-radiological aspects in a way that does not unduly interfere with federal promotion and regulation of nuclear energy. Political pressures from concerned states can, however, be quite effective in altering the federal government's behavior, and there is ample room for state (and citizen) participation in federal decisional processes.

5. Ocean use options involve additional national and international environmental institutions. Nationally, EPA has permitting authority for ocean dumping of TRU waste, though the U.S.

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does not currently employ such an option. Dumping of HL waste is prohibited, though probably this would not include deep seabed emplacement. EPA has also claimed permit-issuing authority over any deep seabed waste emplacement. Internationally, formal agreements to which the U.S. is a party place no unreasonable constraints upon U.S. radioactive waste decisions, but they do require a balancing of other nations' interests. High-level waste "dumping" is prohibited (with "emergency" exceptions), though here again it is doubtful that the term includes deep seabed emplacement. No effective international monitoring or enforcement institution currently exists. The outcome of the Law of the Sea Conference, which is presently unclear, must be taken into account if the U.S. government decides to pursue any of the "ocean options" for radioactive waste disposal. Finally, Antarctica is legally off-limits for any type of radioactive waste disposal.

6. ERDA dominates waste management research and development. NRC and EPA contribute mainly confirmatory research in areas of particular regulatory interest. ERDA thus occupies the dual position of chief researcher and major manager of high- and low-level waste (as well as that of self-regulator of much of its own management activities). A potential problem with such an institutional arrangement is that the managers within ERDA may find themselves forced into management strategies dictated by their research counterparts, instead of being able to direct research efforts according to the necessities of waste management operations.

7. The schedule for implementing current radioactive waste policy goals seems unrealistically rapid. The existing decoupling of NEPA reviews of commercial reprocessing and commercial waste

operations seems unwise as an approach to the strategic decisions involved in post-fission fuel cycle management. If maintained, the decoupling of two such important and strongly interrelated subjects as commercial plutonium management and commercial waste management may prevent a decisional process in which the relevant benefits, costs and risks are comprehensively assessed. Fragmentation of the decisional process regarding post-fission nuclear fuel cycle management may well fall short of NEPA requirements, and hence be vulnerable to legal challenge.

* * *

Existing institutional arrangements for management and regulation of radioactive waste are inadequate for the future.

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APPENDIX A

(Excerpt from Federal Energy Resources Council Status Report on the Management of Commercial Radioactive Nuclear Wastes, May 10, 1976)

- The timetable for major events in the management of commercial radioactive wastes including actions already taken:

1976

- ERDA announced an expanded program to develop Federal repositories in deep geologic formations for terminal storage of radioactive waste.
- ERDA identified candidate high-level waste solid forms for terminal storage.
- President's FY '77 Budget requested, and the Joint Committee on Atomic Energy has approved, funds to accelerate programs for:
 - selection of sites and construction of storage facilities, and
 - development of selected commercial scale solidification process technology and process designs
- ERDA established a terminal storage facility program management office at Oak Ridge, Tennessee.
- ERDA has issued for public review the Technical Alternatives Document.

- NRC will circulate preliminary revised waste form and packaging regulations for comment.
- EPA/NRC, with the assistance of USGS, will evaluate commercial low-level waste land burial sites and will determine criteria on radioactivity levels for wastes to be delivered to each site.
- ERDA will issue a draft generic environmental impact statement on reprocessing.

1977

- ERDA will issue a draft generic environmental impact statement on the management of commercial radioactive wastes for public review and comments.
- EPA will determine general performance criteria for establishment of new low-level waste land burial sites.
- NRC will publish an environmental impact statement for revised waste management regulation.
- ERDA will publish a final environmental impact statement on reprocessing and announce a decision thereon.
- NRC will announce its decision on plutonium recycle.

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- ERDA will publish a final generic environmental impact statement on management of commercial radioactive wastes.

1978

- NRC will publish final regulations for waste form and packaging criteria.
- ERDA will announce a decision on waste forms, storage modes, and packaging criteria to be used as basis for designing terminal storage facility.
- EPA will establish general environmental standards applicable to high-level waste management.
- ERDA will select site(s) for the underground excavation phase of the radioactive waste geologic program. (This action will be subject to the appropriate site-specific environmental impact statement.)
- NRC will establish criteria for long-term care for new low-level waste burial sites.

1979

- NRC will establish site selection criteria for new low-level burial grounds.

1985

- ERDA will start receiving solidified waste in pilot plant operations in a geologic terminal storage facility.

- The dates shown for major regulatory actions are estimates provided by the NRC. The NRC, an independent regulatory agency, points out that these dates cannot be predicted with certainty. Based on experience with regulatory process lead time, however, the time allowed in the program should prove sufficient to allow for full decision-making processes, including public participation.

Waste Type - Source	MAJOR REGULATIONS ESTABLISHED BY NRC			Det'd Reg. Criteria Estab. by NRC
	Industry (or ERDA) Strategy Estab.	Waste Producing Facilities	Offsite Storage/Disp.	
HLW				
- Commercial	YES	YES (d)	YES	PART
- ERDA	PART	---	(YES)	NO
Hi-γ TRU				
- Commercial	NO (in PREP.)	YES	YES (a)	NO (a)
- ERDA	PART	---	(YES)	NO
Lo-γ TRU				
- Commercial	PART	YES	YES (a)	PART (a)(e)
- ERDA	PART	---	(YES)	NO
LLW (non-TRU)				
- Commercial	YES	YES	YES (b)	PART (e)
- ERDA	YES	---	(YES)	NO
Gases				
- Commercial	NO	YES	YES	NO
Mill Tailings	NO (or PART)	YES	NO (c)	PART
Decom Facilities				
- Commercial	NO (or PART)	YES	YES	PART
- ERDA	NO (or PART)	---	---	---

a. Proposed regulation on TRU gives ERDA possession; licensing by NRC was not made specific in the Energy Reorganization Act.

b. Shared with Agreement States

c. Based on previous legal interpretations of definitions of source and byproduct materials.

d. Except specific licensed ERDA facilities.

e. Shared with EPA.

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Footnotes to Chapter 4

1. Hearings on Radioactive Waste Management Before the Subcomm. on Environment and Safety of the Joint Comm. on Atomic Energy, 94th Cong., 2d Sess., vol. 3, 74 (1976) (stenographic transcripts); hereinafter cited as "May hearings."

2. Hearings on Storage and Disposal of Radioactive Waste Before the Joint Comm. on Atomic Energy, 94th Cong., 1st Sess. 18 (1975); hereinafter cited as "November hearings."

3. Address by Dr. Carl W. Kuhlman, Assistant Director for Waste Management, Division of Nuclear Fuel Cycle and Production, ERDA, Atomic Industrial Forum Uranium/Nuclear Fuel Conference, Mar. 21-24, 1976.

4. May hearings, vol. 1, 34.

5. Memorandum from Kenneth Chapman, Director Office of Nuclear Materials Safety and Safeguards for the NRC Commissioners, "Status Report--Waste Management Program," April 22, 1976, 6.

6. Id. at 3, 4.

7. Atomic Energy Act of 1954, 42 U.S.C. §§ 2011-2296 (1970).

8. Energy Reorganization Act of 1974, 42 U.S.C. §§ 5801-5891 (Supp. IV, 1974).

9. See text accompanying fn. 35.

10. 10 C.F.R. § 50 APP. F2. (1971) (policy relating to the siting of fuel reprocessing plants and related waste management facilities).

11. ERDA manufactures the nuclear explosive components of nuclear weapons, which DOD then assembles.

12. 39 Fed. Reg. 32921 (1974).
13. Hearings on Low-Level Radioactive Waste Disposal Before a Subcomm. of the House Comm. on Government Operations, 94th Cong., 2d Sess., 209 (1976); hereinafter cited as "March hearings."
14. Interview with Robert Will, Director, Division of Radiation Control, State of Washington, in Olympia, Wa., July 20, 1976.
15. 42 U.S.C. §§ 2073, 2093, 2095, 2111, 2133, 2134, 2201 (1970).
16. Ibid; 42 U.S.C. §§ 5814(c), 5841(f) (Supp. IV, 1974).
17. 42 U.S.C. § 2021(h) (1970); transferred by Reorganization Plan No. 3 of 1970 § 2(7), 42 U.S.C. § 4321 (1970).
18. Reorganization Plan No. 3 of 1970 § 2(6), 42 U.S.C. § 4321 (1970).
19. Address by William Rowe, EPA, at International Symposium on the Management of Wastes from the LWR Fuel Cycle, Denver, Colo., July 12, 1976.
20. 10 C.F.R. 50 App. F3 (1971).
21. 10 C.F.R. § 20.302(a) (1971).
22. 10 C.F.R. § 20.302(b) (1971).
23. 10 C.F.R. 50 App. F1 (1971).
24. See fn. 12.
25. 42 U.S.C. 5842(3) (Supp. IV, 1974).
26. Interview with Alex Perge, Office of Waste Management, Division of Nuclear Fuel Cycle, ERDA, in Germantown, Md., June 28, 1976.
27. ERDA Manual Chapter 0511.

28. ERDA Manual Chapter 0524.
29. ERDA Manual Appendix 0502.
30. 42 U.S.C. § 2140 (1970).
31. 42 U.S.C. § 5842(4) (Supp. IV, 1974).
32. Brief for National Resources Defense Council, Inc. Before ERDA in re [NRC] Licensing of ERDA's Projects... (July 28, 1975).
33. See, e.g., Brief for NRDC... (July 28, 1975).
34. See p. 3-30.
35. 42 U.S.C. § 2021 (1970).
36. 42 U.S.C. § 2021(j) (1970).
37. March hearings, 206-7.
38. 42 U.S.C. § 5842(4) (Supp. IV, 1974).
39. From discussions with NRC personnel.
40. Interview with Richard Cunningham, NRC, in Bethesda, Md., June 1976.
41. Appendix F of 10 C.F.R. 50, which defines HL waste, was adopted in 1971; the Energy Reorganization Act was passed in 1974.
42. See p. 3-38.
43. U.S. NRC Release No. 76-98, April 23, 1976, 2, 3.
44. 18 U.S.C. §§ 831-5 (1970), 49 U.S.C. 1655(e)(4) (Supp. V, 1975); 46 U.S.C. § 170 (1970), 49 U.S.C. 1655(b) (Supp. V, 1975); 49 U.S.C. §§ 1421-1430 and 1472(h) (1970), 49 U.S.C. 1655(c) and (d) (Supp. V, 1975); 49 U.S.C. 1801-1812 (Supp. V, 1975).
45. Memorandum of Understanding between DOT and AEC, 38 Fed. Reg. 10437 (1973).

46. Ibid.
47. 10 C.F.R. part 71.
48. 10 C.F.R. § 71.12 (1975).
49. See text accompanying fn. 16.
50. From discussions with NRC personnel.
51. Address by D.A. Nussbaumer, NRC, Denver Symposium, July 14, 1976.
52. 42 U.S.C. §§ 2201(b), (c), (o), 2271-2282 (1970).
53. See, e.g., 10 C.F.R. §§ 30-52, 40.62, 70.55, 10 C.F.R. §§ 19.30, 20.601, 30.61-30.63, 40.71, 40.81, 55.50.
54. ERDA Procurement Instructions Subpart 9-7.50, 9-7.5004-12.
55. See fn. 37, particularly 18 U.S.C. § 835 (1970) and 49 U.S.C. 1808-1810 (Supp. V, 1975).
56. 46 U.S.C. § 170 (1970).
57. 46 C.F.R. § 146.02-8(b) (1973).
58. California Assembly Bill No. 2822, June 3, 1976.
59. Letter from Governor William G. Milliken to Robert C. Seamans, Administrator, ERDA, July 8, 1976.
60. Conn. Public Act No. 76-321 (2 Nuc. Reg. Rep. ¶ 20,031 (June 18, 1976)); see also Miss. Laws of 1976 Chapter 469 (2 Nuc. Reg. Rep. Report Letter No. 52 (July 23, 1976)).
61. U.S. Const. art. I, § 8, cl. 3.
62. U.S. Const. art. VI, cl. 2.
63. See 42 U.S.C. § 2021(k) (1970); see generally Hearings on Federal-State Relationships in the Atomic Energy Field Before the Joint Comm. on Atomic Energy, 86th Cong., 1st Sess. (1959).
64. 447 F.2d 1143 (8th Cir. 1971), aff'd without opinion,

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Dumping of Wastes and Other Matter, Dec. 29, 1972 (1975), T.I.A.S. No. 8165; for text see 11 I.L.M. 1291 (1972).

83. Convention on the Prevention of Marine Pollution, art. IV, para. 1.

84. Convention on the Prevention of Marine Pollution, art. VI.

85. Convention on the Prevention of Marine Pollution, art. VII.

86. Antarctic Treaty, Dec. 1, 1959 (1961), 1 U.S.T. 794, T.I.A.S. No. 4780, 402 U.N.T.S. 71.

87. Antarctic Treaty, art. V.

88. Antarctic Treaty, art. VII.

89. Antarctic Treaty, art. X.

90. Antarctic Treaty, art. XII.

91. See generally D. Deese, Law of the Sea and High Level Radioactive Waste Disposal: A Potential Geologic Option Under the Deep Seabed? March, 1976 (unpublished thesis for Fletcher School of Law and Diplomacy, Tufts University).

92. 42 U.S.C. §§ 5814(c), 5813(1) (Supp. IV, 1974); see also November hearings 27, 31.

93. See S. Rep. No. 1252, 93d Cong., 2d Sess. 34-5 (1974).

94. Address by Dr. Carl W. Kuhlman, Assistant Director for Waste Management, Division of Nuclear Fuel Cycle and Production, ERDA, Denver Symposium, July 13, 1976.

95. Ibid.

96. ERDA Program Implementation Document, ERDA's Program for Management of Radioactive Waste from Commercial Nuclear Power Reactors, summary at 16 (1976).

405 U.S. 1035 (1972).

65. See N. Calif. Ass'n to Preserve Bodega Head and Harbor, Inc. v. Pub. Util. Comm'n, 61 Cal.2d 126, 390 P.2d 200, 37 Cal. Rptr. 432 (1964).

66. See fn. 20 and accompanying text.

67. This project involves the development of an extremely low frequency (ELF) communications system designed to provide military communications for U.S. Strategic Forces, particularly submarines.

68. See T. Lash, J. Bryson, and R. Cotton, Citizens' Guide: The National Debate on the Handling of Radioactive Wastes from Nuclear Power Plants 34-41 (2d printing 1975).

69. 33 U.S.C. §§ 1401-1444 (Supp. V, 1975).

70. 33 U.S.C. § 1412.

71. Ibid.

72. November hearings, 49.

73. May hearings, vol. 3, 74.

74. 33 U.S.C. §§ 1251-1376 (Supp. V, 1975).

75. 33 U.S.C. § 1311(f).

76. Train v. Colorado Public Interest Group, 44 U.S.L.W. 4717 (U.S. June 1, 1976).

77. Convention on the High Seas, April 19, 1958 (1962), 2 U.S.T. 2312, T.I.A.S. No. 5200, 450 U.N.T.S. 82.

78. Convention on the High Seas, art. II.

79. Convention on the High Seas, art. XXIV.

80. Convention on the High Seas, art. XXV, para. 1.

81. Convention on the High Seas, para. 2.

82. Convention on the Prevention of Marine Pollution by

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97. 42 U.S.C. § 2014(x) (1970).
98. Federal Energy Resources Council, Status Report on the Management of Commercial Radioactive Nuclear Wastes, (1976).
99. National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321-4347 (1970).
100. NEPA, § 4332(c).
101. Ibid.
102. 42 U.S.C. § 1857h-7 (1970); 42 U.S.C. § 4344(3) (1970).
103. May hearings, vol. 2, 3-4.
104. See App. A, p. 4-34.
105. Natural Resources Defense Council, Inc. v. NRC, Nos. 75-4276 and 75-4278 (2d Cir., May 26, 1976).
106. Ibid.
107. AEC, Draft Generic Environmental Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in LWR's (GESMO), 1974.
108. Natural Resources Defense Council v. NRC, Nos. 74-1385 and 74 1586 (D.C. Cir., July 21, 1976).
109. Ibid.
110. Aeschliman v. NRC, Nos. 73-1776 and 73-1867 (D.C. Cir. July 21, 1976).
111. See Federal Register, August 16, 1976, 34710.
112. Id. at 34707.
113. May hearings, vol. 3, 93.
114. Brief for NRDC ... (July 28, 1975).
115. See Memorandum of Points and Authorities in Support of NRDC's Petition for Rulemaking and Request for a Programmatic Environmental Impact Statement Regarding NRC Licensing of Disposal of Low-Level Radioactive Wastes (August 10, 1976).