

NEW YORK STATE'S CRITERIA FOR LLRW DISPOSAL FACILITY SITING AND DISPOSAL METHOD SELECTION

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ABSTRACT

New York State has promulgated regulations establishing criteria for the selection of sites and disposal methods for low-level radioactive waste disposal facilities. The difficulties of writing regulations that are compatible with 10 CFR Part 61 while also establishing criteria specific to disposal methods other than shallow land burial are discussed. Provisions included in the New York State regulations applicable to above and below ground vaults and underground mined repositories are described.

INTRODUCTION

The New York State Department of Environmental Conservation (DEC) was mandated under the New York State Low-Level Radioactive Waste Management Act of 1986 to promulgate siting and disposal method criteria for the following methods of LLRW disposal: above ground, engineered, monitored disposal; underground mined repository disposal; and other practicable methods, exclusive of shallow land burial, which was specifically precluded from consideration by the law.

The Nuclear Regulatory Commission (NRC) has stated that although the existing federal regulations in 10 CFR Part 61 were principally developed for shallow land burial, they should be considered applicable for near surface engineered disposal technologies. Although many parts of 10 CFR 61 are not applicable for mined repository disposal, NRC has stated that, "A mined cavity could be sited and licensed on a facility-specific basis under existing regulatory provisions in 10 CFR 61." (1) Therefore, New York, as an agreement state, had the task of developing regulations for LLRW disposal technologies that had to both embrace those criteria within 10 CFR 61 as well as expand to address the technologies defined under the New York State law.

This paper briefly summarizes several of the problems encountered in undertaking this task as well as highlighting several of the new criteria developed for the disposal technologies.

NYS LLRW MANAGEMENT ACT OF 1986

New York State's program for developing a low-level radioactive waste disposal facility has been described in detail by Merges (2) and White (3). New York's LLRW Management Act of 1986 established a two-phase process for developing the facility. During the first phase, which is now underway, a five-member, governor-appointed Siting Commission will select and propose one or two sites and the disposal methods to be used. This proposal must in turn be certified by DEC as meeting state site and disposal method

criteria. If the proposed site(s) and method(s) are certified, the second phase will have the New York State Energy Research and Development Authority (NYSERDA) design the facility and prepare license and permit applications. Upon obtaining the required approvals, NYSERDA is authorized to construct and operate the LLRW disposal facility.

The New York State LLRW Management Act of 1986 directed DEC to promulgate, by December 31, 1987, regulations establishing the minimum characteristics a site and disposal method must have to be acceptable for LLRW disposal. DEC met that deadline, and in December 1987 adopted Part 382 of Title 6 of the New York State Code of Rules and Regulations, the regulations that the Siting Commission must meet in selecting any proposed site and disposal method. (Regulations that will govern the second phase of facility development will be drafted in 1988.)

DISPOSAL METHODS CONSIDERED

The New York State LLRW Management Act of 1986 not only prohibited the use of shallow land burial, it specifically ordered the consideration of two methods of disposal above ground, engineered, monitored disposal and underground mined repository disposal. In addition, the law said, the regulations should address other practicable methods, except shallow land burial. An obvious candidate for a "practicable" method was disposal in below ground engineered structures, such as below ground vaults and earth-mounded bunkers. Since the law apparently assumed that above ground disposal and underground repository disposal were practicable, DEC confirmed the practicability of below ground disposal by comparing it to those two methods in terms of cost and performance. Cost estimates for all three disposal technologies were performed and reported in the draft and final environmental impact statements prepared for the regulations (4,5). Below ground vaults were, not surprisingly, found to be the least expensive. The performance of each technology was predicted by pathway analyses and dose assessments,

presented in the draft environmental impact statement. Those results, as well as other studies cited in the final environmental impact statement, predicted that below ground vaults would perform better than above ground vaults. Based on those analyses, below ground disposal was found to be practicable, and regulations for that technology were developed.

DEFINITIONS

The definitions in 10 CFR Part 61 must be adopted essentially verbatim by agreement states in order to maintain compatibility with the federal regulations (8). However, many of those definitions seem to have been written with only shallow land burial in mind, and problems were encountered in applying them in New York State. For example, the definition of the term, "land disposal facility" in Part 61 is, "the land, buildings, and equipment which is intended to be used for the disposal of radioactive wastes into the subsurface of the land". The difficulty of applying such a definition to above ground disposal is apparent. The Part 61 definition for "disposal unit" also appears to be directed at shallow land burial: "a discrete portion of the disposal site into which waste is placed for disposal. For near surface disposal the unit is usually a trench."

For the most part, DEC worked around these contradictions, with varying degrees of success, by adding footnotes to expand the meaning of terms or by changing or deleting words wherever NRC would allow. For example, the definition of "disposal unit" in the state's regulations is, "a discrete structure of the disposal site into which waste is placed for disposal." (changed word underlined) The reference to trenches was eliminated. A footnote to the definition for land disposal facility specifies that the term includes above ground and mined repository disposal.

PERFORMANCE OBJECTIVES

The draft regulations contained all of the performance objectives from Part 61. These were evaluated and determined to be applicable to the various disposal methods. An additional performance objective was proposed, with above ground disposal in mind, to provide regulatory authority (beyond that currently in effect for all uncontrolled areas) over direct radiation exposure from the wastes. The proposed performance objective would have limited exposures of the general public due to direct radiation to 5 mrem per year. However, NRC mandated that the limit be removed, as it would not apply to other facilities using radioactive material, and was incompatible with Part 61.

SITING CRITERIA

The siting criteria incorporate the disposal site suitability requirements from 10 CFR 61.50 and some provisions from the design requirements in 10 CFR 61.51. Other criteria were needed specifically for underground

mined repository sites. Regional groundwater flow patterns (not just those at and near the site) must be able to be characterized, modeled, and analyzed. The presence of subsurface hydrologic processes such as dissolution must also be taken into consideration. Features such as faults, fractures or other discontinuities must be evaluated to determine if they could adversely affect the ability of the facility to meet the performance objectives. Subsidence and instability must also be taken into account. Criteria addressing all these aspects of siting a mined repository were included in the regulations.

Another provision was added in response to a comment regarding the siting of mined repositories. It was recommended that mined repositories should not be sited where natural radioactivity could mask the environmental monitoring program. This was expanded, the final regulations, to include any existing radioactive material on site and to apply to all sites, regardless of the disposal method used.

The New York State regulations address other siting considerations not specifically included in Part 61. The state regulations prohibit locating the facility downstream of a dam or other impoundment whose failure could affect the facility's performance. Existing mined openings and boreholes that could affect the performance of the facility must be able to be identified and sealed. The soils on site must be compatible with the disposal units. Population doses must be kept as low as reasonably achievable. In addition, the regulations exclude siting the facility on a variety of lands dedicated to other uses, including reforestation areas, Native American lands, certain valuable and productive agricultural lands, and certain aquifers identified in the regulations.

DISPOSAL METHOD CRITERIA

The disposal method criteria incorporated design requirements from 10 CFR 61.51, plus many additional provisions considered necessary for effective regulation of the alternative disposal methods.

A requirement for structural stability was added because all the alternative disposal methods involve the use of a structure. The units must maintain their structural stability for 100 years, if containing class A wastes, 300 years if containing class B, and 500 years for class C.

Special criteria were needed for near-surface vaults. Geochemical interaction between the vaults and the soils they contact must not impair performance. The disposal units must maintain their stability and containment of waste under the effects of major natural phenomena such as floods, earthquakes, and tornadoes. Such criteria are especially critical to the long-term performance of an above ground vault. Vaults have a potential for bathtubbing. To help guard against the potential for "bathtubbing" in a vault

structure, the regulations require that the units have a system to prevent any water that enters the vault from saturating the waste and to provide the means for releasing the water from the units without violating the performance objectives. For an above ground vault, this could entail a passive drain system that, after the institutional control period, would release any accumulating water below, rather than onto the surface of, the ground.

Above ground disposal has special problems that were addressed in the regulations. Because they may be especially attractive to inadvertent intrusion, it was decided to establish stricter requirements for inadvertent intruder protection. Above ground vaults containing Class A waste must resist intrusion through a combination of reliance on institutional control and design. This is different from Part 61, which allows total reliance on institutional control. Because of the potential vulnerability of above ground vaults to intrusion, safeguards against the breakdown of institutional control were included. Above ground units containing Class B wastes must be designed to resist intrusion for 300 years. Class C units must meet the 500 year requirement from Part 61.

A provision for resistance to normal environmental conditions was applied to above ground vaults as well as requirement that they be designed to facilitate any necessary remedial action.

For underground mined repositories, several provisions were included. Mining operations must not interfere with the disposal operations nor affect the ability of the facility to meet the performance objectives. Any shafts, access tunnels, adits, and boreholes must be identified and sealed. The repository must be designed to minimize subsidence, and it must be located at least 30 meters below the surface.

CONCLUSION

DEC's task was to promulgate regulations for three disposal technologies which were not specifically addressed in 10 CFR Part 61. The NRC will not render a final determination on the compatibility of New York State's LLRW regulatory program until all the regulations are in place. The regulations for the second phase of facility development, to be adopted in 1990, will cover design, construction, operation, monitoring, site safety planning, and closure. When the draft regulations were submitted for NRC's review, the staff declined to comment on any of the regulations for underground mined repositories, because, "NRC has yet to develop siting criteria for deep (> 30 meters) disposal of

low-level waste." (6) NRC did review the regulation for the other two technologies, and all the changes the staff required for compatibility were incorporated into the final regulations. Therefore, DEC's experience to date has shown that the siting and design provisions of Part 61 can be enhanced and adopted to meet both the requirements for compatibility and the needs of states which have prohibited the use of shallow land burial.

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