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WORLDWIDE LOW-LEVEL WASTE DISPOSAL PRACTICES

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ABSTRACT

Low-level waste disposal practices will be described for ten or more countries. These practices will be compared with expectations for disposal designs for low-level waste regional compacts in the U.S.

INTRODUCTION

Defense waste facilities are entering a new era in regard to low level radioactive waste disposal. We have become more informed on what other countries are doing with their low level waste, and we are becoming more knowledgeable about the direction and philosophy the regional state compacts are taking in their plans for low level waste disposal.

The US does not have a national, consolidated low-level waste program -- it is divided according to DOE, NRC, EPA, and now individual state policies.

On the one hand, the US Congress passed the Low-Level Radioactive Waste Policy Act in 1980 relegating responsibility to each state for providing disposal capacity for low-level waste generators operating within the state's border. Under the Act, the states may form compacts with other states on a regional basis to dispose of LLW within the compact region. In the four years since the Act was passed, six regional compacts have been formed, but none has received final Congressional approval, and no compact region has opened a new low-level waste disposal facility.

On the other hand, the US Nuclear Regulatory Commission amended its regulations in 1982 for licensing facilities for the land disposal of LLW by issuing 10CFR61, which requires classification of LLW into three classes according to the concentration of activity in the waste, and requires separate disposal criteria be followed for each class. The new regulations increase substantially the effort required by a regional compact to obtain a new disposal facility. Only one new disposal site is being investigated at present, and although a large amount of money has been spent on site characterization, licensing of the site for LLW disposal is still an uncertainity.

On a third point, the governors of the three states with commercial LLW disposal facilities in operation (South Carolina, Nevada, and Washington) are taking an increasingly active role in determining what types of LLW and how much can be disposed of in their respective states. The states continue to increment their surcharges for waste disposal to provide an escrow fund for long-term institutional control. Also, each state's health and environmental control agency is demanding increasing control of the ground water beneath the disposal sites.

Because of the difficulties encountered in forming final compacts, in licensing new disposal facilities, and in increased state or regional control, there is a movement of ideas toward monitored retrievable storage of LLW. Storage would be preceded by volume reduction (compaction probably -- incineration would require state permits). Storage would be in the form of above or below ground concrete buildings. Facility design would prevent release of radioactivity to ground or surface water. Storage containers would be precast concrete cylinders or hexagons, or high integrity plastic containers. Storage will necessarily have a higher unit disposal cost than shallow land disposal, and will lead the waste generators to consider more effective volume reduction methods.

The environmental concern in the US over low level radioactive waste disposal has not weakened, but has grown stronger in the past few years, particularly in the concern for ground water protection. The increased concern may lead to a change from disposal of LLW by shallow land burial to contained, monitorable, retrievable storage of the LLW. What follows from that, whether long-term institutional control or geologic disposal or whatever, has not yet been determined.

This paper describes low level waste practices in other countries, and discusses the operation expressed by regional-compact states about low level waste disposal methodology.

LOW LEVEL WASTE PRACTICES IN OTHER COUNTRIES

Canada

- Zero release storage, and eventually a repository.
- Storage consists of a storage building for very low activity waste and tile holes, concrete bunkers, and heavily shielded quadracells for increasingly higher activity waste.
- Two repository sites are being considered.

Belgium

- Formerly ocean disposal, but now storage.
- Using bitumen waste encapsulation.
- Testing disposal in underground clay formations.

France

- Zero-release storage/disposal facility. Higher activity waste placed below ground in concrete monoliths; lower activity waste in concrete forms stacked above ground on top of the monoliths.
- Waste packages stabilized.
- Tritium waste stored for decay in place.
- Complete leak collection. Walk-through, repairable leak collection system.
- Developing closure plans to reduce percolation to 1% of normal.
- Performing site selection for next disposal facility.

West Germany

- Waste treatment -- compaction -- and storage only in a very large storage building.
- Planning two geologic repositories in mines.

Sweden

- Storage now.
- All waste to reinforced concrete containers.
- Constructing an underground repository under the ocean. Reason: no drilling will occur into the waste in the future; any leaks will be greatly diluted by ocean.

Denmark

- Research only; no storage or disposal.

Italy

- Storage only. No immediate future plans for repository.

Japan

- Ocean dumping until recently.
- Now, drum storage only.
- Constructing a low level waste research facility.
- Searching for a repository.

Switzerland

- Planning only.
- Planning to put low level waste from La Hague processing into tunnels under mountains. Containers will be concrete boxes.

UK

- Formerly ocean dumping. Stopped by combination of Greenpeace and union opposition.
- Now, storage only, except at Driggs, where SLB is used.
- Planning treatment, SLB, or repository.

REGIONAL COMPACT EXPECTATIONS

California

- Wants above ground, monitored, retrievable storage/disposal facility.
- Stabilized waste in concrete containers.
- No impact on ground or surface water.

Illinois/Kentucky

- Illinois is the host state.
- Compact prohibits shallow land burial; recommends above ground disposal as the preferred alternative.
- Requires source reduction by generators.

Texas

- Poll of 1000 adults: 58% favor below ground; 24% favor above ground.
- Site selection has been restricted to state-owned lands.

Appalachian (Penn., Md, Del., W. Va.)

- Wants an engineered, monitorable, retrievable facility.
- Pennsylvania will have exclusive management authority over the proposed disposal facility.
- Governor states that the engineering standards of the facility would "greatly exceed" the old standards of traditional shallow land burial methods.

CONCLUSIONS

Most of the other countries looked at in this review are opting for retrievable storage now, and disposal later in a geologic repository. Shallow land burial is not a part of future disposal methods. France is an exception, but in their facility all of the percolate and leachate water is collected -- ground and surface water impacts are zero.

Expressions from people concerned with the regional state compacts for the most part favor engineered, above ground facilities with zero impact on ground water.

These conclusions point to design parameters for the ultimate modern facility for disposal of low level radioactive waste. These parameters, and reasons for them, are:

DESIGN CONDITIONS	REASON
• Total leachate collection	• Decouples waste from ground water
• Double liner of plastic, or clay	• Double protection; suitable for mixed waste
• Retrievable waste forms	• Leaves options open for future generations; allows for repair
• Fully monitorable	• Provides warning against container or cap failure
• Containerized waste forms	• No surface contamination; good stacking efficiency
• Stabilized waste forms	• Prevention of subsidence
• Capping	• Reduced percolation; reduced water interface
• Surface water control	• Control of erosion; reduced percolation

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