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DO WE DISPOSE OF OUR TRASH OR TRASH OUR TECHNOLOGY? THE CHOICE IS OURS

PRESENTED BY
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INTRODUCTION

Nuclear Waste is one of the key issues of the day - not only for the nuclear community, but for the whole of society and this conference is one of those important opportunities to get together and share experiences and together seek solutions.

This morning I'd like to address the topic of low-level waste (LLW) disposal by going back in time in order to understand how we got to where we are today. Then I'd like to assess where we are now in the process. And finally, I'd like to talk about what can be done to keep the process moving.

HOW WE GOT TO WHERE WE ARE

Let's look at how we got to where we are. As I look at the radioactive waste disposal situation today in the United States, I can't help but recall something allegedly said by Winston Churchill about Americans:

> "In the end Americans will do the right thing, but along the way they exhaust every other possibility."

So lets go back into history and look at the possibilities that have been exhausted in the attempt to deal with LLW. As Francis Bacon said, "Histories make men wise." - hopefully, women, too.

The 40's and 50's

From the beginning of the Atomic Energy Commission's (AEC) weapons program, low level waste was disposed of in land disposal sites at its own installations, and it still is, but military and commercial LLW in the 1940's and 50's was disposed of primarily in the oceans. In 1955, the National Academy of Sciences was asked by the AEC to study waste disposal on land, including LLW, but the Academy report issued in 1957 focused primarily on high-level waste (HLW). Mention of LLW was conspicuous by its absence and was apparently simply not viewed as a problem. However even as early as 1956 there was obviously some concern at the AEC where, in an internal memorandum, the Director of Reactor Development acknowledged the importance of public relations related to waste disposal. The memo said, "Expansion of the industry authorized under the Atomic Energy Act of 1954 has and will continue to intensify the public relations problems in waste disposal, because it is obvious that competitive industry will want to build and operate plants in or near populated areas where markets for its products exist. The essence of maintaining good relations with public officials and new users of atomic energy rests in ability and willingness to serve them in resolving technical problems especially those involving waste disposal."

Concern over LLW surfaced at Congressional levels in 1959 when a series of hearings was held by the Joint Committee on Atomic Energy on the implications of health hazards and costs of radioactive waste disposal. Also discussed was ocean disposal of LLW and the need for a better understanding of the effects of radiation on marine life.

Although there was no particular outcome to this series of hearings, there were other incidents which became media events and began to move the AEC to favor land disposal. For example, there were several licensing actions over a period of 2 to 3 years that were opposed by numerous local groups. Then a fake waste drum washed ashore onto a beach in Oregon which caused a stir in the media. It was painted white, its only markings were "Danger-AEC Rad Waste", but when it was tested, it was not contaminated at all. Ultimately, the AEC authorized land disposal at AEC facilities at Oak Ridge and Idaho so that companies that had been denied licenses for ocean disposal could still dispose of waste.

As the controversy over ocean disposal peaked in 1959, the AEC agreed that the agency needed to undertake a public information campaign to explain waste disposal procedures. The Commission held a series of public meetings, conducted drum impact testing and conducted some sampling studies off Boston Harbor to assure the public that there were indeed no detectable levels of contamination. However, beyond these initial public meetings and

sampling studies, there is little indication in historical records of any real public information campaign about waste disposal.

Finally, in December 1959 the AEC adopted a policy favoring land disposal of LLW over ocean disposal with the rationale being that land disposal was less expensive; and, even though ocean disposal was technically safe, land disposal was viewed by the public as being safer. This decision called for disposal on government-owned land, starting with just a few regional sites and building new facilities perhaps up to a total of five or ten as needed. The underlying rationale was to concentrate waste at a few sites rather than at the sites of thousands of licensees across the country.

The 60's and 70's

During the early 1960's, the AEC continued to accept commercial waste for disposal at its facilities at Oak Ridge and Idaho at 70 cents/cu. ft. However, these low prices were seen as an infringement on private business rights by the commercial disposal companies. As a result, the AEC instituted a licensing process and in 1962 issued its first license to Nuclear Engineering Company for operating a land disposal service on state-owned property near Beatty, Nevada.

In 1963 acceptance of commercial waste was terminated at AEC facilities, leaving Beatty as the first commercial land site for LLW disposal.

Through the 1960's, 1970's, and up until the passage of the LLW Policy Act in 1980, development of LLW disposal sites for commercial waste were private business developments, usually located on State-owned land. States typically welcomed these facilities as a way to attract high-tech industries. Kentucky, an Agreement State, issued a license to Nuclear Engineering Company to operate a LLW disposal facility at Maxey Flats in 1963. Nuclear Fuel Services and the New York Atomic Research and Development Authority developed a spent fuel reprocessing facility at West Valley which was licensed in 1963. It included a LLW disposal facility licensed by New York, which served not only the NFS plant, but satisfied the need for a disposal site in the northeastern part of the country, which by then had over 2500 licensees generating waste. Commercial disposal facilities also opened at Hanford, WA and Barnwell, SC in 1971.

Some of the early commercial facilities operated into the mid to late 1970's, but experienced groundwater contamination which attracted adverse media coverage and ultimately led to their closure, although in no case were radioactivity levels in the groundwater found to exceed Federal standards. These included

the facility at Sheffield, ILL, the Maxey Flats site (which became a Superfund site) and the West Valley site.

The 80's

With only 3 sites remaining in Nevada, Washington, and South Carolina, and the belief that no new sites would be developed in a reasonable time frame, the Governors of those 3 states along with the National Governors' Association and the National Conference of State Legislators pressed Congress for legislation to address the situation. The result is history with which you are all familiar, namely the enactment of the Low Level Radioactive Waste Policy Act in 1980.

The act was amended in 1985 to force the development of facilities by way of the so-called "take title" provision which provided that if a non-compact state had not developed disposal capability by January 1, 1996, the state had to take title to the waste generated within that state. This title was struck down as unconstitutional by the Supreme Court in 1992. The question of whether this provision applies to the Compacts remains unclear.

WHERE ARE WE NOW?

So one might ask where are we now? And as the end of the Ten Little Indians nursery rhyme goes: ... and then there were none.

Status

Beatty closed in 1992. Hanford is open only for the NW and Rocky Mountain Compact (9 states). Barnwell closed its doors to waste from outside the Southeast Compact (8 states) in June 1994. That leaves 31 states, the District of Columbia and Puerto Rico with no access to a licensed full-service disposal facility. Generators that choose to remain in business in those 33 political jurisdictions will be forced to store their LLW on-site.

What is happening in these 33 entities? Ward Valley in CA has experienced an unexpected setback, but there is progress elsewhere. Things are moving ahead in Texas including the formation of a new compact with Maine and Vermont. Hopefully, Congress will ratify their compact early in 1995. The S.E. Compact has selected a new site in N.C. And the process of site selection is still progressing in the Appalachian Compact, the Central Compact, and the Midwest Compact. However, many of the Compacts and unaffiliated states face serious schedule delays.

Ironically, because of these delays, in part due to a negative media image which has fed the "NIMBY" syndrome, generators in these 31 states, the District and Puerto Rico will have to store their waste literally much closer to everyone's backyard.

Implications

To understand the implications of having no disposal facilities, it is instructive to look at the sources of LLW. 65% of the volume of LLW is generated by non-utility sources including the academic, medical, industrial, and government sectors; 35% is generated by utilities. Of the total of over 1 million curies disposed in 1992, 86% came from utilities, 10% from industry, and 4% from government. Less than 0.2% came from the medical and academic sectors. What will be the fate of these wastes? Well,

the utilities generally have adequate space and many have storage facilities already in place. State offices and some Compacts report that they expect some materials licensees to be able to store waste for 1-2 years with no problems through a combination of approaches including: building more storage facilities, increasing possession limits, or allowing decay-in-storage for disposal. Ultimately, however, these licensees will have problems providing adequate storage. On the other hand, some generators, including research clinics, hospitals, outpatient treatment clinics, and small industrial users, particularly in large urban areas, are now having problems. The New York City cancer research facilities and hospitals, e.g., Sloan-Kettering, began reporting curtailment of many research projects early in October. To further compound the problem, waste treatment facilities, which are mostly located in the NW and SE compacts, can potentially exclude out-of-compact waste for treatment since the disposal of intermingled Compact and non-Compact wastes is illegal. With protracted on-site storage comes the potential for the real safety problems that led to the NRC's long standing policy of preferring disposal over such storage. These include increased potential for greater worker exposures and the increased possibility of public exposures due to the many problems associated with storage not to mention the practical difficulties of effectively regulating thousands of storage sites.

It might only be a matter of time before waste is stored in unsafe places, is sent down the drains or out with the regular trash, or just dumped down a ravine.

Ultimate Consequences

If the LLW problem is not solved and the above problems are not avoided, the use of nuclear energy and materials in the United States may be in jeopardy. Any responsible society must consider these ultimate consequences before allowing this outcome.

The question becomes: What does society lose if all technology based on the use of radiation and radioisotopes is halted because the waste problem is not solved? Nuclear technology is a major tool of today's society which impacts our quality of life and our standard of living. It is instructive to review some of these applications, since in many cases there are no available or reasonable substitutes for the use of radioactive materials.

Nuclear energy is perhaps the most visible application. In the U.S. approximately 20% of our overall electricity is generated from nuclear power. It has saved the U.S. approximately $100 billion in foreign oil payments from 1973 to 1990. Nuclear plants produce electricity without releasing carbon dioxide, sulfur oxides, nitrogen oxides, smoke, particulates, or organic

compounds, all of which are released by fossil fuel plants. In terms of solid waste, a coal-fired plant produces about 750,000 tons of ash per year; a nuclear plant produces about 50 tons of spent fuel per year. The hazardous ingredients in coal ash include arsenic, mercury, cadmium, and lead, all of which maintain their toxicity forever. Coal ash is discharged to the environment with minimal regulatory controls. Spent fuel, while highly radioactive for many years, eventually does decay and is highly controlled and regulated. The Congress, via the Energy Policy Act, assumes that nuclear power will continue to be a vital part of the energy mix to provide an element of energy security, and to provide, together with fossil fuels, the electrical capacity required in the U.S.

I'm sure all of us have known of someone who has benefitted from the use of radioactive materials in medicine. 12 million nuclear therapy procedures and over 100 million nuclear diagnostic procedures are performed in the U.S. each year. One in 3 hospitalized patients benefits from a nuclear medicine procedure as part of the diagnostic process. Other applications include blood testing and sterilization of clothing, sutures, dressings, syringes, catheters, and human tissue used in grafts and implants.

Radioactive materials are used extensively in industry and consumer products. Radiation is used to vulcanize sheet rubber, in the manufacturing of tires and to test steel quality in cars. Radiography is used to provide quality control in the construction of gas and oil pipelines, and to examine the structural integrity of bridges and airplanes. Radioisotope gauges are used to measure and control the thickness of steel, paper and textiles, the proper level of liquid in your favorite beer and the amount of air whipped into ice cream. Radioisotopes in antistatic devices reduce static electricity in materials that are rolled, such as newspapers, and paper, and in textiles and copy machines, thereby reducing the potential for fire. Radioisotopes are used to sterilize everyday consumer products from cosmetics to contact lens solutions, in gauges that monitor air pollution, assess soil contamination and the absorption of greenhouse gases by plants and the oceans, and in scrubbers on coal-fired power plants to remove both flue gases and particulates. Tritium is used in emergency signs. Nuclear techniques are used to date historical and archeological objects, and in remote sensing techniques, and radioisotopes have powered more than 20 NASA space craft since 1972 including satellites for exploring the outer reaches of the universe.

Radioactive materials are used in agriculture to treat seeds for improving yields and making plants more disease resistant. They are used as tracers to study plant physiology.

The economic bottom line for the uses of radioactive materials in the U.S. economy, has been estimated by Management Information Services, Inc., a consulting firm that does work in cost/benefit, industry impact, and job effects in the energy and environmental areas, in its report on the "Economic and Employment Benefits of the Use of Radioisotopes and Radioactive Materials." Their 1993 report indicates that the total industry sales attributable to radioactive materials in 1991 was $257 billion, that 3.7 million jobs were created by working with radioactive materials, and that $45 billion was paid in local, state and federal taxes by companies and institutions that used radioactive materials in 1991.

If the nation is forced to eliminate the uses of nuclear technology or make do with less satisfactory alternatives, because of the unavailability of waste disposal facilities, both the economic and quality of life ramifications are likely to be significant.

WHERE ARE WE GOING?

One must ask the question, "If society then decides that nuclear technology should not be lost, then what can be done to solve the LLW dilemma?".

First, it is clear that the technology is available. Society in recent years has shown enormous ingenuity regarding waste minimization, recycling, and new technologies for both waste treatment and disposal. Disposal technology is not the problem.

Secondly, a regulatory, legal and an administrative framework is in place. NRC and Agreement States have rules available regarding the disposal of LLW. Compacts are established. While the future of the "take-title" provision of the low level waste legislation may be unclear, other incentives remain - most notably, the legal ability of compacts to exclude non-compact waste. This, and the financial incentives in the legislation, can provide the impetus to further progress. On the other hand, it has been 14 years since the enactment of the Low Level Radioactive Waste Policy Act, and not one new facility has been built. There is no clear agreement on how many facilities are needed, and on what process should be to used to find a site. Nevertheless, I suspect that it is premature to conclude that the structure and process cannot work, especially in the absence of any proposal for reasonable and viable alternatives.

The major problem seems to be that the societal decision-making process has broken down. Why? A sense of balance seems to be missing. The use of nuclear technology involves balancing the benefits, the risks and the costs. The risks, not always accurately portrayed, have become widely known to the public. But often little if anything is known about the benefits or costs, either of nuclear technology or of the alternatives, if any. Moreover, the public, rather than focusing on the larger issue of determining an acceptable balance between the uses of nuclear energy and nuclear materials and the risks involved, has occasionally become distracted by side issues, for example, how to selectively identify and exclude utility generated waste. But we all know that many of the same isotopes can be generated as waste via a variety of applications and that utility generated waste is far from the largest proportion of the total by volume. Also tossed about is whether waste can be divided into "good" waste, e.g., Class A and "bad waste", i.e., Class B or C, and with the bad waste being correlated with a specific type of generator. Again we know this is not the case since classification depends primarily on concentration, not on the source of generation. Such debates not only lead to oversimplification and erroneous conclusions but, more importantly, distract from the central question society must face: what price are we willing to pay for the benefits of both

nuclear energy and nuclear materials. Ultimately, society must choose how much risk it is willing to accept in order to avail itself of the benefits of a technology that enhances the quality of life. Alternatively, society must know what risks or consequences may result from eliminating nuclear technology. Society must make an informed decision.

HOW CAN WE GET THERE?

NRC was given a limited role in the low level waste arena via the LLW Policy Amendments Act. It is simply regulatory in nature: that is promulgation of regulations, development/implementation of guidance, licensing in non-Agreement states, and determining adequacy and compatibility in Agreement States. Any attempt by NRC to force action, on other than a health and safety basis would be inappropriate. The host states, Compacts, and non-Compact Agreement States clearly have the responsibility under the law for taking the lead in siting, developing and licensing disposal facilities.

Despite our differing responsibilities however, we all need to provide better information so that the public will be in a position to accurately balance the benefits with the risks of the use of nuclear technology, including the risks associated with the disposal of LLW. I believe that the NRC can and should play a stronger role in providing factual information to the public. I have been reviewing information prepared in other countries, for example, by the National Radiological Protection Board in the U.K. and ANDRA in France, as well as information that was published by NRC's predecessor agency, the AEC. It is basic information on "what is radiation", "what does it do", "where does it come from", etc. This type of information is basic to the public's understanding of risk, and how to weigh the risks of the use, benefits and costs of nuclear technology.

However, much needs to be done with respect to highlighting the benefits which are the other side of the risk coin and with respect to comparing the risks and benefits of the use of nuclear energy and nuclear technology with the use of alternatives or the lack thereof.

It is clear that this country has chosen a technology that has improved our health, increased the quality and quantity of consumer products, improved the safety, quality, and quantity of the food we eat, our basic transportation systems, fire protection in our homes, and in general, greatly improved our quality of life. All of us must work to bring balance to the decision-making process. This is going to entail a public information campaign. Where does this bring us? Full circle - back to the conclusions the AEC reached in the 1950's, which were essentially the same; and which reminds me of Dixy Lee Ray, the former Chairman of the AEC, who writes in her book, Trashing the Planet, "Final decisions are made, quite rightly, by the people and their elected representatives. It is especially important, then, that responsible scientists and their institutions make sure that scientific facts get a proper airing in the media so that we can all make intelligent decisions about the new technologies and scientific issues that affect our lives."

We in this room are the ones whom Dixy Lee Ray might have spoken these words to again today. It is finally time to meet her challenge on this difficult, but solvable issue. If we do, then I am confident, as I think she was, that the people and their elected representatives will make the right choices for the benefit of all. In the end, Americans will do the right thing for our nation, for humankind, the environment, and for the planet.

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