ILLINOIS DEPARTMENT OF NUCLEAR SAFETY BRIDGES OVER LLRW COMPACT SYSTEM PROBLEMS WITH UNIQUE STORAGE SOLUTION

Thomas W. Ortciger, Director
Illinois Department of Nuclear Safety

Michael E. Klebe, Chief
Division of Low-Level Radioactive Waste Management
Illinois Department of Nuclear Safety

Paul Corpstein, General Manager
Chem-Nuclear Systems

ABSTRACT

The Illinois Department of Nuclear Safety (IDNS) has developed a unique way to bridge the gap across the present problem stifling progress in developing safe, secure and cost effective commercial low-level radioactive waste (LLRW) disposal facilities in the U.S.

At present, stakeholders in the compact system site development process are characterizing it as "dead", "dying", and "in hospice care". Recently, several compacts and states have made decisions to terminate, suspend or delay their new disposal facility development. Coupling this with the uncertainty surrounding the South Carolina and Utah sites' long-term availability, the IDNS decided to develop a proactive plan to assure Illinois and Kentucky generators would be protected.

Focusing on the needs of the generators in Illinois and Kentucky, accepting its waste management responsibilities, protecting the citizens of both states from unneeded risk, the IDNS set out to find a solution. The quandary to which the IDNS focused its efforts was "how to provide Compact generators with a safe and secure facility where they can send their waste, have it processed, treated, packaged and safely isolated from the public and the environment and kept in this facility until it becomes economic to develop a permanent disposal facility for this waste."

In light of the decline in LLRW waste amounts being generated in the Central Midwest Compact over the last several years, and based on rate-forecast modeling conducted and reported at WM-98, the IDNS has modified the disposal facility development schedule to allow facility development and operations to coincide with the decommissioning of the state's nuclear power plants, generally expected to begin around 2012. Not having the new disposal facility available until then could place the region's generators in jeopardy if the Barnwell, South Carolina and Clive, Utah sites were not available.

The IDNS has defined the potential risk and has developed preliminary plans for a waste management system that would accept waste from the region's LLRW generators, take title to this waste, provide appropriate waste processing, packaging and transportation, and safely store

the waste until the permanent disposal facility is built and ready to operate. This storage proposal would prevent generators from having to develop and build, and the IDNS from having to license, 80 to 100 scattered on-site waste storage facilities across the state. When implemented, this waste management system will mitigate the impacts posed by the denial of disposal access prior to the development of the regional disposal facility in Illinois.

INTRODUCTION

The Illinois General Assembly passed the Illinois Low-Level Radioactive Waste Management Act (the Act) in 1983, which established the state's initial framework for siting a LLRW disposal facility in Illinois. The Central Midwest Interstate Low-Level Radioactive Waste Compact (Compact) was formed in 1984 and ratified by the U.S. Congress in 1986. The states participating in the compact are Illinois and Kentucky.

In 1986, the Illinois Department of Nuclear Safety (IDNS) initiated siting activities in Illinois to find a suitable location and define a willing host community to meet the requirements outlined in the Act. Illinois was designated host state by the Compact in 1987. In the following years, between 1987 and 1992, Illinois followed a path not dissimilar from what other states and compacts followed. Illinois screened the state and found two locations with willing communities and land appearing suitable to host a LLRW facility. Eventually, a site in eastern Illinois near the town of Martinsville was selected and characterized, a disposal facility was designed for the property, a license application was prepared and submitted to the IDNS, and all efforts seemed on track for success.

In 1989, as a result of actions by the then Director at IDNS and as a result of public perceptions that politics rather than science had been driving the siting process, the Illinois General Assembly created the Illinois Low-Level Radioactive Waste Disposal Facility Siting Commission to review the work performed on the proposed site and determine if the site met the statutory requirements of the Act. The result of this process was that the Martinsville site was rejected.

Following this failed effort, the Illinois General Assembly amended the Act to address problems identified by the Siting Commission. The Illinois Low-Level Radioactive Waste Task Group was formed to shift some of the IDNS siting responsibilities to an appointed panel of technical, regulatory and industry persons. In the amendments to the Act in 1996, a framework for a new siting process was also defined. This new siting process is currently being implemented in Illinois and has public, industry, and regulatory support.

Subsequent to the latest amendment to the Act, IDNS, in conjunction with the state's largest generator and the facility developer, evaluated the impact of declining waste volumes on facility development. This study focused on determining the most cost-effective timeframe for facility development (1). The conclusion of this study was that development of new disposal capacity in the Central Midwest Region will not be cost effective until the region's nuclear power stations are decommissioned beginning in the year 2012.

Given this delayed facility development schedule, the potential exists for generators in the region to lose access to disposal capacity should the Barnwell and/or Envirocare facilities close. The probability of the Barnwell facility closing prior to 2012 increased with the recent change in South Carolina's Governor. Without access to disposal, generators in the region would be forced to store their waste in the interim period.

Waste Generation and Management

Figure 1 shows historic as-generated and final disposal waste volumes for Illinois over the last eight years. While the volume of waste generated in Illinois has not declined, the amount of waste requiring disposal has declined substantially. The imposition of federal and state surcharges on waste disposal over the past decade has spawned the growth of the waste processing industry. Waste processing results not only in volume reduction but also in an improvement in the final waste form.

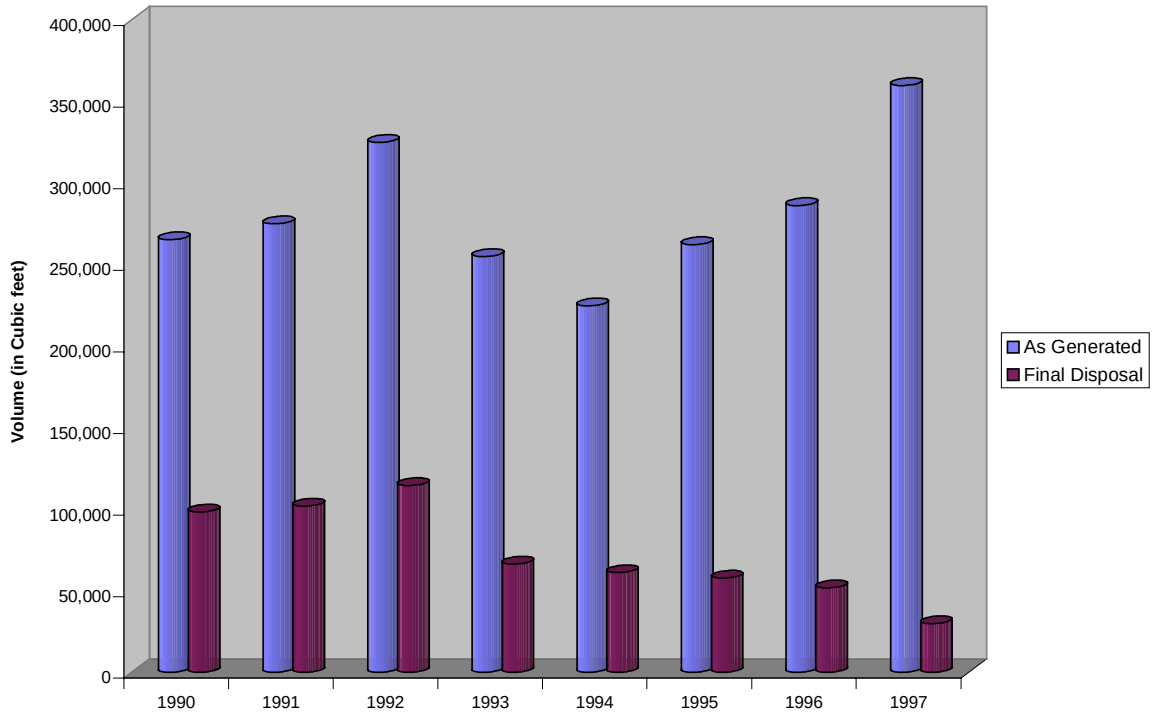

Fig. 1. Historical Waste Volumes – As-Generated and Final Disposal

Note: The waste volumes do not include waste that was sent to the Envirocare of Utah facility. Also, the waste volume for 1992 has been adjusted to remove 170,000 cubic feet of low concentration decommissioning waste that was disposed at the Beatty, NV facility.

ILLINOIS WASTE MANAGEMENT AND STORAGE CONCEPT

The Illinois Department of Nuclear Safety proposes to develop a comprehensive waste management program that would accept waste generated by the region's generators, secure the appropriate waste processing, provide interim storage and transfer the waste to the regional disposal facility when it becomes operational. This program would be implemented if current access to operating disposal facilities were terminated. For this program to be successful, participation by the region's generators is essential. This would require the Central Midwest Commission to exercise its waste import and export control capabilities.

The waste management program would act as the gateway for waste processing or disposal. All waste generated in the region that requires offsite management would be managed through this program. As part of this program, a facility would be constructed that would be capable of receiving waste, storing it pending shipment for processing, and providing interim storage of processed waste pending the development of the regional disposal facility.

Waste Management Facility

The Department would site a facility that would be capable of receiving the waste generated in the region. Since this facility is temporary in nature, the facility would not need to comply with the siting requirements for a low-level radioactive waste disposal facility. Siting the facility could occur in areas of the state where the communities are more comfortable with facilities that use radioactive materials that otherwise would not meet the long-term disposal facility siting requirements.

Major features of the facility include a waste receipt and inspection facility, temporary storage for waste pending shipment for processing, longer-term interim storage for waste pending disposal in the regional disposal facility, and facilities to store waste for decay to background. Other than holding waste in decay in storage, there would be no waste processing at this facility.

In order to develop this facility, a site of approximately 30 to 40 acres would be needed. The site would be located based on operational considerations such as proximity to major transportation corridors. Additionally, the facility would need to comply with other normal siting standards for radioactive materials licensees. The facility would require basic infrastructure services such as phone, power, water and sewer. If needed, water could be provided by developing onsite wells and sewer could be provided by onsite septic systems. Facility security would be comprised of fencing and lighting. A storm water detention pond would be constructed to collect and detain surface water runoff for analysis prior to discharge. Buildings would be designed and constructed to meet the anticipated lifetime. Buildings used for interim waste storage may be constructed incrementally on an as needed basis. This will minimize the initial construction cost of the waste management facility.

Waste Receipt and Title

The storage facility would accept waste from the generators prior to any offsite processing. As shown in Figure 1 above, as-generated waste volumes have ranged from 230,000 to 350,000 cubic feet per year for the last eight years. Upon receipt of this waste, the appropriate waste processing technique will be determined. The waste would be shipped offsite for waste processing. Upon its return, the waste will be put in storage pending the development of the regional disposal facility.

One of the major concerns expressed by the region's generators is who will have title to the waste and be ultimately responsible for its final disposal. When the waste is transferred to this waste management facility, the State of Illinois would assume title to the waste. The State of Illinois would then be responsible for the final disposal of the waste. This acceptance of title and ultimate disposal responsibility should prove attractive to the region's generators such that the generators would ship their waste to the interim storage facility rather than store their waste onsite.

Waste Processing

Upon receipt of the waste, a determination of the appropriate waste treatment will be made. The appropriate waste processing services will be procured, and the waste will be transferred to the waste processor for treatment. The Department would secure the waste processing services to treat the waste. Securing these waste processing contracts would result in economies of scale, which are normally reserved for large volume generators, being extended to small volume generators.

In determining the appropriate waste processing and resulting waste form, the Department will consider the economics of waste processing and disposal. There is a balance to consider in reducing the waste volume as it relates to the cost for waste disposal. The greater the level of waste reduction, the less waste requiring disposal. The lower the disposal volume, the greater the cost for disposal. Since the waste will be stored for future disposal pending the development of the regional disposal facility, there are no actual disposal costs to consider in the waste processing decision-making process. Rather, the Department will utilize its rate forecasting model to predict what those disposal costs will be given the resulting waste volumes.

Interim Storage

Following waste processing, the waste will be placed into an interim storage facility designed to safely store the waste until the regional disposal facility is operational. The interim storage facility will be designed and constructed to allow for the periodic inspection of the waste. Operational procedures would be developed and implemented for periodic waste inspection.

The majority of waste received at the interim storage facility is anticipated to have a small surface dose rate such that it can be contact handled. Waste that represents a greater occupational exposure would be segregated in shielded storage. If necessary, remote handling equipment and procedures will be utilized to move and inspect the waste.

Transfer of Waste to the Regional Disposal Facility

Upon the operation of the regional disposal facility, the waste in interim storage will be transferred to the regional disposal facility. Given the large volume of waste that is anticipated to be in storage, this transfer would likely occur during the first several years of disposal facility operation.

CONCLUSIONS

The State of Illinois has considered the potential impact that a loss of access to disposal facilities for low-level radioactive waste would have on the region's generators. In response to this potential impact, the Illinois Department of Nuclear Safety has developed a plan to implement a comprehensive waste management program that would result in the safe and efficient management of the region's waste. This program would site and construct an interim storage facility, accept and take title to the generators' waste, secure the appropriate waste processing, and provide safe and secure storage until the regional disposal facility becomes operational.

REFERENCES

1. Ortciger, Thomas W., Michael E. Klebe, and Paul Corpstein, "Modeling the Impact of Declining Waste Volumes for Input to the Economic and Development Strategies of New LLRW Disposal Facilities for Illinois", in Waste Management '98, Tucson, AZ, March 1998, R. Post, Ed.