

THE PENNSYLVANIA SITUATION

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ABSTRACT

In December 1985, the Pennsylvania legislature adopted and Governor Thornburgh signed into law the Appalachian States Low-Level Radioactive Waste Compact. The Appalachian Compact provides for the establishment and operation of facilities for regional disposal of low-level radioactive waste (LLRW) to eligible states. Pennsylvania is designated as the initial Host State to develop a regional LLRW disposal facility. The Compact legislation did not grant Pennsylvania the authority to license, permit, regulate, inspect or otherwise initiate the processes necessary to establish a LLRW disposal facility. The burden for implementing the Compact is placed on the state of Pennsylvania. The implementing legislation needed to proceed is currently in Pennsylvania's legislative process. Siting and design criteria are currently being developed by D.E.R. staff in conjunction with a sixteen member public advisory committee. Upon enactment of the implementing legislation, Pennsylvania will proceed with all processes necessary to develop a regional LLRW disposal facility for the Appalachian Compact.

THE APPALACHIAN COMPACT LEGISLATION

Background and Historical Overview

Following passage of the Federal Low-Level Waste Policy Act in 1980, Pennsylvania participated with a coalition of eleven Governors from the Northeast in an attempt to form the Northeast Compact. Both legislative and administrative officials from Pennsylvania joined in the public drafting process. It readily became evident that Pennsylvania, as a major generator of LLRW in the region, could become the Host State for all LLRW generated in an eleven state area of the Northeast.

After reviewing the draft of the proposed Northeast Compact legislation, Governor Thornburgh, with support of the General Assembly, announced in June 1984 that Pennsylvania would not participate in the Northeast Compact. Governor Thornburgh then proposed a smaller Appalachian Compact consisting of Pennsylvania, Maryland, Delaware, and West Virginia.

After months of negotiations, the four states released a draft of the proposed Appalachian Compact legislation for public comment and legislative action in each state. West Virginia almost immediately enacted this version of the Compact. No legislative action was taken in the states of Maryland and Delaware.

In Pennsylvania, a modified version of the draft was introduced into the Senate in February 1985. After hearings and public input, a further amended version of the draft was passed by the Senate and moved into the House. After additional amendments in the House, a joint Committee resolved the remaining differences and the Appalachian Compact was overwhelmingly adopted by the full legislature and signed into law by Governor Thornburgh on December 22, 1985.

Major Provisions

The Appalachian Compact provides for the establishment and operation of facilities for regional disposal of LLRW to eligible states. Four states: Pennsylvania, West Virginia, Maryland, and Delaware are designated as the only eligible party states for the Compact. Each party state shall have equal access to regional facilities located within the region.

The Appalachian States Low-Level Radioactive Waste Commission is established by the Compact as an instrumentality of the governments of the party states, but is a separate and distinct corporate entity. Each non-host state is to have two members on the board; the host state(s) are to have four. Upon selection of a site, a resident from the host county or municipality is to be appointed as an additional Commission member with full voting rights. General action by the board requires a majority approval of all the members. Actions related to the regional facility and management of low-level radioactive waste within the host state require a majority vote of the host state delegation.

The Commission has virtually no power over the development, regulation or licensing of a regional facility but is granted authority in the following areas: adherence to federal and state packaging and transportation regulations with the authority to levy fines for violations, designation of host state status and revocation of party state membership where applicable, collecting information, conducting research, promulgating regulations to promote volume reduction of waste, and the preparation of emergency contingency plans and regulations including temporary out-of-region access and export of waste. The Commission may also make recommendations with regards to site operations, charges, and fees.

Pennsylvania is designated as the initial Host State for the Appalachian Compact. Pennsylvania and any party state generating 25 percent or more of the volume or curie content of low-level waste generated by Pennsylvania, based on a comparison of averages over the three years 1982 through 1984 is required to initially host a regional LLRW facility. Party states that generate less than this amount are not required to host a regional facility. However, once a party state reaches the 25 percent level and maintains that degree of generation for three years, the Commission is to designate it as a host state for a regional facility for the next thirty years. A host state's obligation to operate a regional facility continues as long as it produces, over a three year period, 25% or more of the volume or curies of waste generated by Pennsylvania.

Under the provisions of the Compact, Pennsylvania as a host state is required to develop a regional facility in a timely manner, and set fees to cover all aspects of regional site development, operation, post-closure maintenance, etc. Pennsylvania will have sole authority over the operation of the initial regional facility. However, any host state is compelled to prohibit the use of shallow-land burial, and also develop alternative means for the treatment, storage, and disposal of LLRW. The host state is also required to establish, to the extent not prohibited by federal law, financial responsibility requirements that must be met by regional site operators, generators, waste carriers, etc. A long term care fund is to be established and funded by a fee placed on generators. A host state is also required to maintain a manifest system to track all waste-related activities of generators, and brokers and to establish a chain of custody of all waste from its initial generations to the end of its hazardous life.

Liability arising from operation of the regional facility is to be shared by each party state in an amount based on that state's share of the region's low-level waste disposed of at the facility.

Each party state is to develop and enforce, to the extent permitted by federal law, procedures for transportation and packaging as specified by the regional facility. Party states are to conduct periodic inspections of LLRW generating facilities and packages, and take enforcement actions against those who violate regulations.

As of this writing, the Delaware legislature has also adopted the Pennsylvania version of the Appalachian Compact. It appears that West Virginia is also looking favorably on this version of the legislation. Although Maryland is still eligible to become a party state in the Appalachian Compact, they have not made a decision on whether to withdraw from the Northeast Compact.

LLRW CHARACTERISTICS

Overview

The Pennsylvania Bureau of Radiation Protection has been compiling data on radioactive waste generated in the Appalachian Compact to determine the needs for the initial LLRW disposal facility in Pennsylvania. LLRW generators located within the Compact answered detailed surveys which provided information on waste generated in 1982 and 1984.

The information presented in Table I represents a summary of the volumes (ft³) and activities of LLRW that were shipped from the Compact to commercial disposal facilities since 1982.

The Appalachian Compact generates approximately 10% of all LLRW generated in the U.S. annually. Pennsylvania is the single largest generator of both volume (80% average) and activity (83% average) of all LLRW in the Compact. Only the state of Maryland once exceeded 25% of Pennsylvania's activity when it shipped 39,171 (40.3%) curies in 1984. Should Maryland decide to join the Appalachian Compact that state would have to exceed the 25% level of LLRW generation for three successive years before the Commission would designate Maryland as a host state.

Because the state of Pennsylvania is the largest generator of LLRW in the Appalachian Compact, a more detailed analysis of the waste generated within Pennsylvania was made. A generalized summary of that analysis is also displayed in Table I. Because a detailed survey was not performed in 1983 an itemized account of activity shipped from each generator category was not available.

Analysis

An analysis of Pennsylvania's waste in Table I revealed some anomalies which demonstrate how LLRW characteristics can change on a yearly basis.

Preliminary data from the 1984 survey shows a marked increase in activity shipped from Pennsylvania's nuclear power plants. Activity levels went from 4,926 curies in 1982 to 94,370 curies in 1984 while the volume generated remained essentially the same. An investigation into the cause of this anomaly revealed that the disposal of irradiated components, which were being stored on site, was the cause of the increase. The components were mostly composed of stainless steel containing activation products of which approximately 90% of the activity had a half life less than five years.

The industrial general and fuel cycle generators experienced fluctuations which resulted in decreases in the activity levels of LLRW shipped. The reasons for the decreases varied from the disposal of a single shipment of a large sealed source in 1982 to better waste handling practices in general.

The medical community also attributed their decrease in the amount of activity shipped for disposal to better waste handling practices and longer on site temporary storage. Where radionuclides with very short half lives had been immediately disposed of in 1982, many were being stored on site for longer periods to reduce the activity of the waste.

Additional analysis was made on preliminary data from the 1984 survey to determine the distribution of activity in LLRW generated in Pennsylvania. Table II represents a summary of the analysis and shows the activity distribution based on half life of radionuclides.

Approximately 95% of all radionuclides disposed of in 1984 from Pennsylvania had a half life less than five years. Of the remaining radionuclides; 3% had half lives between five and thirty years; 1.9% had half lives between 30 and 100 years consisting primarily of Ni⁶³ which is essentially a low energy Beta emitter and possesses high ion exchange

TABLE I

Summary of LLRW Shipped
From the Appalachian Compact

Source	1982		1983*		1984 (Preliminary)	
	Ft ³	Curies	Ft ³	Curies	Ft ³	Curies
Delaware	1,338 (.63%)	10.3 (.07%)	1,062 (.39%)	2.04 (.01%)	1,178 (.54%)	0.59 (<.01%)
Maryland	40,391 (19.0%)	1,393 (9.3%)	47,400 (17.5%)	212 (.88%)	41,686 (19.1%)	39,171 (40.3%)
W. Virginia	382 (.18%)	15.4 (.1%)	717 (.27%)	.13 (<.01%)	200 (.09%)	.02 (<.01%)
Pennsylvania						
Nuclear Power						
Plants	151,633 (71.6%)	4,926 (32.8%)	189,959 (70.2%)		156,008 (71.3%)	94,370 (99.5%)
Industrial						
Fuel Cycle	33,863 (16.0%)	1,680 (11.2%)	66,498 (24.6%)		37,794 (17.3%)	455 (.4%)
Industrial						
General	6,506 (3.1%)	8,377 (55.7%)			5,887 (2.7%)	25.5 (<.1%)
Medical						
Research	5,280 (2.5%)	8.1 (<.1%)	9,888 (3.7%)		1,192 (.5%)	2.1 (<.1%)
Medical						
General	11,995 (5.7%)	32.7 (<.2%)			14,130 (6.4%)	6.2
Academic	2,114 (1.0%)	2.3 (<.1%)	4,061 (1.5%)		3,461 (1.6%)	20.8 (<.1%)
Government	526 (0.2%)	3.3 (<.1%)	35 (<.1%)		225 (0.1%)	1.7 (<.1%)
PA Total	211,916	15,030			218,697	94,881
PA Disposal						
Site Records	212,859	15,033	270,441	24,203	218,582	97,400
Compact						
Total	254,028	16,448	319,620	24,417	261,761	134,053
U.S.						
Total	2,680,008	413,898	2,708,898	505,340	2,553,730	660,880

(%) Represents the percentage generated as compared to Pennsylvania

1983* No survey; Based on commercial disposal facility records

properties; and less than .1% had half lives greater than 100 years again consisting primarily the low energy Beta emitter C14.

Projections

In both the 1982 and 1984 surveys, projections of future LLRW volumes generated were made based on information provided by the generators. In 1982, it was estimated that there would be an average 9% volume increase per year. Based on the 1984 preliminary survey, these estimates were revised and now indicate virtually no increase over the next several years.

DISPOSAL FACILITY DEVELOPMENT

Implementing Legislation

The Compact legislation did not grant Pennsylvania the authority to license, permit, regulate,

inspect or otherwise initiate the processes necessary to establish a LLRW disposal facility. The implementing legislation that is needed to proceed with the LLRW facility development is about to enter Pennsylvania's legislature at the time of this writing.

As the initial Host State for the Appalachian Compact, it is extremely important that the implementing legislation be enacted promptly to allow for adequate time to complete the necessary processes to adhere to the federal milestones of the amended LLRW Policy Act.

As envisioned, in the current draft of the implementing legislation there are two viable options for developing a disposal facility in Pennsylvania.

In the first option, an environmental consultant would perform the site screening process based on approved screening criteria. The screening process would identify a specific number of potentially suitable areas of desirable size in which a LLRW disposal facility might be located. The licensee designee would then be selected and would characterize the potentially suitable areas and choose the specific site most desirable for licensing. The operator would then proceed with final site characterization, design, license application and so on thru construction and operation. Conservative estimates indicate that approximately 3½ years will be needed to complete the screening, licensee selection, site characterization and license application processes once the implementing legislation is enacted.

TABLE II

Pennsylvania 1984 LLRW Shipped Offsite for Disposal

Distribution of Radionuclides by Half Life

half life range	percent of all radionuclides
< 1 year	6.4 %
between 1 year and 5 years	88.7 %
between 5 years and 30 years	3.0 %
between 30 years and 100 years	1.9 %
> 100 years	0.01%

In the second option, an environmental consultant would also perform the site screening process based on the approved screening criteria. The rest of the procedures would essentially be the same as in the first option with one exception. A Cabinet-level Task Force consisting of the Secretary of the Department of Environmental Resources (D.E.R.) who would serve as Chairman, the Secretaries of Health, Community Affairs, Transportation, and General Services would determine the qualified potentially suitable area. The Task Force could also determine that additional site selection studies are required.

Siting and Design Criteria

Siting and Design Criteria are currently being developed by Bureau of Radiation Protection staff in conjunction with members of a public advisory committee.

The Public Advisory Committee consists of sixteen members from a wide cross section of interest groups in Pennsylvania. The members include representatives from environmental and conservation groups, consulting and engineering industries, waste generators, medical and health concerns, county and municipal supervisors, state chamber of commerce, citizens advisory groups and state government. When the committee was formed in April 1985, it was directed to develop both siting and design criteria for the disposal facility.

Design Criteria are still in the very early stages of development and have not even been presented to the full public advisory committee for discussion. It would be premature at this point to speculate on specific alternatives that might be acceptable in designing the initial disposal facility in Pennsylvania. The only official directive for design of Pennsylvania's LLRW disposal facility is the mandate that "Shallow Land Burial is not acceptable", as stipulated in the Compact legislation. The disposal site must be an engineered facility.

As directed, criteria are being developed which may be used in the initial phase of site development, the Screening Process. It is envisioned that Pennsylvania will first be screened on a regional basis to delineate a prescribed number of potentially suitable areas which could accommodate a regional disposal facility of approximately 500 acres for the Compact.

In developing the Screening Criteria, it was first emphasized that any potentially suitable area must be able to meet NRC performance objectives for protection of the general population and stability of the disposal facility in 10CFR61. The Screening Criteria then proceeds to establish additional overall requirements, disqualifying conditions, and additional considerations for specific criteria categories.

Pennsylvania is a state which has more stream and road miles than any other state in the continental U.S. It contains large areas with complicated geology and surface features primarily due to deformation during the Appalachian Orogeny. Virtually the entire state contains natural resources in some form which have been subjected to exploration and/or exploitation. Pennsylvania has historically been a major producer of coal, oil, and gas in the U.S.; and still contains large reserves of these fossil fuels. These conditions, when combined with the fact that Pennsylvania is one of the nations most populated states, place stringent demands on developing selection criteria for a LLRW disposal site in a humid climate.

In its present form, the draft Screening document requires evaluation of specific considerations such hydrogeology, flooding, tectonic stability, valuable natural resource protection, exploration for and exploitation of resources, transportation and demography.

Part I of the Screening Criteria contains the Performance Objectives for Protection of the General Population and Stability of the Disposal Facility. Potentially Suitable Areas are required to meet all performance objectives.

Part II of the Screening Criteria contains the Overall Requirements and Disqualifying Conditions for each Screening Criteria category. Potentially Suitable Areas are required to comply with each Overall Requirement. Additionally, Potentially Suitable Areas can not have disqualifying Conditions present.

Part III of the Screening Criteria contains discussion of Additional Considerations whose evaluation are considered important and necessary for Potentially Suitable Areas to be considered qualified.

From the potentially suitable areas identified in the screening process a disposal facility location will be selected by a process which will be defined by the implementing legislation.

SUMMARY

The State of Pennsylvania has accepted the responsibility as the initial Host State for the first LLRW disposal facility in the Appalachian Compact. Actions are in progress which will provide the authority for Pennsylvania to develop such a facility. In the interim, technical criteria are being developed and administrative necessities are in progress. It is anticipated that the many separate but related processes will unite in the near future and that an environmentally sound and socially acceptable disposal facility will be located in Pennsylvania to serve the needs of the Appalachian States Low-Level Radioactive Waste Compact.