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Nuclear Waste/Nuclear Power--Their  
Futures Are Linked"

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projects

Envirosphere Co., a division of  
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# **NUCLEAR WASTE/NUCLEAR POWER-- THEIR FUTURES ARE LINKED**

by

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**EBASCO SERVICES INCORPORATED**  
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## **NUCLEAR WASTE/NUCLEAR POWER— THEIR FUTURES ARE LINKED**

### **PROGRAMS OF INTEREST**

Federal and state government policy regarding permanent and interim high level waste disposal, low level waste disposal and radioactive waste transportation are issues important to utility executives because of their high potential to affect utility planning, operation and costs.

The availability of permanent repositories for High Level Waste (HLW) Disposal is required to plan any further nuclear capacity in several states. No repository, no nuclear plant. If the National Waste Terminal Storage Program falters, how many other states will pass initiatives? Will your state?

The Away-From-Reactor (AFR) Storage issue directly affects the options available to a utility to keep its nuclear plants from potential shutdowns based on their ability to store fuel discharged from the reactor. The federal government has reversed its policy and no longer promises to store the nation's spent fuel. How many electric utilities had planned to be in the business of HLW storage?

Low Level Waste Disposal is an issue which has forced some utilities to go to unusual lengths to assure disposal space for its waste at one or more of the three facilities still accepting waste. How many utilities are ordering their people to secure additional waste capacity allotments? I was stunned to learn that some people carry out their company's directives by queuing up as early as 2 and 3 AM at disposal site offices to gain access.

Local restrictions and/or bans have made a mockery of the supposed federal preemption doctrine regarding HLW Transportation, thereby forcing utilities to enter into strategies and designs they might not otherwise have considered.

All of these issues share at least one thing in common. Each exerts pressure on a utility resulting in changed plans, restrictions on operations and, in most cases, higher costs. It is appropriate, therefore, that we review the status of these issues as a whole and begin to ponder what lies ahead in the next 20 years.

### **HIGH LEVEL WASTE DISPOSAL**

#### **Responsibilities**

The key players in the National Waste Terminal Storage Program (NWTS) are the Department of Energy (DOE), Environmental Protection Agency (EPA), Nuclear Regulatory Commission (NRC) and the new kid on the block, the State Planning Council (SPC). Collectively, this group will be responsible to design, construct, regulate and help assure public acceptance of the nation's first high level waste repository.

DOE has the responsibility to locate, design construct and operate the nation's HLW repositories. The Battelle Project Management Division (BPMD), operating out of Columbus, Ohio, has been charged with carrying out these responsibilities for DOE since 1978.

EPA has been directed to develop the radiological guidelines for repository operation and has pursued a goal of assuring doses to the general public no greater than would be received from natural ore bodies.

NRC, through its office of Nuclear Materials Safety and Safeguards, will develop performance criteria and actually license the facility.

The *State Planning Council (SPC)*, established by Jimmy Carter's Executive Order in February 1980 and officially disbanded as of July 1981, was responsible for providing advice and recommendations to the President on ways to strengthen the working relationship between the federal government and state, local and tribal governments on radioactive waste management. The Council's goal was to avoid the Lyons, Kansas debacle of a decade ago. As you may recall, the salt mines of Lyons, Kansas were to be the site of a HLW repository but the federal government, by not consulting with state and/or local officials, caused an uproar that eventually helped to kill the experiment.

### **HLW Disposal Options Considered by DOE**

Briefly described below are the various alternatives considered in DOE's Environmental Impact Statement on this subject. Alternatives had to be considered to satisfy the requirements of NEPA, the *National Environmental Policy Act*.

**Mined Geologic Repository**<sup>1</sup>—Waste form buried over ¼ mile deep in a suitable geologic medium: salt, basalt, granite, tuff (volcanic ash) or shale. If reprocessing continues in limbo, the waste form will consist of canistered spent fuel assemblies.

**Very Deep Hole**<sup>2</sup>—Waste form lowered into holes drilled up to 6 miles deep in stable geologic rock.

**Rock Melt**—Waste slurry pumped into underground cavities where waste melts the rock and solidifies over time thus trapping the waste in place.

**Island Mined Geologic Disposal**—Much the same as the mined geologic option but on an island site.

**Subseabed Disposal**<sup>2</sup>—Waste canisters released from ocean's surface to imbed several hundred feet into oceanic sediments.

**Ice Sheet Disposal**—Waste form placed in shallow hole whereupon it proceeds to melt ice and descend to the bottom of the ice sheet with solidification of the melted ice above it to form a seal.

**Well Injection Disposal**—Waste liquid or grout pumped 1 to 3 miles deep into fractured rock where it would eventually solidify.

**Transmutation Concept**—Spent fuel is reprocessed and a portion transmuted into stable or short-lived isotopes, the remainder buried in a mined geologic repository.

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<sup>1</sup> Selected for at least the first repository.

<sup>2</sup> Selected for further development.

**Space Disposal**—Waste form rocketed into space where it eventually assumes an orbit stable for one million years. The space shuttle is intended for use should this option ever revive. One question that occurred to me on reviewing this option was why not shoot it to the sun? It appears that the fuel requirements for all the trajectory maneuvers are prohibitive.

**No Action**—Significantly curtailed HLW R&D with the assumption that spent fuel would be stored indefinitely at reactors or at independent sites.

### **Status of Mined Geologic Repository Option**

DOE announced in May of this year its official policy which calls for high level waste disposal in a mined geologic repository (MGR). DOE will, however, continue to examine subseabed and very deep hole as potential backup technologies. Since the Reagan Administration has not significantly decreased the funds available to pursue this program, it's a fair bet that the NWTs is considered a priority program.

Currently several test sites are active in the salt, basalt and granite media. In addition to these test sites, DOE, in a recent change of strategy, has announced its intention to go forward with the construction of exploratory shafts and a Test and Evaluation Facility to demonstrate the technology utilizing several hundred spent fuel assemblies. This strategy switch will likely delay the current schedule which calls for permanent waste emplacement by 1997, but should serve to greatly increase the confidence of the public. Such a facility would be useful in finalizing the repository design, especially the emplacement and waste handling systems. DOE and the US Geological Survey are in the process of meeting with state officials to discuss cooperative planning.

DOE has selected most of the major contractors it will need to license its MGR. Ebasco and its Envirosphere Division will play a significant role in this national program. We have been selected to lead the licensing effort as well as supply major portions of environmental baseline data and analyses. Since both DOE and Battelle have characterized the NWTs Program's problems as 10 percent technical and 90 percent societal, we expect to be tested in the decades ahead as we discharge our responsibility on this first-of-a-kind licensing effort.

NRC, in March of this year, published as a rule that portion of The Code of Federal Regulations (10CFR60) that details the administrative licensing procedure to be followed. In June of this year, the NRC Commissioners voted to go to rulemaking with the technical portion of 10CFR60. With the finalization of this rule, the major piece of regulatory guidance will be in place. As usual, not everyone is happy with the specifics in the rule. If they were, this could hardly be the nuclear business.

Another development at NRC (and in the Reagan Administration) is the revival of talk about reprocessing. Consideration is being given to restarting the Barnwell Facility. However, there are certain institutional hurdles yet to be cleared before we see the day, (such as, restart and conclusion of the GESMO<sup>3</sup> proceedings). Economics are yet another matter.

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<sup>3</sup> Generic Environmental Statement on Mixed Oxide Fuel.

EPA has not yet issued its draft technical criteria document for public comment. These criteria, to be known as 40CFR191, are scheduled to be issued in final form by July 1982. EPA estimates up to a \$600 million annual cost (1978 dollars) to implement its standards! This is almost 50 percent of the total estimated repository cost!

The State Planning Council (SPC), in its final report, has recommended the following to the President:

- The doctrine of consultation and concurrence should consist of a process to resolve disagreements between the federal government and a state or tribal government with the use of neutral third parties when appropriate;
- A statutorily defined conflict resolution mechanism which calls upon the President or the Congress to make final siting decisions if the parties reach an impasse; and,
- A technically conservative, step-by-step repository development program geared to build public confidence.

#### **Issues of Interest to Utilities**

There are at least three issues in my view that utilities ought to be concerned about which are dependent upon the NWTs Program either directly or indirectly: the issues of consultation and concurrence, nuclear moratoria and spent fuel storage.

Consultation and concurrence is a euphemism for federal preemption. For the HLW disposal issue particularly, there needed to exist a policy to involve the states without outright abdication of federal responsibility. Even though state veto power over siting is unlikely to be granted, under current SPC recommendations, states could force a Congressional or Presidential action to decide siting issues. Although this does not seem totally unreasonable given the issue, I wonder how such a precedent would filter down to the reactor siting process. There can be little doubt that the "consultation and concurrence" process sprung from the best of intentions. But my experience in licensing nags me to consider this is just the type of precedent that organized obstructionists would take to court to "test" its applicability to nuclear power plant siting. Perhaps a policy of *consultation and coordination* is an approach more consistent with the intent of the Atomic Energy Act.

Additionally, it is to be noted that legislatures in a multitude of states are proposing laws that would preclude their state from becoming the site of a HLW disposal facility. I urge all of you to follow these proposals and to do your part to allow the consultation process to work. It is in the nation's and ultimately the utilities' best interests.

Regarding nuclear moratoria, the NWTs Program has provided much of the data in support of the Waste Confidence Rulemaking. The Waste Confidence Rulemaking was undertaken by NRC to establish for the record that the technology exists for attaining the goals of the NWTs Program. The outcome of this effort will be directly related to the future of nuclear programs in most of the moratorium states and will constitute an industry weapon in any future contests. Additionally, if successful, the Confidence Rulemaking would essentially preclude the consideration of the HLW disposal issue in each individual NRC licensing proceeding.

Lastly, the ability of the federal government to carry out its responsibility to dispose of commercially generated high level waste in a timely manner directly affects utility planning regarding interim storage of spent fuel which, in the absence of reprocessing, must be considered waste.

## **INTERIM STORAGE OF SPENT FUEL**

### **Responsibilities**

Government storage of spent fuel on an interim basis is a dead issue for the foreseeable future, and for all intents and purposes may be dead forever. Even though Senate Bill S 2189, signed by President Carter on December 22, 1980, assigned dual responsibilities by (1) directing DOE to design, acquire or construct one or more federal away-from-reactor (AFR) spent fuel storage facilities, and (2) directing utilities to maximize the storage of on-site spent fuel storage capacity. As of April this year, the responsibility for interim storage of spent fuel has now become the utilities in total. Since utility plans must go forward to reliably provide for their own storage needs, a future government turnaround on this issue may be moot.

NRC, of course, is responsible for the licensing and regulation of any such facility or modification on-site or off. SPC was responsible for making recommendations to the President

### **Status of Interim Spent Fuel Storage Program**

The Reagan Administration has failed to authorize funds to allow DOE to fulfill its responsibilities as outlined in S.2189. Essentially, Reagan has said that the interim storage of spent fuel is the industry's problem. Consequently, federal possibilities to purchase Barnwell or the Morris facility have dried up. Instead of the AFR, DOE now has a program focused on the development of alternate spent fuel storage technologies, such as dry storage and rod compaction, to enhance utility *at-reactor* storage capabilities.

NRC meanwhile, knowing that some form of augmented interim spent fuel storage capacity would be required (whether by DOE, utility or both), amended its regulations by the addition of a new rule, 10CFR72, which covers the storage of spent fuel at an AFR on an interim basis. The new regulation became effective December 1980 and so is in place to process utility applications for an AFR facility. The new rule in fact does not use the term AFR since it provides for wet or dry storage at an Independent Spent Fuel Storage Installation (ISFSI) which could be located "at" or "away from" the reactor site. The dry storage concept is gaining favor in some quarters due to reduced costs and modular design features.

Although the utilities have not been submitting AFR applications, neither have they been idle. Utilities have submitted 55 applications as of July 1981 to increase spent fuel pool storage capacities. NRC has approved 39 of these; the remainder are pending.

For its part, the State Planning Council has not been idle either. Its deliberations were concluded and recommendations reached before the new administration changed the game again. Their recommendations have a prophetic ring to them:

- 1) *The industry should be primarily responsible for providing storage capacity.*
- 2) *If a federal role in providing storage capacity is established, any federal capacity should be limited to existing facilities for the storage of spent fuel from existing reactors, and such federal facilities should be established regionally.*
- 3) *Utilities should be required to maximize existing on-site storage.*
- 4) *The construction of new reactors should include life-of-plant storage capacity.*

SPC also drafted a resolution that encourages states to minimize the institutional barriers to utility solutions for interim storage. As for DOE development of alternate storage techniques, SPC asks DOE to ensure that such techniques are available for use by 1986.

### **Issues of Interest to Utilities**

I believe that most, if not all, utilities have gone about their strategic spent fuel storage planning without counting on federal help. Utility decisions may have been delayed while awaiting a firm commitment from the federal government on AFRs, but contingency plans were in the works. However, there is a limit to how much (and how often) an existing spent fuel pool can be modified. Clearly a utility's confidence in the availability of the first permanent HLW repository becomes a *new variable in the next round of strategic planning*. Other variables could include the possibility of future reprocessing, utilities sharing AFRs (similar to low level waste facilities discussed later in this paper), the transportation issue, and the possibility of on-site construction.

In addition, SPC's recommendation for life-of-plant spent fuel storage capability (and beyond?) for new reactors must be seriously analyzed.

Future policy changes on reprocessing could, of course, change the picture once again although, perhaps, not in time to affect decisions that must be made in the near future. In view of the variables and uncertainties, utilities must decide to deal with the capabilities we have here and now: designs for on-site or off-site pool storage incorporating modularity and flexibility to accommodate shared utilization and new technology developments (rod compaction, dry storage). Modularity in design should prevent costly over building.

## **LOW LEVEL WASTE DISPOSAL**

### **Responsibilities**

The Low Level Waste Policy Act, signed into law December 1980 attempts to recognize the seriousness of the approaching LLW crisis. Of the three sites across the country that still accepted nuclear LLW for burial disposal in May of this year: (1) the Hanford site, except for an 11th hour (June 26) court ruling, would have been prohibited effective July 1, 1981 from accepting any additional non-medical LLW; (2) the Barnwell site has imposed a two-year volume reduction program (effective October 1981) that will halve the amount of waste accepted for burial; and, (3) in Nevada, Beatty is closed (effective April 1981) to all who do not submit to do a third party inspection and audits of compliance with regulations on packaging and transportation of LLW.

Among other provisions, the Low Level Waste Policy Act assigns responsibility for LLW disposal to individual states for waste generated within their borders. A state is permitted, however, to enter into compacts with neighboring states for the establishment of regional LLW disposal sites. You will note a philosophical difference in the treatment of HLW and LLW. Whereas the federal government assumes responsibility for HLW disposal, the states have responsibility for LLW disposal. The fact that commercially available technology can be applied to LLW disposal accounts for the dichotomy. The federal government is not without any responsibility, however.

Per the Low Level Waste Policy Act, DOE is required to conduct various studies to project future volume requirements to support state planning. In addition, DOE is to provide technical and financial support to the states.

NRC and SPC are responsible for the regulations governing LLW disposal and for providing advice to the President, respectively.



Utilities, of course, have responsibilities too, although not spelled out in the Act. Utilities must keep their plants operating which means that once again their capital expenditures will increase as plans for on-site treatment (e.g., volume reduction) are implemented.

### **Status of LLW Disposal Issue**

To date, more than 20 states have completed or are conducting studies of their LLW management requirements. During the past nine months, groups of states in each section of the country have met to discuss alternatives for regional management of LLW. An interstate compact has been drafted and adopted by four states in the Northwest, and a draft compact is expected to be ready for submission to nine state legislatures in the Southeast by January 1982. States in the Northeast, Midwest and South Central regions are working toward similar arrangements.

Not all the state action has been positive. Legislation continues to be introduced which, if passed, would directly conflict with the intent of the federal Low Level Waste Policy Act by restricting or prohibiting disposal of LLW in those states.

DOE has undertaken four studies related to LLW:

- 1) Present and Future Disposal Capacity Needs.
- 2) Current Status of the Six Commercial Disposal Sites
- 3) Transportation Requirements.
- 4) DOE Capacity for Interim LLW Storage

The results of these studies are now available (DOE/NE-0015).

NRC issued a draft of 10CFR61, the regulation which will govern the licensing of LLW facilities, in November 1979. The final rule is scheduled to be in place by September 1982.

Once again the State Planning Council seems to have been able to greatly influence the outcome of legislation. The SPC has recommended to the President that (1) LLW disposal sites should be under state supervision; (2) compacts should be encouraged; and, (3) the federal government should aid the state technically and financially.

Utilities are exploring methods for volume reduction and/or storage to avoid plant operational restrictions due to unavailability of offsite disposal capacity.

### **Issues of Interest to Utilities**

A federal district judge ruled on June 26 of this year that the state of Washington's ban on out-of-state shipments of nuclear waste was unconstitutional. The suit was brought by a coalition of individuals, business and labor groups. The judge reasoned that the "Washington initiative is unenforceable because it violates both the supremacy and the commerce clauses of the US Constitution." The ruling was so decisive that state authorities will probably not appeal. Left unchallenged, this ruling becomes a powerful disincentive for similar "ban" initiatives.

The state of Nevada fined a utility \$1500 and imposed a 3-month ban (effective immediately) for packaging violations. Although the ban is probably unconstitutional, at least until 1986, the effect is real. Utilities have a real interest in ensuring that packaging procedures are adhered to. If we believe Nevada's action to be unfair, then the lesson taught by recent years of public indignation have still not been learned.

Regional LLW compacts are forming. These compacts will need to be sanctioned by various state laws and regulations. Any approval process which involves multiple states could conceivably take years. Hence, a utility needs to monitor its own state's progress and plan accordingly. Additionally, as states inherit the LLW problem, you can expect them to demand a stronger role in the regulation of shipping and packaging.

Also to be noted is the provision in the Low Level Waste Policy Act which allows LLW from non-compact member states to be excluded from regional compacts after 1986. Obviously, there may be a penalty, even though self-imposed, for balky states. Further, certain state compacts are proposing to shorten the decision threshold even more by restricting participation sooner, such as 1983 in the case of the Northwestern Regional Compact. I would expect any efforts to change the 1986 date to be held in violation of the law.

Finally, with Barnwell's volume limitation in effect, about half of the waste generated in the east will require shipment to the west. Stricter packaging requirements and third party inspection imposed at Beatty plus the increase in transport distance will guarantee an increase in your costs.

## **TRANSPORTATION**

### **Responsibilities**

A number of state and local governments have either passed or proposed legislation that severely restricts transportation of certain radioactive materials through their jurisdiction. Some laws provide for civil penalties of tens of thousands of dollars. Some of these bans will outlaw shipping routes which have been in effect for over 20 years.

The transportation of radioactive materials differs from other aspects of their use and handling because it is subject to dual federal regulation, involving not only NRC but also the Department of Transportation (DOT). In 1974, Congress enacted the Hazardous Materials Transportation Act which vested in the DOT the authority to regulate all modes of transportation of hazardous materials, *explicitly including radioactive materials*.

The Atomic Energy Act of 1954 vested in the now Nuclear Regulatory Commission jurisdiction over the civilian use of nuclear materials including the packaging, shipment and physical security of nuclear materials.

As if two federal regulatory agencies weren't enough, federal law also involves the Interstate Commerce Commission (ICC) in the transport of radioactive materials.

States and local governments also claim to have a say. The authority of state and local governments to regulate the transportation of radioactive materials stems from their inherent police powers to protect the health and safety of their citizens.

The State Planning Council, as with the other issues discussed, was responsible to provide guidance to the President.

### **Status of Radioactive Waste Transportation Issue**

In January 1981, DOT issued its final rule on the highway routing of radioactive materials. The rule represents a reasonable balance between national and local interests while providing for a national uniform and safe, viable transport system for radioactive materials. The rule will take effect in February 1982. In it, DOT asserts the federal preemption doctrine.

For its part, NRC revised its regulations (10CFR71), effective December 1979, to require all shipments of radioactive material made by NRC licensees to conform to DOT's new regulations. Additionally, NRC has proposed via an amendment to 10CFR71, effective June 1981, that a licensee shipping nuclear waste provide advance notification of shipment to the governors of states affected. Notification of shipment of spent fuel is to be withheld from the public by the governors until after shipment. These requirements are intended to facilitate emergency planning.

The State Planning Council in its July 1981 report (1) endorsed DOT's rule which designates the interstate highway system as the preferred route for "large quantity" shipments; (2) recommended that existing prenotification systems should not be preempted until DOT and NRC promulgate a uniform prenotification system developed in consultation with state and local governments; (3) suggested that the federal government must initiate and implement a strong enforcement program even though generators and shippers are primarily responsible for safety and integrity of all shipments; and, (4) recommended that states should have the lead role for developing emergency response plans for dealing with transportation accidents.

With respect to state and local activity, a pattern of nonfederal regulation has emerged, generally falling into one of four categories:

- 1) Ordinances or regulations that operate to ban completely the transportation of radioactive materials through a given jurisdiction;
- 2) Ordinances or regulations that impose significant regulation over such transport. Examples of these are speed limits, escort requirements, and rules specifying approved routes;
- 3) Ordinances or regulations that require a state or locality to monitor and receive information concerning transportation of radioactive materials through the jurisdiction; and,
- 4) Ordinances or regulations that adopt partially or completely the federal regulatory scheme.

More than 50 percent of our states have passed laws that regulate, limit or prohibit the movement of radioactive waste.

Switching for a moment from trucks to trains, ICC has determined that mandatory special train service (imposed by railroad carriers to "provide additional safety margins") is wasteful transportation and an unreasonable practice. ICC ruled that NRC, not the railroads, is responsible for nuclear safety and ordered a retroactive rollback of fees.

### Issues of Interest to Utilities

It is important for persons in the industry to be aware of the problems associated with such a wide variety of regulations governing radioactive materials transport. Planning of storage capacity can be difficult to do in an orderly manner. Brookhaven National Laboratory was ultimately forced to expand its spent fuel storage facilities when both New York City and then New London, Connecticut restricted movement of spent fuel through their areas.

Utilities ought to concern themselves with the implementation of DOT's rule. Utilities need to combat the disruptive effects of groups formed to modify or repeal the DOT rule, and to work with the states to preclude the issuance of restrictive routing regulations: in effect, to avoid challenges to the federal government and avoid delay. I should point out that the preemption section of the DOT rule is not self-executing, i.e., state and local rules that are preempted by the DOT rule will not immediately become null and void. Carriers transporting radioactive materials within jurisdictions where a restrictive regulation is in effect will have to obey that regulation until it is found to be preempted either by the DOT or a court of law—for each case. Such a process is extremely slow and costly, thus the controversy is far from over.

### CONCLUSIONS

The intent of this paper is to bring us up-to-date on related aspects of the general topic known as radioactive waste disposal. Along the way we have hinted at ways in which utility planning and cost can be affected by decisions based less on technical than on political necessity. This appears to be true for all four aspects of the radioactive waste disposal issue we have addressed: HLW, LLW, interim spent fuel storage and transportation.

If I had to draw but one conclusion from this update it would be that there seems to be little, if any, relationship between the waste-related problems that confront the industry and real hard technical issues. We know how to ship waste and we know how to store waste. Yet our problems persist. They persist because we as an industry have not devoted sufficient attention to the institutional factors, i.e., factors important to society. Engineers as a group tend to get bored with institutional problems; we seem to have little patience with those who are not capable of readily assimilating technical logic. We tend to be technical macho men. Well, we're finding out the hard way that technical logic by itself does not impress a lot of people and, further, that those unimpressed people can cause a lot of grief for utilities. What then can we do?

Step number one is to recognize that we as an industry are vulnerable, that public support is necessary for the industry to thrive and that some positive action on our part is necessary to gain it. Since we don't seem to need a better mousetrap, our actions should not necessarily be technically based.

Step number two is to understand that those people who continue to confront and frustrate our industry fall into two basic camps: those that oppose us on ideological grounds and those that are simply afraid. Most of the public who oppose our programs fall into the second category and, interestingly enough, provide the power base for the first group. But even our supporters often give only qualified approval—"Nuclear? Yes we need it, but please don't build it around here. I've got young children to rear." There is a fear of nuclear power or, more precisely, radiation. How do we combat this fear?

With our form of government, there is no substitute for a long-term public information program conducted by technical people who care about the public's fears. Only then, and by enforcing the rules we've agreed to accept in our licensing documents, can we regain the public's trust. In addition, since people with fears and ideologies different than ours get elected, the same type of effort must be directed at local, state and federal lawmakers. We need their trust just as much, but sooner. Even though we may not agree with all of the State Planning Council's recommendations, I would suggest that we all become more familiar with its workings. Under the direction of Governor Richard W. Riley of South Carolina, the Council has managed to merge the technical and institutional needs of this nation. The Council has touched all the bases without straying outside the baselines in either direction. We need to do as well.

I hold no illusions about the ability of public information programs to make our problems quickly disappear in the radioactive waste disposal area. I do believe it can keep them from deteriorating so that today's energy options are not precluded if world events dictate a change in future energy strategy. In the meantime, implementing solutions for our immediate needs in the radioactive waste disposal arena will continue to be difficult. Striving for solutions involving public input and the levels of government with which we must deal will not be unlike a ping pong match using a dented ball. Just when you think you are in position to deliver a winning blow, the target jumps off into left field, seemingly without rhyme, reason or warning. When that happens, it is likely that we have stopped listening to institutional rumblings: we have missed the warnings.