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Technical and Legal Considerations Immanent in the Disposal of Commercial Nuclear Waste

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TECHNICAL AND LEGAL CONSIDERATIONS
IMMANENT IN THE DISPOSAL OF
COMMERCIAL NUCLEAR WASTE

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PREFACE

There is, currently, a flurry of activity as the present Administration, along with the United States Department of Energy and the United States Nuclear Regulatory Commission, struggles to develop a comprehensive national program for the management and disposal of radioactive wastes. That such a program has been long overdue in its birthing reflects ill upon the federal government; the seriousness of this shortcoming is only compounded by the wide range of technical, environmental, and socio-political problems besetting the issue of disposal. Because of these problems, the emerging program should be closely monitored by the individual states, particularly those states within whose boundaries a nuclear waste repository might be sited. If the waste management program is to be truly national in its scope, then no state should be precluded from having an effective voice in the development of the program.

This, then, is the subject of this paper. The first section of the paper deals with some of the inherent technical issues. This includes a review of the origin of nuclear wastes; the hazards of the wastes, including impacts upon the biological environment; and the extent of the state of the art for disposing of such wastes. The second section is an attempt to review the scope of the federal program, from its genesis to its uncertain future. Although the commercial use of nuclear material was first permitted in the 1950's, it was not until the 1970's that an attempt was made to statutorily clarify which federal agency was responsible for the ever-increasing stockpile of nuclear waste; and it has only been in recent years that a comprehensive program has been conceived. Thus, review of a limited and inconsistent federal program of past years is followed by
an examination of the present embryonic program. This is then succeeded by a discussion of the role of individual states as godparents to the federal program.

However, the extent to which an individual state has a voice in the program is affected by complex legal considerations. It is the contention of the federal government that a state may contribute a voice only when permitted to do so. An attempt is made to outline the basis for this federal assertion, first, through a general decision of the degree to which a federal law may supercede the rights of a state (the preemption doctrine); then, a review of litigation and its impact upon the state role is made. Finally, although the general consensus of judicial opinion seems to be adverse to a state's desire to assert some authority in the area, suggestions are advanced as to possible legal tools whereby the state might exert itself.

Additionally, there may be other means of which a state might avail itself: the development of administrative law is not without its benefits. Hence, a section of the paper addresses some of the procedural devices available to a state. The first of these arises as a result of the mandated preparation of an environmental impact statement by involved federal agencies. The state may either try to affect the process during the preparation of the statement, or subsequently, challenge the adequacy (thoroughness) of the document. Additionally, it is suggested that if a state possesses a sound basis for contesting the siting of a nuclear waste repository within its boundaries, it may wish to present this evidence to interested federal agencies prior to an administrative commitment being made to a particular site.
The paper is, thus, a synopsis of some of the myriad issues implicit in the management of nuclear wastes. It relies extensively upon the many examinations which have been made of varied aspects of the topic; a review of authorities cited within the paper provides but a brief glimpse of the abundance of such literature. Finally, it should be noted that, where feasible, discussion is made with reference to a particular state -- Louisiana -- as areas within that state have received considerable attention from the federal government as a prime candidate for a nuclear waste disposal site.
I. Technical Issues Immanent in the Management of Commercial Nuclear Waste

A. Introduction

Due to the ever increasing uncertainties of the world fossil fuel supply, it appears that this country will continue to rely upon nuclear power to satisfy its energy appetite. As with all sources of energy utilized by the modern world, nuclear energy generates more than power, it also generates environmental problems. Yet, if nuclear energy is to be a politically acceptable source, now is the time for governmental institutions to begin to resolve some of the serious and complex problems raised by the nuclear process. In particular, the problem of what to do with the highly toxic radioactive wastes created by nuclear power is one of the most important issues yet to be resolved in planning for the future development of nuclear power.

Radioactive wastes are generated from a wide variety of activities including research investigations, medical diagnostics and therapy, mining of uranium ore, defense-related nuclear activities, and the operation of commercial nuclear power plants. During the last thirty years, defense-related nuclear activities produced most of the radioactive wastes in terms of volume and radioactivity. However, now and as projected for the future, the radioactive waste generation rate of the defense-related programs is about constant and small in relation to that of nuclear power plants. The commercial nuclear power industry has grown tremendously since the 1960's and, as a result, has now generated more radioactive waste (measured in terms of cumulative radioactivity) than past defense-related activities and can be expected to grow in accord with the federal government's encouragement of such development.
B. Nature of Nuclear Wastes

Radioactive wastes are produced at several points in the nuclear fuel cycle; during the milling of uranium ore, the operation of nuclear power plants, the reprocessing of spent fuel, and the fabrication of fuel containing plutonium. The largest quantities of radioactivity, and thus, the greatest potential hazards result from the actual reactor processes. These wastes from the "back end" of the fuel cycle include low-level ("contaminated") waste, high-level waste from reprocessing activities, and spent fuels which have not been reprocessed.

Low-level wastes contain small quantities of transuranic contaminants per gram of material or they may be free of transuranic contaminants. They require little or no shielding and have low, but potentially hazardous, concentrations or quantities of radionuclides. Low-level wastes are generated in almost all activities involving radioactive materials and are presently disposed of by shallow land burial.

Transuranic wastes result predominantly from spent fuel reprocessing, the fabrication of plutonium to produce nuclear weapons, and if it should occur, plutonium fuel fabrication for recycle to nuclear reactors. These wastes have long half-lives (toxic periods) and must be absolutely contained for the hundreds of thousands of years that are required for the radioactivity to decay to innocuous levels. 3

High-level wastes (HLW) are either intact fuel assemblies that are being discarded after serving their useful life in a nuclear reactor (spent fuel) or the portion of the wastes generated in the reprocessing of spent fuel that contains virtually all of the fission products and most of the
actinides not separated out during reprocessing. These wastes present the greatest short-term health hazards due to their emissions of intense radioactivity and high toxicity in minute amounts. These factors, when combined with their long radioactive life, high levels of radioactivity, and generation of intense heat, present many difficult problems with respect to disposal which have yet to be resolved. And, as pursuant to the present Administration's non-proliferation policy, the federal government will accept spent fuel from other countries, the volume of these wastes can be expected to grow disproportionately to our own development of commercial nuclear power. Thus, both the volume and the dangerous toxicity of these wastes emphasize the critical need for a safe method of isolation from the biosphere.

C. Environmental Aspects of Commercial Nuclear Wastes

The fission process which occurs in nuclear reactors produces large quantities of man-made radioactive materials which are so harmful to life that they must be isolated from the biosphere for extraordinarily long periods of time. Again, exactly how long a period of isolation is needed is still a subject of controversy; opinions vary from several hundred to several million years; yet, it is generally agreed that a thousand years is a minimum requirement. The special hazards of these wastes result from the emission of radiation the effects of which are cumulative and not readily discernible, but which may include the development of cancer and/or genetic damage. Thus, radiation exposure now can harm generations yet to be born.

Radionuclides are toxic in two aspects: chemical toxicity and radioactive damage. While the direct effects of radionuclides have been vaguely
defined, what reaches humans through environmental pathways is not clear: chronic effects are even less understood. The problem is especially complicated as many radioactive elements do not disperse in the environment, but concentrate in some plants and animals, thereby affecting the entire food chain. Furthermore, unlike most other environmental contaminants with which we are familiar, there is no method of altering the period of time in which a particular species of radionuclide remains radioactive. Each radionuclide decays at its own particular rate, regardless of temperature, pressure, or chemical environment. Presently, the only practical means of mitigating the hazards of radioactive wastes is to allow the radionuclides to decay naturally, a process ranging from the hundreds of years for the bulk of the fission products to millions of years for certain of the actinide elements and longer-lived fission products.

The toxicity of radioactive wastes comes from the ionizing radiation emitted as alpha, beta, and gamma rays. The action of these emitted rays is to break bonds in molecules within the cells. The result may be minor when only affecting the multiple proteins, but the action on the unique DNA chromosome strands can lead to various immediate and long-term effects. A property of radioactive wastes that makes them particularly insidious is the transformation process they exhibit called transmutation. The radioactive elements, which are inherently unstable, will change in their size and form as the nucleus of the atom becomes its parts, e.g., radioactive uranium, a solid fuel can become radioactive radon, a gas: numerous heavy metals result as part of this transmutation process.

In the aquatic environment, radionuclides are added to the sediment by deposition of particles associated with the nuclides or by the movement
of radionuclides through the sediment itself. It is thought that accumulation of radionuclides by aquatic organism is most likely to occur if radionuclides are introduced into an area of high biological activity where there is a shortage of trace elements. Accumulation is also thought to be enhanced in areas of acidic sediments.\(^9\)

In addition to specific directed studies of radionuclides, the influence of other environmental factors must be considered. Lethal amounts of acute radioactivity differ widely among organisms and are related to such variations as age, physiological status, and body size. These variations are further complicated by the fact that the possibilities for damage to organisms will probably increase through the combination and interaction of different environmental factors, such as the presence of chemical carcinogens.\(^{10}\)

At low level exposure, there is within an organism a repair mechanism that repairs damaged cells before a cancer can form. The dose that mutates the maximum number of cells that can be repaired could be considered the threshold dose. (The question of whether or not there is a threshold level below which exposure does not affect an organism is a subject of considerable controversy within the scientific community -- as to all types of pollutants.) If there is already present so much of a pollutant that cancers produced by it are common, an additional dose of this pollutant or any dose of a pollutant which gives cancer by the same mechanism is thought to produce an effect that may be greater than any incremental dose.\(^{11}\) For example, radiation reaches all parts of the body and produces cancers at essentially all sites: in contrast, chemical carcinogens tend to discriminate in favor of certain sites, i.e., the liver. Thus, a chlorinated
hydrocarbon may not be a direct carcinogen but may only become carcinogenic due to products of metabolites (induced by radionuclides) in the liver. These considerations emphasize the critical need for a viable method of isolating radioactive wastes.

D. Disposal of Commercial Nuclear Wastes

However, the management of radioactive wastes for the past thirty years has been said to be characterized by the inadequate integration of waste management research and development efforts with those for other parts of the nuclear fuel cycle. The "mindset" of the federal regulatory agencies has been that the technology would somehow spontaneously arise full blown from Zeus' head concomitant with the immediacy of need for a disposal solution. This is due to insufficient attention to developing the needed technological and scientific capabilities and to low funding levels compatible with a narrow approach towards HLW disposal (one geologic medium-salt, and few sites).

At present, most commercially generated wastes are stored in temporary water cooling ponds on the reactor sites. However, besides the environmental problems raised by this make-shift technology, there are other serious issues raised. For instance, as long as spent fuel, or any other radioactive waste, is stored on the surface, it is susceptible to sabotage. Furthermore, many commercial nuclear power plants are nearing the upper limits of their designed capacity for storing wastes temporarily on site. (Depending upon reactor type, nearly a third of the reactor fuel core must be removed each year.) Thus, besides the dangers posed, these problems will inevitably result in increased costs of storage which will be passed on to the utility
consumer (costs which were probably not quantified in the initial justification for the construction of the nuclear power facility).

Efforts have been initiated to deal with this dilemma within a short time span. The Interagency Review Group Report on Nuclear Waste Management (IRG) has identified several candidate technologies for disposal:

- placement in mined repositories,
- placement in deep ocean sediment,
- placement in very deep drill holes,
- placement in a mined cavity in a manner that leads to rock melting,
- partitioning of reprocessing waste, transmutation of heavy radionuclides, and geologic disposal of fission products, and
- ejection into space.\(^17\)

The IRG suggests that the technology of placement into mined geologic repositories\(^18\) is the most readily available, with deep ocean emplacement and deep drill hole disposal another ten to fifteen years from implementation. The other technologies are more difficult at this time because of scientific, engineering, or institutional problems. Although the present extent of knowledge is most complete for mined repositories, and in particular those within salt formations, there are still significant gaps and uncertainties in our current technical understanding.\(^19\) Furthermore, although present scientific and technical knowledge is adequate to identify potential repository sites, the long toxic period of HLW requires certainties of safe isolation not yet within the state of the art; for instance, beyond a few thousand years, the capability to assess the performance of the repository site diminishes and, consequently, the degree of assured safety is thereby reduced.\(^20\)
It is precisely because of these considerations that the IRG endorses a "systems" approach for the selection of the geologic environment, repository, and waste form. The physical and chemical properties of the medium must be relied upon as well as engineered barriers (such as waste form, container, and density of emplacement) to provide multiple, and to some extent, independent, natural and engineered barriers to the release of radionuclides to the biosphere. Geologic burial combines the advantage of isolation from the biosphere, minimum surveillance, and minimum risk of inadvertant release of radioactivity.

Research on disposal in salt deposits in the longest pursued and hence, furthest advanced. Salt deposits are a leading candidate for a repository because the presence of salt indicates a general absence of circulating groundwater, the principal mechanism of transporting radioactive waste to the surface where it would enter the biosphere. Salt is abundant and easily mined. It conducts heat readily, shield well against radiation, and is structurally strong. Further, salt flows plastically under pressure and would seal cracks which would otherwise result in the release of radionuclides. However, salt is not without its disadvantages, precisely because of the plasticity of salt, the repository openings will have a tendency to close due to the flow in molecules resulting from heat generated by the waste. The heat generating properties of the waste reveal another problem: certain brine deposits would tend to migrate towards the heat generating containers and corrode them although the brine would not transport radioactivity to the surface in the same manner as groundwater. Additionally, salt is itself soluble and does not provide the sorptive qualities of other rock types nor is it benign to interactions with the
waste or the container. Finally, salt formations are often located in areas where oil, gas, or potash is found -- which, of course, increases the possibility of human intrusion.

II. The Federal Role in Nuclear Waste Management
A. The Role of the Atomic Energy Commission

The Atomic Energy Act (AEA) of 1946 delegated to the Atomic Energy Commission (AEC) broad regulatory authority over source, by product, and special nuclear materials. "The paramount concern of Congress was the assurance of the common defense and security in the development and utilization of nuclear power", since the principal use of nuclear energy at that time was for military purposes. In recognition of scientific and technical advances in the development of nuclear energy for peaceful purposes, Congress amended the AEA in 1956 to encourage private, commercial development of nuclear power: the development, use, and control of nuclear energy was now to be directed "so as to make the maximum contribution to the general welfare, subject at all times to the paramount object of making the maximum contribution to the common defense and security".

The 1956 amendment created a licensing scheme in which the AEC would authorize the private ownership of nuclear by product and the rental of special nuclear material for commercial purposes. The federal government limited possession of special nuclear materials to AEC licensees. The AEA now authorized the AEC to establish such standards "as...it deemed necessary or desireable to promote the common defense and security or to protect health or to minimize danger to life or property".
Further amendments in 1959 reflected a desire to effectuate a coordinated, orderly, and effective regulatory plan and clarify the interrelationship of the states and the AEC; the amendments established the respective responsibilities of the states and the AEC in regulating source, by product, and special nuclear materials, including the licensing of low-level waste land disposal operations; however, the AEC could not discontinue regulatory authority over special nuclear materials in quantities sufficient to form a critical mass. Essentially, the amendments provided that the AEC would turn over to the states, as they became qualified, certain defined areas of regulatory jurisdiction, including control over radiation hazards; this to be done through the mechanism of a state-AEC agreement. (For instance, an "agreement" state may regulate the disposal of low-level waste provided its regulatory program is compatible with the federal program.) But notwithstanding these agreements, regulatory jurisdiction would not be transferred to the states until the AEC determined that the state had a program for the control of radiation with standards adequate to protect the public health and safety. In addition, the AEC would retain jurisdiction of certain materials involving special hazards.

It is important to note, however, that "nothing in this amendment was to be construed to affect the authority of any state or local agency to regulate activities for purposes other than protection against radiation hazards".

B. The Role of the Nuclear Regulatory Commission and the Department of Energy.

Then, in response to criticism of the dual role of the AEC as both promoter and regulator of nuclear power, the Energy Reorganization Act
(ERA) of 1974 abolished the AEC and separated the regulation of nuclear power from the promotion of nuclear power. The licensing and related regulatory functions of the AEC were transferred to a new Nuclear Regulatory Commission (NRC) while the operation of governmental nuclear research and production facilities were transferred to the Energy Research and Development Administration (ERDA).

The ERA made it explicit that the federal government was responsible for nuclear waste management; ERDA was specifically assigned the task of "encouraging and conducting research and development, including demonstration of commercial feasibility and practical application of the ... storage phase... related to the development of use of energy from...nuclear sources". In particular, ERDA was given the responsibility to "develop, demonstrate, implement and operate high level radioactive waste program", including:

- the storage or permanent disposal of commercial wastes that the NRC required to be transferred to federal custody,
- the storage or permanent disposal of wastes generated at facilities operated by ERDA,
- the development of waste treatment techniques to facilitate storage or disposal, and
- evaluation of various geologic formations and specific sites as to their suitability as high level waste repositories.

However, as the ERA provided that the NRC had licensing and regulatory authority over facilities used primarily for the receipt and storage of HLW and other facilities authorized for the express purpose of subsequent long-term storage, ERDA's National Waste Terminal Storage Program was subject to NRC regulatory authority except for on-going research and development.
Subsequently in 1976, the Department of Energy Organization Act transferred the activities of ERDA to the Department of Energy (DOE). As Congressional intent was to provide "a comprehensive statement of the responsibilities relating to nuclear waste management", DOE was delegated control of existing government nuclear wastes and was to establish a program for nuclear waste management, including responsibility for all R&D efforts directed towards commercially feasible technologies.

As noted, most HLW is presently stored in liquid or partially solidified form in underground or above ground storage tanks. Current federal regulations require that HLW be solidified within five years after reprocessing and that the solidified waste be delivered to a federal repository within ten years after reprocessing. The commercial industry is responsible for the interim storage, solidification, and transportation to the repository site. These repositories will feature interim retrievability of the waste for five to twenty-five years; however, after this initial period, the repository will be sealed for permanent disposal of the wastes at which point the NRC takes title to the site. Finally, disposal of HLW is not permitted except on land owned and controlled by the federal government. Unfortunately, there are several complications with the present scheme. First, commercial reprocessing has been indefinitely postponed; thus, current regulations have limited applicability. Further, the federal government has yet to develop a politically acceptable program for disposal or a repository.

C. Federal Role in the Future

In a message sent to Congress on February 12, 1980, President Carter outlined a comprehensive national nuclear waste program: in accord
with this Presidential directive, the DOE is now preparing a National
Plan for Nuclear Waste Management which will include specific program
goals and milestones for all aspects of nuclear waste management. 58
A principal component of this program is the official adoption of an interim
planning strategy for HLW focused on the use of mined geologic repositories
capable of accepting both waste from reprocessing and unprocessed commercial
spent fuel. Thus, immediate attention is being given to locating and
characterizing several different potential repository sites. The present
timetable for the program establishes 1985 as the date for choosing the
site of the first full scale repository within which operations are to
begin as soon thereafter as technically feasible—approximately the mid-
1990's. 59

The NRC has now issued draft regulations proposing a licensing procedure
for geologic disposal 60 promulgated pursuant to the authority granted
in the ERA: 61 the technical criteria against which a license application
will be reviewed are still under development. The proposed NRC regulations
adopt a scheme similar to the two-tiered construction permit and operating
license stages of commercial nuclear power plants; i.e. there are several
points at which the NRC will review the DOE disposal program. Additionally,
although present regulations do not list disposal in a geologic repository
as an action requiring preparation of an Environmental Impact Statement
(EIS), 63 the new regulations state that the issuance of a license for
a disposal site will require that an EIS be generated with the NRC as
the lead agency. 64 Finally, although standards of the Environmental Protection
Agency (EPA) do not presently cover waste disposal sites, such criteria and
standards are being developed: the NRC would enforce these EPA standards through the licensing process as the EPA does not have direct authority over waste facilities.65

On the technical side, DOE has followed up on the work of its predecessor agencies, AEC and ERDA, by conducting extensive literature studies and field work investigations in numerous states in search of a suitable site for a repository. In particular, considerable attention has been focused on the Interior Gulf Coast Salt Dome Basins and a substantial amount of technical investigation has been on-going for several years.66 Recent literature available from the DOE Office of Nuclear Waste Isolation suggests that these salt domes may be among the first potential repository sites.67 At present, tests with electrical heaters are being conducted in a salt mine on Avery Island in Louisiana to assess stresses created by the intense heat generated from HLW.68

However, besides the technical problems which remain to be resolved in the development of a national HLW program, there are a number of political and institutional issues which are quite provocative. Thus, the federal government has also attempted to include socio-political considerations in the development of a national program.

D. The State Role in the Federal Program

Pursuant to the recommendations of the IRG,69 the national waste management program will include several provisions designed to encourage a cooperative relationship between the states and the federal government, For instance, a State Planning Council has been created to advise the Executive Branch and work with Congress in making and implementing decisions
Among those to be chosen for the nineteen member council will be fifteen state governors or other elected officials: it has been suggested that these members represent a complete spectrum of states including those that voiced opposition to siting facilities within their boundaries, states with more neutral views, as well as states who presently utilize nuclear power plants extensively. Generally, the responsibilities of the Council will be to:

- recommend procedural mechanism for reviewing specific federal plans and programs, including a "consultation and concurrence process" to develop federal, state, and local cooperation,
- develop detailed waste management plans,
- advise on all aspects of siting and licensing of facilities for storage and disposal of nuclear wastes,
- advise on proposed federal regulations, standards, and criteria related to nuclear waste management programs, and
- identify and make recommendations on other matters related to the program.

Another aspect of this pragmatic recognition of the need for increased state involvement is the proposed "consultation and concurrence process" to be developed within each affected (potential site host) state. Under this approach, an affected state would participate in the site identification and characterization process: it is generally felt that the technical and socio-political success of the federal program is dependent upon the state having a continuing role with respect to the siting, design, and construction of a geologic repository. It has been suggested that the
"consultation and concurrence process" be directed by the governor of the affected state: if concurrence cannot be realized, the issue could be appealed to Congress for a decision. 73

Also, in response to IRG recommendations, 74 the NRC has proposed regulations designed to foster increased public participation in the NRC licensing procedure. 75 As the NRC has stated that state concerns should be identified and addressed at the earliest possible time, 76 the DOE is required to include within its site characterization report a description of how the state was involved in the site selection process. 77 To further ensure state involvement, the NRC has proposed, beginning with initial notification by the DOE of selecting a site for site characterization, a process whereby the state can actively participate in the licensing process. States may submit proposals for participation in the review of the Site Characterization Report and any subsequent license application from the DOE. 78 The proposed ways in which a state could participate are varied: they may

- assist the NRC in reviewing license applications,
- perform other technical assistance work, i.e., environmental studies,
- perform monitoring for the NRC,
- participate through employment or exchange of state and federal personnel under the Intergovernmental Personnel Act, or
- participate in hearings on a license application. 79

Nevertheless, it still appears that despite these new gestures of the NRC, the central concern of the agency is how to proceed with siting a federal waste repository if state concurrence cannot be obtained voluntarily. 80
Finally, as noted hereinabove, under NRC regulation, disposal of HLW is not permitted except on land owned and controlled by the federal government. However, increasing public opposition almost ensures the possibility of a conflict between the federal government and an affected state. Consistent with an earlier ERDA policy of ceasing HLW-related activities in any state officially indicating its desire to not have a repository sited within its boundaries, the state of New Mexico was given the right to veto any DOE plan within its boundaries.\footnote{81} Indeed, the proposed Waste Isolation Pilot Plant in New Mexico has recently been cancelled in the face of such opposition.\footnote{82} And in Louisiana, a much milder form of this kind of deference has been outlined as one aspect of an agreement signed by the Governor of the state and the DOE:\footnote{83} unfortunately, the agreement only states that "to the extent permitted by law, \{the DOE\} will use their best efforts" to avoid overriding state objection: the degree of actual deference to the state's wishes is somewhat less than certain under this wording. Thus, despite whether increased state participation in the federal program is actually realized, affected states will remain concerned with the extent of potential impacts resulting from a repository sited within their boundaries and the degree to which the state has legal perogatives, if any.

III. Legal Issues Immanent in Commercial Waste Management

A. Introduction

The hazardous nature of HLW disposal creates risks to the health and safety of persons in the repository area both in present and future
generations. The restrictions needed to ensure the integrity of the barriers of the repository system will result in a large area of land becoming unavailable for other potentially productive uses. The development may create burdensome demands for housing, schools, and other supporting services normally provided by the state or its political subdivisions; traffic patterns may need to be substantially changed. All of these considerations lie within the realm of what is considered traditionally to be a state's "police power". Because of this and because of the health hazards posed by the generation and disposal of HLW, many states have enacted legislation within recent years which affects the issue of nuclear waste management within their jurisdiction.

Some of the state legislation deals specifically with the disposal of HLW: other statutes address the issue as one aspect of comprehensive regulation of nuclear power facilities. In general, these statutes can be divided into three broad categories: 1) states imposing an absolute ban on the disposal of wastes within their jurisdiction (a sub-category within this group consists of those states which impose a ban only on wastes generated from without the state); 2) states which relate the continued construction and development of nuclear power plants to the development of a safe and demonstrable technology for the disposal of wastes; and 3) states which mandate an expression of legislative or popular approval before disposal within the state is permitted. The enactment of such legislation by the states raises interesting and complex constitutional issues. The degree to which the state is "preempted" from the exercise of such authority depends upon the scope and comprehensiveness of federal laws and regulations, the degree to which the state legislation may be said to impinge upon
interstate commerce, the purposes for which the state legislation was enacted, and the language of the state enactment itself.

A. The Preemption Doctrine Generally

The extent to which the federal government may impose its authority upon the states is governed by the Constitution. The mere fact that a problem may be said to be national in scope is in itself insufficient: an assertion of overriding federal authority must derive from either: 1) a power explicitly enumerated by the Constitution, 2) the "necessary and proper" clause of the Constitution, or 3) a power that can reasonably be inferred from the nature of the federal system. All other powers not so delegated to the federal government are reserved to the states. However, insofar as the federal government acts within the range of constitutional authority, its statutes may be considered paramount; and state laws to the contrary are said to be "preempted" if they conflict with the federal scheme. Indeed, it has been suggested that the United States Supreme Court gives more weight to the effect of the Supremacy clause than it accords to the Tenth Amendment reservation of powers to the states. However, it is important to remember that federal supremacy is not to be generally presumed.

A three prong test for determining whether a state's regulation of a subject may be preempted by federal authority was enumerated in the first major case considering the preemptive effect of federal nuclear laws. First, where state laws are in such irreconcilable conflict with federal laws that compliance with both is a "physical impossibility", state law must yield. Second, if Congress has "expressly" declared
that the federal statute grants exclusive authority, then concurrent or complementary state regulation within the field is precluded, even absent a direct conflict. Finally, in instances in which the foregoing are not evident; the court may infer an intent to preempt when: 1) the federal scheme of regulation is so pervasive that there is no room for a state to assert authority; 2) the federal interest is so established and dominant that there is a presumption of preemption of state laws on the same subject; 3) the nature of the subject regulated demands uniformity of treatment; or 4) the state policy would produce a result which would frustrate the objective of the federal law.\textsuperscript{96}

Generally, there are four possible federal-state interactions in which the fate of a particular state regulation will be evaluated: these are direct conflict between the statutes, state regulation outside of the preempted field, concurrent regulation, and complementary regulation: the latter two instances provide the greatest legal difficulties.\textsuperscript{97} If Congress has expressly declared its intention that a field be preempted, then neither concurrent nor complementary state regulation would be permitted.\textsuperscript{98} However, if, as has been suggested, recent court decisions indicate a judicial inclination to uphold state laws if not clearly repugnant to federal law,\textsuperscript{99} then state regulation must be permitted to supplement federal programs so long as the federal scheme is not frustrated: indeed, the "proper approach [may be] to reconcile the operation of both statutory schemes with one another rather than holding one completely ousted". Thus, the question of whether a particular state law is preempted is largely a matter of statutory construction. If the characteristics of the
subject call for exclusive national jurisdiction, "preemption" would be
more favorably received by the courts than where the subject is traditionally
"local". 101

Indeed, states' rights deserve special consideration by the courts, 102
especially when the state is exercising its traditional "police powers".
The "police power" authority is inherent in state government: it is one
of the most protected of government powers—and through it, the state may
act to protect the health, safety, morals, and general welfare of its
citizens. 103 Furthermore, the exercise by a state of its police powers
may be superceded by the federal government only when the nature of the
regulated subject is such that national uniformity of regulation is impliedly
necessary (implied preemption) 104 or when a complete ouster of state power
has been clearly and manifestly expressed by Congress (express preemption). 105

Generally, the express declaration of preemption by Congress limits the
court's role in determining the balance of power between the federal and
the state government; however, the court must still determine whether or
not Congress meant to invalidate a particular state law. 106 In contrast,
with respect to state statutes based upon the police power, implied preemption
is operative only where there is a direct conflict or a clearly manifested
Congressional intent to preempt. 107

B. State Regulation of Nuclear Energy

The general scope of federal law and regulations governing nuclear
energy matters has been discussed supra; however, the extent of those
laws and regulations is germane to any analysis of limitations on state
regulations within the same area. A great deal of litigation has ensued since the enactment of the AEC, most of which has resulted in the invalidation of state statutes; however, even these decisions suggest areas within which the state can exert its authority.

1. State Regulation of Radiation Hazards

The seminal case involving the state regulation of radiation hazards is that of Northern States Power Co. v. Minn.: subsequent cases have largely been content to rely heavily on Northern States rather than engage in independent analysis. In Northern States, Minnesota had imposed radiation emission standards on a nuclear power plant more restrictive than those approved by the AEC: thus, the issue to be determined by the court was whether the federal government had sole authority to regulate radioactive waste releases from nuclear power plants. Relying on the language of the AEA, the legislative history, the pervasiveness of the federal regulatory scheme, and the "need for uniform controls in order to effectuate the objectives of Congress", the court found that the state had no authority to regulate radiation hazards except as specified in a state-AEC agreement and an emission limitation could only be for the purpose of protecting against radiation hazards.

However, it has been suggested that the analysis in the case should be accorded less precedent weight than it has generally received. For instance, a state law is preempted when Congress has either explicitly declared that effect in the enactment of a statute or it is implicitly contained in the structure and purpose of the enactment: as the AEA is devoid of language explicitly mandating federal preemption, then a preemption effect may only result if it can be reasonably inferred from
the structure and purpose of the act. Furthermore, the court should have "considered the relationship between state and federal laws as they were interpreted and applied, not merely as they were written".\textsuperscript{115}

As one of the stated purposes of section 274 of the AEA is to foster cooperation with the state in regulating nuclear energy, perhaps eventually terminating federal regulation in order to accord states regulatory responsibility,\textsuperscript{116} it does not appear to expressly preclude a state law regulating HLW.

Unfortunately, this whole matter appears to have been glided over by the Court in \textit{Northern States}. Although the Eighth Circuit prefaced its analysis with the acknowledgement that preemption can be found only after a determination has been made "that the federal government possesses the power to regulate in a given area", it appeared to accept without analysis the Congressional declaration of acting upon its (Congress') "constitutionally granted powers over the common defense and security, interstate and foreign commerce, and promotion of the general welfare".\textsuperscript{117}

Unfortunately, a mere assertion by Congress that it is acting within the scope of constitutional authority is insufficient: the court should have carefully scrutinized this threshold issue before proceeding with the preemption analysis -- "especially in light of the states' traditional police power over matters of public health and safety".\textsuperscript{118} Thus, the case should be strictly limited to its facts: \textit{"Northern States involved preemption based on the commerce clause, not some implied authority of Congress to regulate public health and safety"};\textsuperscript{119} there is, of course, no general federal police power.\textsuperscript{120} Furthermore, insofar as radiation hazards do not arise in a situation involving or affecting interstate
commerce (such as the generation of electricity in Northern States), the commerce clause is inappropriate as a basis for sole federal authority.\textsuperscript{121} Finally, just as Northern States is important for the precedent which it set, it is also important for what it did not do. It did not rule that all state regulation of nuclear power plants was preempted. Indeed, it is clear from the case, as well as the AEA, that states retain jurisdiction over such questions as need for facilities, financing of specific proposals, and general economic and environmental acceptability of nuclear projects.\textsuperscript{122} Additionally, a recent decision of the Atomic Safety and Licensing Board of the NRC provides that states, as well as their political subdivisions, retain the right to regulate on the basis of economic or environmental considerations.\textsuperscript{123} Furthermore, the exact application of Northern States has been sharply limited by subsequent federal legislative activities.\textsuperscript{124}

2. Regulation for Purposes Other than Protection against Radiation Hazards

As noted, subsection K of section 274 of the AEA\textsuperscript{125} provides that: "nothing in this section shall be construed to affect the authority of any state or local agency to regulate activities for purposes other than protection against radiation hazards". Thus, even though state-AEC agreements contemplated by this section may limit the degree to which states may regulate radiation hazards, states are not necessarily preempted if state regulations is governed by a purpose other than protection against radiation hazards. Hence, while a state statute which actually conflicts with or impedes the effectiveness of a federal scheme will not be permitted regardless of state purpose,\textsuperscript{126} and although the issue of whether a conflict exists cannot be determined solely by evaluating the state purpose;\textsuperscript{127} the federal
scheme, as reflected in section 274, explicitly makes state purpose relevant in the regulation of nuclear activities. Clearly, states may regulate nuclear activities for health, safety, and economic purposes other than radiation protection. Thus, a central question to be resolved before determining whether a state statute is preempted by federal law is whether the statute falls within the presumably preempted area of protection against radiation hazards or within a legitimate area of state concern.

There are at least three approaches by which the courts may make this determination. First, the court could assume that if there is a legitimate purpose to be served by a state law—other than protection against radiation hazards—it should be presumed to be valid. This method would follow the doctrine enunciated in U.S. v. O'Brien, in which the Supreme Court stated that "[i]t is a familiar principle of constitutional law that this court will not strike down an otherwise constitutional statute on the basis of an alleged illicit motive". A second method would be to review the statute itself together with all available legislative history in order to determine, as a matter of fact, the primary purpose of the law in question. Or possibly, the courts would presume that whenever a state regulation could arguably be considered to be aimed at radiation hazards, it is invalid in absence of compelling proof to the contrary: this was the approach of the U.S. District Court in Pacific Legal Foundation, et al. v. State Energy Resources Conservation and Development Commission, et al. In this decision, a state statute linking the licensing of nuclear power plants to an effective federal waste management scheme was found invalid.

The judicial record of state statutes regulating different aspects of nuclear energy is not enviable; yet, it is clear that states must
take a hard look at potential avenues of challenge if they desire to oppose the siting of a federal waste repository within their boundaries. It is possible that guidance towards legislating a constitutional state statute or challenging the site designation may be found in recent court decisions.

C. Possible Legal Avenues for an Affected State

1. Challenging the Designation on the Basis of National League of Cities v. Usery

Historically, the limits placed by the Tenth Amendment upon the Congressional exercise of power deriving from the commerce clause were not clearly defined. Indeed at one time, the Supreme Court declared that the commerce power was not to be abridged by any consideration of the Tenth Amendment.133 The culmination of an omnipotent commerce power was succinctly stated in Maryland v. Wirtz when the Court found that Congress was not constitutionally required to "yield to states save in the performance of governmental functions".134 At that time, the Court felt that Congress, acting pursuant to a delegated power, lawfully applied the federal wage and hour law to non-professional state employees and, thus, overrode countervailing state interests.135 However, several years thereafter, a retreat from this position surfaced in Fry v. U.S.;136 the court announced that the Tenth Amendment "expressly declared the constitutional policy that Congress may not exercise power in a fashion that impairs the states' integrity or their ability to function effectively in a federal system".137 The final death toll to an unchallengeable exercise of commerce power was pronounced in National League of Cities v. Usery138 (NLC).
In *NLC*, the Court held that the minimum wage and overtime pay provisions of the Fair Labor and Standards Act would not be applied to states and their subdivisions. According to the Court, the exercise of Congressional power pursuant to the commerce clause is restrained by the Tenth Amendment when matters "essential to the ~state's~ separate and independent existence are involved". Thus, "traditional governmental functions" are constitutionally immune from Congressional legislation absent a showing of compelling national necessity. Indeed, federal authority is generally suspect insofar as it displaces the state from its role of providing social order or making provision for the public welfare, i.e., the "dual functions of administering the public law and furnishing public services".

According to one interpretation of *NLC*, the Court was upholding the state's role of providing for the interests of its citizens in receiving certain important social services. Thus, to the extent that a federal action would affect a state's ability to provide "essential" services, it may be constitutionally impermissible. To carry this a step further, it appears that if a federal action may jeopardize the ability of state and local governments to provide certain services out of their general tax revenues, this impact upon the tax revenues may be unacceptable.

Several impacts resulting from establishing a federal waste repository could arguably lead to the invocation of *NLC*. There will certainly result a disruption of the economy and tax structure of the subject state. Additionally, the state (and affected local governments) may need to enact substantial local legislation, employ substantial numbers of additional governmental employees, and accordingly, expend substantial funds in order to respond to a federal policy which was imposed upon them. The establishment
of the repository with its attendant security area will result in the productivity of that land being lost for present and future generations; additionally, the state would be deprived of its choice as to how best protect its environment. Arguably, the magnitude of these impacts would be so great as to displace the states' freedom to structure those operations and services generally considered to be in the realm of traditional governmental functions.

2. Enactment of State Law Regulating Land Use

The same impacts which could lead to an affected state to challenge the site designation may form the basis for a valid law prohibiting such disposal. Indeed, such an approach may be most suitable for those states within whose boundaries lie salt domes: in addition to salt domes being considered as a candidate site for a HLW repository, there have also been suggestions that they be utilized to store other hazardous materials. A state may wish to enact some form of land use regulation prohibiting salt domes from being used to store hazardous or dangerous materials.

It is certainly within the purview of a state's police power to enact land use regulations aimed at avoiding environmental degradation or improper land usage: environmental concerns are "legitimate local purposes similar to the states' interests in protecting the health and safety of their citizens". Furthermore, it is clear that section 274(d) of the AEA intended to "make it clear that the bill [did] not impair the state authority to regulate activities...for the manifold health, safety, and economic purposes". Indeed, a land use statute based upon such grounds may legitimately avoid constitutional problems despite the fact that it may have an incidental relationship to questions of radiation protection.
Furthermore, dictum of the Supreme Court suggests that state bans of nuclear waste disposal may not be unreasonable burdens on interstate commerce. In City of Philadelphia v. New Jersey, the Court held that a state prohibition of wastes from other states violated the Commerce clause, but added that not all protectionist regulation by the state was necessarily unconstitutional: Laws which banned importation of items which by "their very movement risked contagion and other evil,...did not discriminate against interstate commerce as such, but simply prevented traffic in noxious articles, whatever their origin". New Jersey had attempted to minimize the adverse environmental effects of solid waste disposal by prohibiting in-state disposal of out of state wastes. It appears, however, that insofar as the Court was concerned, New Jersey's fatal error was that it attempted to ban disposal of out of state wastes while not imposing similar restrictions on waste generated from within the state.

The opinion of the Court suggests that it utilized a three-tiered test to determine the validity of a state statute under the commerce clause. First, state statutes are presumed valid if they do not discriminate against interstate commerce. If, however, the burden on commerce is excessive in relation to the local benefits derived from the statute-the statute is invalid unless the state can demonstrate that the statute promotes a legitimate state goal and there are no adequate nondiscriminatory alternatives. Finally, those statutes which on the face discriminate against interstate commerce will be subject to strict scrutiny and most likely be determined invalid. Therefore, the first point of inquiry is whether
or not the statute purportedly discriminates against interstate commerce. The Court clearly held that a state may not discriminate "against articles of commerce coming from outside the state unless there is some reason, apart from their origin, to treat them differently." Certainly, a statute that prohibits disposal of particular types of wastes based upon health, safety, and economic grounds -- regardless of the origin of the waste -- does not imply a discriminatory approach towards articles of commerce. Furthermore, it appears that the Interstate Commerce Commission has declined to exercise jurisdiction over the transport of radioactive wastes on the grounds that such materials do not have any of the attributes commonly associated with articles classified as "goods" or "property" under the Interstate Commerce Act.

Nevertheless, there are several drawbacks to this strategy for a state. If, for instance, radioactive wastes are produced within a state, the state is faced with the dilemma that it must be responsible for those wastes which are a byproduct of the state's electrical generating capacity. Any attempt to regulate only wastes produced out of state would have a patently discriminatory effect. Additionally, it is suggested that the doctrine of intergovernmental immunities would render such a statute inapplicable to the United States, its property, and its instrumentalities: the federal government could ship such wastes into the state regardless of a statutory prohibition; thus, the Louisiana statute which reads that "no high level radioactive waste, including spent fuel rods from nuclear reactors, shall be transported into the state for disposal or storage in this state or elsewhere" would be suspect under the decision in City of Philadelphia as well as being simply inapplicable to the federal government.
Furthermore, it is suggested that Section 1115B of the Louisiana statute which states that "[n]otwithstanding any law, order, or regulation to the contrary, no salt dome within the jurisdiction of the State of Louisiana shall be utilized as a temporary or permanent disposal site for radioactive waste or other radioactive material of any nature by any person" seems to ignore the preemptive effect of the federal scheme; and section 1115D runs afoul of the doctrine of intergovernmental immunities inasmuch as it attempts to condition the operations of a federal agency, DOE, within the state.

In addition to the hereinabove considered questions as to whether a state may affect the siting of potential repositories: there are several related legal issues. Among these are the exercise of eminent domain by the federal government, the effect of a state government attaching conditions on the use of land by the federal government, as well as the ramification of the "property" clause and intergovernmental immunities. However, these issues are generally beyond the scope of this paper and have been thoroughly treated elsewhere. Unfortunately, the general consensus of most commentators considering these issues (and there have been many such commentaries) bodes a lack of success for the state. Nevertheless, there may be another approach whereby the state can ensure a measure of participation in this controversial area: the procedural requirements of the National Environmental Policy Act (NEPA) may provide a forum for state influence.

IV. Procedural Considerations Raised by NEPA

A. NEPA and the Requirement for an EIS

It is fairly well established by this time that NEPA was the first
successful attempt by Congress to establish a national goal of preventing environmental degradation: indeed, "it is the continuing policy of the Federal Government, in cooperation with State and local governments,... to use all practicable means and measures,... in a manner calculated to foster and promote the general welfare... To this end, NEPA requires a series of procedural steps, including the preparation of an Environmental Impact Statement (EIS), as part of any "major" federal action "significantly affecting the quality of the human environment". As the result of broad interpretation by the courts, NEPA, with its attendant EIS's, has become a basic consideration in the decision making processes of federal agencies, including the NRC. For pursuant to NEPA, federal environmental responsibilities overlap with the states' authority to protect its citizens' health and welfare: thus, the NRC must consider "all foreseeable environmental impacts", when issuing a license such as for a geologic repository, including radiological as well as non-radiological impacts.

B. The Council on Environmental Quality and its Regulations

In order to implement the policies pronounced in the act, NEPA also created the Council on Environmental Quality (CEQ), which has numerous statutory responsibilities. However, most significant are the duties of CEQ, along with the subsequent responsibilities of federal agencies, as modified by President Carter in 1977. Executive Order 11991 first authorized and directed the issuance to all federal agencies of CEQ regulations compelling implementation of the procedural provisions of NEPA; and secondly, directed all federal agencies to comply with the regulations issued by CEQ. Thus, CEQ has the authority to issue said regulations and to
compell federal agencies to abide by its directives: every agency is compelled by this Executive Order to comply with the regulations as issued by CEQ, except where such compliance would be inconsistent with other statutory requirements.171 Thus, CEQ has the means whereby it can ensure that comprehensive environmental reviews are made and that the EIS's are implemented, rather than simply prepared and then ignored.

The final CEQ regulations were promulgated in 1978:172 the ultimate objective is to provide better and more meaningful environmental decisions.173 Although there are several significant changes effected by the regulations,174 the single most far reaching change is that the regulations have administratively broadened the mandate of NEPA. Whereas NEPA only required an EIS for major federal actions significantly affecting the quality of the human environment; the regulations expand the definition of "effects" (though the semantical metamorphosis of "affecting" into "effects") to encompass both direct and indirect impacts,175 including ecological, aesthetic, historical, cultural, economic, social and health-related effects.176 Therefore, all future EIS's will have to encompass an expansive view of the human environment, weighing intangibles as well as tangible impacts affecting the natural and physical environment and the relationship of people with that environment177—both present and future generations. 178 Additionally, upon completion of a project, each agency must prepare a "record of decision" which will report the final action taken by the agency, including a statement of what other specific considerations of national policy overrode selecting an environmentally preferrable alternative, if such be the case.179 Federal agencies will now have to compile EIS's far more comprehensive than before.
C. Issues Facing the NRC as a Preparer of an EIS

The multitude, and the magnitude, of impacts that the NRC must consider in preparing an EIS prior to deciding whether to issue a license for a particular site, will be far greater than any previously faced by a federal agency. Although it is beyond the scope of this paper to identify all such impacts, certainly two of the most important issues will be that of socio-economic impacts and quantifying the environmental risks.

The major socio-economic impacts associated with HLW disposal will be dependent upon two factors: the construction and operating requirements for the project, including labor forces, and the specific socio-economic characteristics of each site. There will certainly result a "boom and bust" cycle caused by a rapid influx of construction labor force which then subsides to be replaced by a small operational labor force. Isolated sites, such as the salt domes being considered in rural Northwest Louisiana, would experience significant stresses due to the proportionately greater influx; additionally much commuting from metropolitan areas would result. Immense strain will be placed upon both state and local government to provide traditional social services such as health, education, sanitation, and transportation: the ability to allay these stresses will be only partially offset by increased revenues.

A greater difficulty will beset the NRC (and the DOE) in quantifying short- and long-term environmental risks. An especially complex issue is the burdening of future generations with the monitoring of these repositories. Further, there is the even more elusive issue of exposing future generations to risks resulting from accidental intrusion or accident. Nevertheless,
these issues as well as the more intangible such as aesthetic, cultural, and ecological effects must be adequately addressed by those federal agencies preparing an EIS— all are issues of great concern to an affected state.

D. Louisiana's Role in the EIS Process

It is, then, during the EIS process that an affected state will have, perhaps, the best opportunity to affect the decision making process, either through mediation with the federal agency during the preparation of the EIS or during subsequent public hearings. In addition to ensuring full consideration of socio-economic and related impacts, many uncertainties resulting from geological and geohydrological characteristics of the area need to be adequately addressed in order to answer an affected state's concerns.

1. Matters of Particular Concern to Louisiana

For instance, in northern Louisiana, old boreholes from wildcat oil tests remain an unknown hydrological factor. Many of these testholes were inadequately sealed; additionally, there is a scarcity of records as to the full extent of such drillings. The presence of undiscovered boreholes means that a conduit could exist between aquifers and the storage area. Furthermore, available data suggests abundant oil and gas reserves in the area; in addition to oil and gas, there is a large active gravel pit near one candidate salt dome and the area shows potential lignite reserves. The presence of potentially valuable natural resources increases the risk of accidental intrusion.

And although the northern Louisiana salt domes appear tectonically stable, there are still unresolved questions about the stability of a specific dome, Vacherie. Furthermore, while such stability is a
necessary requirement for a repository site, equally important is ascertaining the geohydrological stability. Current evidence suggests that at least one of the sites (Rayburns) may be subject to dissolution: the shallow depth below ground of which this dome is found raises questions about the chance of contact with the prolific fresh water aquifers in the shallow strata and the degree to which the dome is insulated from the effects of surface water.

The possibility that water circulation could exist in the secondary openings in the salt or the possibility that the repository chamber could be breached is most serious as the occurrence of either would correspondingly increase the likelihood that radioactive waste could be exposed to the groundwater system. Of critical concern would be the breaching of the repository chamber as this would probably be followed immediately by flooding of the cavity with soluble radionuclides taken up and transported by the water in the direction of ground water flow. Furthermore, the heat generated by the waste would tend to exacerbate only hydrological instability, thus endangering major aquifers used by nearby municipalities. Hence, it is important that the state itself begin to evaluate the suitability of such repositories in light of the biological, physical, and chemical environment of the area.

2. Approaches Available to an Affected State

If, after initial assessment of the suitability of potential sites located within its boundaries, a state decides that it wishes to participate in the decision making process, there are several approaches of which it might avail itself.
First, the state might wish to submit a proposal to the NRC outlining
a program of participation and, if necessary, requesting needed resources. This
would, then, insure full access to relevant data as it is compiled and
submitted on a particular site: it would also provide a means of input into
the NRC decision-making process, including that agency's preparation of an
EIA.

The state might also wish to establish direct communications with the
DOE. As the DOE must prepare an EIS prior to submitting an application for
construction authorization to the NRC, the state should raise issues with
that agency which it feels should be addressed in the document. Indeed,
the state may feel that problems raised by the proposed siting are of such
magnitude that the site is inappropriate in the state's opinion. Communi-
cation of this information to the DOE should result in a careful evaluation
of the suggested problem areas. If, however, the agency is unresponsive to
state concerns, the state may wish to contest the matter by asserting, via
litigation, the inadequacy of the EIS as prepared, i.e., the EIS failed to
address those issues of concern. Because such a challenge frequently results
in a complicated as well as extensive process and because the agency has
been mandated a rather strict timetable for having an operational repository,
the mere possibility of such an action occurring may suffice to encourage the
DOE to be more responsive to the particular concerns of a state. In fact,
such an approach may be far more advantageous to a state than a direct
judicial confrontation with the federal government over a state statute.
V. Conclusion

The federal government is intent on overcoming past deficiencies in establishing a feasible national waste management program: now, the emphasis is on developing a comprehensive program, including repositories for receipt of wastes within the next ten years. In their role as constituents of the federal system and because of the numerous technical, biological, and institutional uncertainties which remain to be addressed, each individual state should carefully monitor the emerging program: this is especially true for those states who may find themselves host to a waste repository within their boundaries.

If such a state is uncertain about the adequacy of the federal program or otherwise remains unconvinced about the acceptability of the program or the suitability of a particular site, it behooves the state to carefully assess the extent to which it may participate; either legislatively or administratively. For the state which prefers not to be a host for a repository, it is unfortunate that the judicial system seems to support the federal government's assertion of dominance. Nevertheless, that does not mean that the state is precluded, rather, new approaches must be considered.

In fact, the newer approaches may be far more effective. Certainly, the abundance of literature on the subject combined with the enhanced capabilities of state officials in this area provides impetus for a state to assert its attitude about the program and possible ramifications; indeed, it is incumbent upon the state to do so in view of its constitutionally recognized role as provider of social services and protector of the health,
safety, and welfare of its citizens. The federal government can not afford to ignore the legitimate concerns of an affected state.

However, the state itself must take an active stance in these matters. It must assess the options available to it and decide which best comports with the particularities of the area. Careful consideration should be given to developing a thorough understanding of devices which provide a forum for state views. But the state must begin to act now for although the federal program has languished for nearly thirty years, it is expected to become fully operational within the next ten.
In addition to environmental stresses created by radioactive emissions and wastes, the generation of electricity by nuclear power plants result in thermal pollution. In comparison with fossil fuel plants, nuclear reactors require 50% more cooling water and raise the output temperature of the water by 6-8 degrees more; this compounds problems of cooling the water before discharge and increases the likelihood of damage. "Note: Application of the Pre-Emption Doctrine to State Laws Affecting Nuclear Power Plants," Va. L.R. 62:739,754 (1976).

The present state of nuclear technology is inadequate to cope with numerous safety-related problems that beset the operation of all nuclear powerplants. The AEC identified over 100 unresolved safety risks, some of which are common to all such plants. AEC Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Power Plants 172-173 (1975). If a safety risk is common to all nuclear power plants, it is labeled a generic safety issue and need not be resolved prior to license approval. The absence of a long-term program for disposal of high level wastes has been labeled a generic safety issue.


Ibid., 270.


12 Interagency Review Group on Nuclear Waste Management: Report to the President, TID-29442 (March 1979) at 2; hereinafter referred to as IRG Report.

13 See generally, The Report of the President's Commission on the Accident at Three Mile Island (October 1979) for a discussion of the NRC's "mindset".

14 IRG Report at 2.

15 Lash at 273-74/ Also, see generally, testimony at the Hearings on Nuclear Waste Management before the Subcommittee on Energy Research and Production of the Committee on Science and Technology, U.S. House of Representatives, 95th Cong., 1st Sess., May 15, 16, 17, 1979: hereinafter referred to as the 1979 Hearings.


17 IRG Report at 35.


19 1979 Hearings at 63.

20 IRG Report at 42.


22 IRG Report at 37; see also Oversight Hearings, op. cit. 5-7.
Lash at 272, n. 12.

Lucas at 926. Therefore, maintaining retrievability beyond a few years will probably involve substantial expenditures.

Subgroup Report at 84. The IRG recommends that retrievability of wastes be ensured for technological and safety reasons; IRG Report at 46.

Subgroup Report, Appendix A at 29.

Ibid., at Appendix A. The IRG Report stresses the need for multiple barriers including the ability of certain rock types to absorb release radionuclides and hence retard the migration towards the surface,


42 U.S.C. 2131, 2192, 2344.

42 U.S.C. 2201(b).


42 U.S.C. 2021(b). There are approximately twenty-five agreement states; the texts of the agreements are singularly remarkable insofar as the states generally agree to operate a program completely compatible with that of the federal government, hence no unique responsibilities are assigned to the states pursuant to the agreements.


42 U.S.C. 2021(c).
42 U.S.C. 2021(k).

42 U.S.C. 4801 et seq.

42 U.S.C. 5841(f), 5824, 5814(c).

42 U.S.C. 5814(a)(b).

42 U.S.C. 5813(2).

42 U.S.C. 7107-7351, 7151.

42 U.S.C. 5842(3), (4). There is, however, a definitional ambiguity in the language of the Act as to whether the NRC has authority over repositories for spent fuel. Haggard, "Nuclear Waste Management," ALI-ABA Course of Study: Atomic Energy Licensing and Regulation 187 (1979). The statute does not define high-level waste and the present definition of high-level waste found in the NRC's regulations does not presently include spent fuel (10 C.F.R. 50, App. F): given the "no-reprocessing policy" of the present Administration, this remains a grey area.


42 U.S.C. 7101.


42 U.S.C. 7133(a)(8).

42 U.S.C. 7151(a).


Ibid., F(3).


U.S.D.O.E., Draft Report, op. cit. at 48. Additionally, DOE has a current spent fuel policy whereby utilities are to deliver their spent fuel to DOE in exchange for a one-time fee designed to cover the costs of interim storage and eventual disposal. See also, statement of Dr. Worthington Bateman, Acting Asst. Sec. for Energy Technology, U.S.D.O.E. in 1979 Hearings at 9, referring to the proposed "Spent Nuclear Fuel Act of 1979" submitted by DOE to Congress.


Under the proposed scheme, there are basically four steps in the process of obtaining licenses from the NRC:

1) DOE will be required to submit a site characterization report. This will provide an informal review after DOE has made a tentative site selection,

2) submission by DOE of an application for construction authorization at a particular site from among those previously characterized. The application will include information on site suitability and design features, as well as an environmental impact statement,

3) NRC then reviews the application again prior to actual receipt of wastes at the repository on the basis of health and safety issues.

4) once the wastes are empced, the DOE submits an application to decommission the repository and a final review of repository activities will be made by the NRC.
Ausness at 733. Proposed criteria were published by the EPA in Nov., 1978 at 43 F.R. 53262 (1978). These criteria specify which types of defined nuclear wastes should be controlled, enumerate the objectives of waste control, and delineate institutional as well as other inherent limitations. In general, the criteria aim towards ensuring the isolation of nuclear waste.


Statement of Sen. Charles Percy, reprinted in the Congressional Record S5587 (May 9, 1979).

Section 14(a) of the 1979 NRC Authorization Act (P.L. 95-601) provides that the NRC shall notify the governor and the state legislature of the state whenever the NRC has knowledge that a storage or disposal facility has been proposed to be built within that state.
44 F.R. 70420, to be incorporated in 10 C.F.R. 60.11(a)(6).

Ibid., to be incorporated in 10 C.F.R. 60.62.

Ibid.


Presidential Message to Congress, op. cit. at n. 56.

See Appendix A hereinafter attached, item #8.

The buffer zones around HLW facilities are generally estimated to require 50-100 times the area occupied: at a minimum, the total surface area required will be 2000 acres. U.S.D.O.E., Draft Environmental Impact Statement for the Management of Commercially Generated Radioactive Wastes at 1.10-1.18. (April 1978). Further, the preliminary site suitability criteria for geologic disposal states that all activities, including mining and exploration for minerals, which may interfere with repository operation or adversely affect the integrity of the repository should be expressly prohibited. U.S.N.R.C., Office of Nuclear Material Safety and Safeguards, Workshop Materials for State Review of U.S.N.R.C. Site Suitability Criteria for High Level Radioactive Waste Repositories 7-9. NUREG-0329 (1977).

Because of this, the federal government is considering a funding program similar to that of the Coastal Energy Impact Program funds which are used to mitigate the consequences of offshore oil and gas production. See 1979 Hearings.

See Appendix B hereinafter attached.


U.S. Constitution, Article I, section 8, cl. 18.

Ibid., 10th Amendment.

Ibid., Article VI.

92  Jaksetic at J80.

93  New York State Dept. of Social Services v. Dublino, 413 U.S. 405, 413 (1975).


95  Ibid., at 1146.

96  Ibid, at 1146-1147.


98  Northern States, op. cit. at 1146.


100  Merrill Lynch, Pierce, Fenner, and Smith v. Ware, 414 U.S. 117, 127 (1973); also, Tulsa Law Review at 408.

101  Tribe, op. cit. at 690-691.


104  Kelly v. Washington, 302 U.S. 1, 9 (1937) and Flia. Lime, op. cit at 146-47.


Dublino, op. cit. at 413; Florida Lime at 142; California v. Zook, 336 U.S. 725, 733 (1949).

op. cit.

Tribe, op. cit., at 693, n. 74.

op. cit. at 1153.

Ibid. at 1149-50. One court which has expressly considered whether such state-AEC agreements have a preemptive effect stated in dictum that the agreement "[d]o not overlap with the exercise of state judicial power to insure the welfare of its citizens". Marshall v. Consumers Power Co., 65 Mich. App. at 237 237 N.W. 2d at 281.

The Court also felt that dual regulation might create an obstacle to the federal objective of promoting atomic energy; however, whatever the validity of this statement at the time of the decision, the subsequent separation of promotional and regulatory activities in the nuclear field by the ERA negates the basis of the reasoning-particularly in view of the call for balanced energy source development by the DOE Act, 42 U.S.C. 7112.

See e.g., Jaksetic at 382-385; Tribe at 697-698.


430 U.S. at __, 97 S.Ct. at 1309.

42 U.S.C.A. 2021 (a) + (b).

447 F. 2 d at 1147.

Jaksetic at 385.

Ibid. at 386.

Murphy & LaPierre at 435.

Jaksetic at 387
122
42 U.S.C.A. 2018, Also, in Northern California Assoc. to Preserve Bodega Head & Harvor v. Public Utilities Commission 61 Cal. 2d 126, 390 P. 2d 200, 37 Cal. Rptr. 432 (1964), the court found that the AEA did not preempt the state's police power with respect to protecting the public from non-radiation hazards.

123
In the matter of Consolidated Edison Co. of N.Y., Inc. (Indian Pt. Station Unit No. 2), 2 CCH Nuc. Req. Reprtr., 30, 265.02 at p. 28, 411 (1978).

124
A federal enactment sharply limiting the utility of Northern States is evidenced in the Clean Air Act Amendment of 1977 (42 U.S.C. 74 22). Partly in response to N.S. (Joint Explanatory Statement of the Comm. on Conference, H.R. Rep. No. 564, 93rd Cong., 1st Sess. 143 (1977), section 22 of the amendments transferred from the NRC to the EPA, as well as states participating in EPA programs, the authority to set standards for radioactive air pollutants. Thus, at least in the context of radioactive air pollution, Congress is not adverse to allowing the states to regulate potential radioactive hazards.

125
42 U.S.C.A. 2021 (k).

126

127

128
See Tribe at 700, n. 110.

129

130

131
Civ. No. 78-711-E, currently on appeal in the Ninth Circuit.

132
This decision was followed by a similar result in Pacific Gas & Electric v. ERDC, 78-527, which held that the California statutes were unconstitutional insofar as they frustrated the federal objective of promoting the development of nuclear power. However, as noted in fn. 124 supra, reliance on such generalized federal objectives may overlook the import of federal enactments subsequent to the AEA.

133
U.S. v. Darby, 312 U.S. 100, 124 (1941).

op. cit., at 195.


op. cit., at 547, N. 7.


426 U.S. at 845.

The Court did not enumerate all the activities that constitute "traditional governmental functions" although it did mention fire prevention, police protection, sanitation, and public health among its examples. 426 U.S., at 851, n. 16. State regulation of land use, although not a public service per se, does provide "an integral portion of those governmental services which the states and their political subdivisions have traditionally afforded their citizens." 426 U.S. at 855.

426 U.S. at 851.

Michelson at 1172.

In Va. Surface Mining and Reclamation Assoc., Inc. v. Andrus, No. 78-00224-B (W.D. Va. Jan. 3, 1980), the court held that state regulation of land use is a traditional governmental function and that portions of the federal Surface Mining Control Reclamation Act of 1977 were violative of the 10th Amendment insofar as they displaced the state's ability to make "essential decisions" and deprived the state of any discretion or control over economic development in the affected area. However, other recent court decisions have shown reluctance to render such an expansive interpretation of NLC: under these decisions, if the federal action has only an indirect effect upon state treasuries or state choices, then it is not an impermissible intrusion. See Public Service Co. v. FERC, 587 F. 2d 716 (5th Cir., 1979), cert.denied U.S. , 100 S. Ct. 166; Okla. et al. v. FERC, No. 78-01251-T (W.D. Okla., June 4, 1980).

145

146

147

148
437 U.S. at 628-29.

149

150
437 U.S. at 627, 98 S.Ct. at 2537.

151
Jaksetic at 401.

152
There are presently two construction licenses issued by the NRC for nuclear power plants in Louisiana: one at St. Francisville, the other at Taft, La.

153
Jaksetic at 401

154

155
Ibid., at para. 30:1115 (B).

156
Ibid., at 30:1115 (D).

157

158
U.S. Constit., Art. I, Sec. 8, cl. 17.

159
Ibid., Art. IV, Sec. 3, cl. 2.

160
Jaksetic at 389-403, Lucas at 437.
161
42 U.S.C.A. 4321 et seq.

162
Ibid. at 4331(a).

163
Ibid., at 4332 (2)(c).

164
See e.g., Calvert Cliffs' Coordinating Comm. v. AEC, 449 F. 2d 1109 (D.C. Cir. 1971).

165

166
42 U.S.C. 4332.

167
Ibid., at 4342.

168
Ibid., at 4344.

169

170

171
Exec. Order 11911 para. 2.

172
CEQ Regulations, 43 F.R. 55978 (1978), to be codified in 40 C.F.R. 1500.

173
Ibid. at 55991, to be codified in 40 (F.R. 1500. 1(c) ).

174

175
op. cit. at 56004, to be codified in 40 C.F.R. 1508.8.

176
Ibid., at 56008, to be codified in 40 C.F.R. 1508.8 (b).
177
Ibid., at 56004, to be codified in 40 C.F.R. 1508.14.

178
Ibid., at 55986, Preamble commenting on 1505.2.

179
Ibid., at 55999, to be codified in 40 C.F.R. 1505.2.

180
See text accompanying notes 162-178, supra.

181
DEIS on Commercially Generated Radioactive Waste, supra, at 3.1.4.4.

182
See Figure 1.

183
U.S.G.S., Geohydrology of the Northern Louisiana Salt Dome Basin Pertinent to the Storage of Radioactive Wastes at 15.

184
Martinez et al., 1977.

185
Martinez et al., 1975.

186
Martinez et al., 1978.

187
The dome must not be undergoing dissolution, or the dissolution rate must be sufficiently low that it will not create problems within the time frame involved, about 25,000 years.

188
Martinez, et al., 1978.

189
See text accompanying notes 60-64 and 180-82, supra.

190
See text accompanying note 62, supra.

191
See text accompanying note 59, supra.

192
See text accompanying notes 108-124, supra.
In accordance with discussions between representatives of the Department of Energy ("DOE") and the State of Louisiana, the parties hereby agree that to the extent permitted by law, they will use their best efforts to adhere to the following policies and practices with respect to development of the Strategic Petroleum Reserve in the State of Louisiana:

1. **Napoleonville Salt Dome**—DOE use of this salt dome and others in Louisiana for strategic petroleum storage will be acceptable to the State, so long as no employees of industries utilizing the domes are displaced in their jobs by the Department of Energy in its storage operations.

2. **Atchafalaya Pipeline**—The State will support the proposed pipeline extending from St. James Terminal to Weeks Island, provided that activities in laying the line through the Atchafalaya Basin will not be undertaken until after July 1, 1978, and that applicable environmental and governmental regulations are adhered to.

3. **Backup Operations**—DOE will give all due consideration to barging operations as an available backup method to pipeline transportation of strategic reserves in emergencies. In particular, barging facilities at the Port
of New Iberia, and the accompanying dredging and deepening of the channel there will be studied. DOE will make available immediately $300,000 to the U.S. Corps of Engineers to be spent in 1978 for the preparation of an environmental impact statement and urge an early decision for the New Iberia project.

4. **Compensation**—DOE will pay the State $1,289,082 for the State's interest in the West Hackberry Salt Dome, located on 35 acres of State-owned land under Black Lake in Cameron Parish.

5. **Docking Facilities: St. James Terminal**—The State will support the permitting, construction and maintenance of the St. James Terminal as a docking facility.

6. **Well Pad Construction: Bayou Choctaw and Hackberry**—The State will support the permitting of well pad facilities at these two salt domes.

7. **Sabine River/Hackberry Pipeline**—The State will support the granting of permits and rights of way for the proposed pipeline extending from the Sabine River Crossing to the Hackberry Salt Dome.

8. **Nuclear Storage**—All Federal Government studies relating to nuclear waste disposal in the Vacherie Salt Dome in Webster Parish and the Rayburn's Salt Dome in Bienville Parish will be subject to this stipulation: The Department of Energy will not construct any nuclear waste
repository in Louisiana if the State objects. Studies of possible areas in Louisiana as well as in other states would continue with some test drilling which will always be preceded by complete discussions with state officials.

9. Sub-Office--The Department of Energy will open a sub-office in New Orleans, accommodating some 200 federal and contractor employees.

10. Reversionary Rights--With respect to any donations by the State of property to the Federal Government, DOE agrees that when the use to which the property was donated ceases, the State will have the right of first refusal with respect to acquisition of the property.

John O'Leary
Deputy Secretary
Department of Energy

Edwin Edwards
Governor
State of Louisiana

Date 2-27-78

Date 2/27/78
I. States Imposing A Ban

A. Ban on all HLW

Louisiana:

R.S. 30:1115 B. prohibits the disposal of nuclear waste in salt domes. No tests to determine the suitability of salt domes for disposal may be conducted unless the parish government, the natural resources committees of the state House and Senate, and the Secretary of the Dept. of Nat'l Resources have been notified. Further, if any of the above parties objects to the testing, it must cease immediately.

Maryland:

Ann. Code 43-689 B. states that it is unlawful to establish any long-term or permanent storage facility, burial ground or other such installation. Wastes can be temporarily stored until June 30, 1980 if the Sec. of Health and Mental Hygiene determines that storage is:

1) necessary;
2) in the public interest;
3) unlikely to cause any risk of leakage or release of radiation; and
4) is stored within a facility designed and regularly tested so as to safely accomplish long term storage.

Michigan:

Stat. Ann. 14.528(351) and (352) state that radioactive wastes may not be deposited or stored within the state. The ban does not apply to: facilities at educational institutions, spent fuel storage pools at existing nuclear power plants, mill tailings from uranium mining conducted within the state, medical uses of radioactive material, or temporary storage of low-level waste for not more than 60 months which was being stored before Jan. 1, 1970.
Oregon:

O.R.S. 469.500-.510 gave the Energy Facility Siting Council extensive authority to regulate all powerplants, but imposed some standards applicable only to nuclear related activity, including the promulgation of rules for the proper management and monitoring of radioactive wastes. Applicants for site certificates must agree to abide by the Council's rules, which forbid the establishment or operation of radioactive waste disposal facilities within the state.

B. Bans on wastes generated from without the state

Arizona:

R.S. 30-691 provides that no license shall be granted for the disposal of any radioactive waste that originated as waste from outside the state (however, the statute appears to refer only to low-level wastes).

Montana:

Rev. Code. Mt. 75-3-302 prohibits the disposal of large quantity radioactive material (as defined in 40 CFR 173.389(b)) produced in other states. As for in-state waste, Montana has additional provisions which may be found in category III, i.e. approval through a popular referendum is required.

II-States which relate the continued construction and operation of nuclear plants to the development of a safe and demonstrable technology for disposal of wastes

California:

Ca. Public Resources Code 25524.2: this HLW Disposal Provision delays the approval of nuclear fission thermal power plants until the State Energy Commission finds that the NRC "has approved and there exists a demonstrated technology or means for the disposal of HLW", and until the legislature has reviewed the state Commission's findings. Thus, it requires a delay until a "permanent and terminal disposition" of the waste can be achieved through existing technology. Calif.
has conditioned permission to construct new plants within the state on an appropriately documented federal determination that the containment problem can be permanently resolved.

Connecticut:

C.G.S.A. 19-409 D. conditions new construction of nuclear power plants on the identification and approval of a demonstrable technology for disposal of HLW. Additionally, no burial of waste may be made unless the general assembly finds that no significant adverse effects will occur and approves, by a special act, the burial.

Wisconsin:

The Public Services Commission issued an order (Docket #05-EP-1) dated August 17, 1978, stating that no nuclear power plants shall be planned or applied for (except those already under consideration) until reasonable progress, satisfactory to the PSC, has been made in resolving waste disposal and decommissioning issues. (9 Envir. Rep. BNA 77-08 (1978))

III-States requiring legislative or popular approval

Maine:

R.S.A. 1-15-A states that the approval of the legislature is needed for the state to consent to the acquisition by the federal government of any land, building...for storage, disposal or treatment of radioactive waste. This does not apply to spent fuel from presently operating power plants when stored in on-site facilities pursuant to a certificate issued under R.S.A. 10-251 et seq.

Minnesota:

prohibits the construction or operation of a waste management facility unless authorized by the legislature. Prohibits the transport of wastes into the state for disposal or storage unless authorized by the legislature, excepting temporary storage for up to 12 months pending transport out of the state.

(found in Means for Improving State Participation in the Siting, Licensing, and...
Mississippi:

Miss. Code 17-17-49 states that no salt dome or other geologic structure shall be the site of long-term or terminal disposal or long-term storage of HLW or other high-level material except as provided. If any person desires to conduct a study of suitability, he shall notify the division of radiological health of the state board of health, the Miss. Mineral Resources Institute, and the Dept. of Natural Resources. Results of the study shall be made available to the above persons and to the governor. The DNR and the Governor are to determine the advisibility of storage and make their recommendations to the division of radiological health. Only after receipt of favorable recommendations, may the division of radiological health grant approval for disposal and storage.

Montana:

R.C.M. 75-20-1201 provides that the people of Montana reserve the exclusive right to determine whether any nuclear facilities are to be built and operated within the state. R.C.M. 75-20-1202 states clearly that a nuclear facility includes facilities which generate, reprocess, store or dispose of nuclear wastes. Further, even after approval, no facility may be constructed unless:

1) there are no limits to liability for accidents;
2) the effectiveness of safety systems has been demonstrated in tests;
3) the facility is impervious to leakage or release of contaminants during the time it remains a radiological hazard; and
4) the operator must post a bond for decommissioning costs which is not less than 30% of the total capital cost of the facility.

New Mexico:

N.M.S.A. 74-4A-2 et seq express the concern of the state over the proposed Waste Isolation Pilot Plant (WIPP). No storage or disposal of wastes may occur until the state has concurred. It is interesting to note that DOE gave absolute veto power to the state over the siting and construction of the WIPP.
North Dakota:

Century Code 23-20.2-09 provides that no radioactive waste may be brought into the state for disposal without the prior approval of the legislative assembly.

New York:

L. 1979, chaps. 614 and 615 require both gubernatorial and legislative approval before a repository for the terminal storage of nuclear waste may be sited, constructed or operated in New York State. In order to assist the Governor and the legislature in making their determination as to the need and safety of such facilities, the NY State Energy Research and Development Authority shall:

1) conduct a study of all issues involved, including health, safety, and fiscal;
2) solicit and evaluate recommendations from appropriate state agencies;
3) prepare and EIS;
4) determine whether technology and the site will not result in a threat to public health; and
5) hold public hearings throughout the state to receive public opinion.

South Dakota:

Compiled Laws 34-21-1.1 bans the containment, disposal or deposit of HLW, radioactive substances or radioactively contaminated materials or the processing of HLW within the state unless prior approval is grant by the legislature. Exempts uranium ore and mill tailings from the provisions of the statute.

Vermont:

V.S.A 10-6501 bans the construction or establishment of a HLW repository within the state unless the General Assembly approves it, through either a bill or joint resolution. Yankee Nuclear Power Plant was specifically excluded as to spent fuel stored on-site.