

NEW YORK STATE'S REGULATIONS FOR LOW-LEVEL RADIOACTIVE WASTE DISPOSAL FACILITIES

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ABSTRACT

The New York State Department of Environmental Conservation's (NYSDEC) regulations for low-level radioactive waste (LLRW) disposal facilities set primarily performance-based criteria for LLRW disposal facilities. The regulations (Part 383 of Title 6 of the New York State Codes of Rules and Regulations) set requirements for design, construction, operation, monitoring, site safety planning, financial assurance, closure, post closure monitoring and maintenance, and institutional control. The regulations are unique in their detail and in presenting specific requirements for below ground disposal units, above ground disposal units, and underground mined repositories.

INTRODUCTION

New York State became the fourth Agreement State in the country on October 15, 1962. The authority to issue radioactive materials licenses is divided among the New York State Department of Health (DOH), the New York City Department of Health (NYCDOH), and the New York State Department of Labor (DOL). The DOH and NYCDOH have jurisdiction over medical, academic, and research uses. The DOL issues radioactive materials licenses for commercial and industrial uses of radioactive materials. After the New York State Department of Environmental Conservation (NYSDEC) was created in 1970, the NYSDEC became the fourth agency implementing the Agreement State Program in New York State. The NYSDEC regulates the discharge of radioactive material to the environment, including releases to the air and water, and the disposal of radioactive material in the environment.

In response to the 1985 amendments to the Federal Low-Level Waste Policy Act, New York State enacted the New York State Low-Level Radioactive Waste Management Act (LLRWMA). New York State had decided not to join a compact, and the LLRWMA set up a process for development of a disposal facility in New York State. This law also authorized the NYSDEC to be the primary regulator of such a facility.

In 1987, NYSDEC adopted regulations governing the selection of sites and methods for low-level radioactive waste (LLRW) disposal facilities (6 NYCRR Part 382). The NYSDEC also issued an environmental impact statement in support of those regulations (4). Part 382 set forth the minimum criteria that a site and disposal method must meet to be used for a LLRW disposal facility, including the performance objectives from 10 CFR Part 61. Part 382 also contains the classification system for LLRW and the requirements for acceptable waste form and characteristics (1).

In 1988, the NYSDEC adopted final regulations (6 NYCRR Part 381) establishing manifest and permit requirements for transportation of LLRW into, within, and through the state. The NYSDEC issued a final generic environmental impact statement in support of that rulemaking (2).

A disposal facility in New York State would be regulated by two state agencies. The DOL will regulate the worker safety

aspects of the operation, through a radioactive materials license. All other aspects of facility design, construction, operation, closure, and post-closure care will be regulated by the NYSDEC.

In 1991 and 1993, the NYSDEC adopted a comprehensive set of rules for regulating LLRW disposal facilities. These regulations (Part 383 of Title 6 of the New York State Code of Rules and Regulations) established standards for the design, construction, operation, closure, and institutional control of LLRW disposal facilities in New York State. The Part 383 regulations are one component in New York State's program for developing and regulating a LLRW disposal facility, and are more detailed than 10 CFR Part 61 and most other Agreement States' regulations. These requirements are primarily performance-based, although prescriptive administrative procedures and technical criteria have been included, where needed.

The Nuclear Regulatory Commission (NRC) has reviewed New York State's regulations for LLRW disposal (NYSDEC's 6 NYCRR Parts 380 through 383 and DOL's 12 NYCRR Part 38). The NRC determined that the state's LLRW regulations are compatible with 10 CFR part 61 and other applicable NRC regulations for LLRW disposal.

6 NYCRR Part 383 - NEW YORK STATE LLRW DISPOSAL FACILITY REGULATIONS

The Part 383 regulations consist of fifteen subparts. The NYSDEC adopted Subpart 383-6, financial assurance requirements for LLRW disposal facilities, in 1991. The remaining subparts were adopted in 1993. They contain requirements for design, construction, operation, site safety planning, monitoring, closure, post-closure monitoring and maintenance, and institutional control of LLRW disposal facilities. Both rulemakings were supported by generic environmental impact statements (3,4). The contents of the fifteen subparts are reviewed below.

General Provisions and Applicability (Subpart 383-1)

The regulations require any party to obtain a permit from the NYSDEC before commencing construction of a LLRW disposal facility. The transition provisions describe how Part 383 applies to existing disposal facilities such as the inactive, State-licensed disposal site at West Valley, New York. Where

existing disposal sites had approvals granted under previous regulations, those approvals remain in effect. Part 383 does not apply to existing radioactive waste disposal facilities unless specific sections of Part 383 are incorporated into those existing approvals through modification of the approvals.

In granting the permit, the NYSDEC may limit the total inventory of mobile, long-lived radionuclides that may be placed in the disposal facility. These radionuclides include iodine-129, technetium-99, and carbon-14, and any other radionuclide shown by performance assessments to have a similar potential for causing a dose in excess of the dose limits.

Definitions (Subpart 383-2)

The terms defined in the regulations include not only the terms defined in 10 CFR Part 61, but also terms associated with underground mined repositories and engineered structures used as disposal units.

Permit Procedures (Subparts 383-3, 383-4, and 383-5)

The regulations in Subpart 383-3 describe the procedures for obtaining a permit under Part 383. The permit application must include performance assessment modelling that predicts doses due to releases for 10,000 years after facility closure, unless a shorter time period is justified. Subpart 383-4 requires the permittee to obtain a permit modification before closing the facility, and Subpart 383-5 defines the requirements for a permit modification to begin the period of institutional control.

Financial Assurance Requirements (Subpart 383-6)

The financial assurance requirements for LLRW disposal facilities require the operator to establish a trust fund to cover the costs of closure, post-closure monitoring and maintenance, and institutional control. The required amount of coverage will be based on annual estimates of the costs to carry out those activities. The trust fund must also provide for remedial actions and third party damages, if needed. That coverage will be based on facility-specific risk assessments. The operator must arrange for interim coverage until the trust fund is fully funded.

Design and Construction Requirements (Subpart 383-7)

The design of the facility must provide for disposal of Class B and C waste and stabilized, high activity Class A waste in separate disposal units from unstabilized, lower activity Class A waste. Separate disposal units must also be designed and constructed for mixed hazardous and low-level radioactive waste. The designs for all disposal units must accommodate gasses that may be generated in the unit.

The regulations set detailed requirements for a quality assurance program during design and construction. In addition, the regulations incorporate by reference the Nuclear Regulatory Commission's publication, "Quality Assurance Guidance for a Low-Level Radioactive Waste Disposal Facility" (NUREG-1293). All construction materials must be monitored for radiation before they are brought on site. A portal monitoring system could be used to meet this requirement.

The design of all disposal facilities must take into account seismic risks. Both deterministic and probabilistic seismic analyses must be done to support the design of any structure in which LLRW may be housed. Safety hazards must be minimized as part of the design, and debris generated during land clearing for construction must be disposed of on the site.

The design criteria also require associated facilities and support systems for the facility. These include systems for

communication, electrical service, water supply, lighting, sanitary waste disposal, fuel storage, and emergency electrical service. Areas for receiving, inspecting, and temporarily storing waste are required. The storage area must be sized to store at least the volume of waste expected to be received in a six-month period.

The design must incorporate fire-retardant building materials, fire-fighting equipment, fire extinguishing systems, and on-site and off-site warning systems and an on-site alarm system for reporting and responding to a fire.

Surface drainage control must be included in the facility design to direct surface water away from the disposal units. The surface drainage systems must provide for the collection, sampling, and possible treatment of collected water prior to release. It must be designed to handle the run-off from a 500 year storm.

Regulations for the design and structural analysis of above and below ground disposal units address loads and load combinations, structural analysis and design, the use of reinforcing steel, and the quality and durability of construction materials. The requirements are set for water infiltration resistance, internal drainage, retention of radionuclides, and intrusion resistance. Protective enclosures are required for these disposal units. The regulations include performance requirements for earthen covers on disposal units.

Design and construction requirements for underground mined repositories address surface subsidence, structural stability requirements, excavation and underground support systems, water infiltration, and bulkheads, seals, and other engineered barriers

Requirements for Facility Operation (Subpart 383-8)

Requirements for operation of the disposal facility address waste receipt and inspection, temporary storage of waste, and placement of waste in the disposal unit. The regulations exclude from the disposal facility biological and other putrescible wastes, waste in loose particulate form, and petroleum-based liquids, fuels, and lubricants. A quality assurance and quality control program must be implemented for operations.

Under the required inspection and testing program, all waste packages must be surveyed, and most Class A waste packages (except for casks) must be X-Rayed to detect unacceptable waste forms. In addition, a sample of packages must be subjected to one of several inspection procedures, as appropriate for the waste. These procedures range from sampling of the waste itself to non-destructive testing and inspection methods.

Unless otherwise authorized by the NYSDEC, waste that is accepted for disposal must be emplaced in disposal units no later than 90 days after it was received at the land disposal facility. The waste must be protected from the elements both before and during emplacement.

Waste Form and Classification

In the same rulemaking as the adoption of Part 383, the NYSDEC made several changes to 6 NYCRR Part 382 affecting the waste form and classification criteria. When Part 382 was originally adopted in 1987, these criteria were virtually identical with those in 10 CFR Part 61, sections 61.55 and 61.56. The 1993 changes to Part 382 allow LLRW disposal facilities to accept naturally-occurring and accelerator-produced radioactive material (NARM) wastes.

The 1993 amendment of Part 382 also changed the provisions for averaging activity over the volume of the waste for the purpose of waste classification. Similar to the criteria in effect at the Barnwell (South Carolina) disposal facility, the amended regulations allow concentration averaging over the volume of waste and solidification matrix where the radioactive material is homogeneously distributed throughout the matrix. If the radioactivity is concentrated in a discrete object, such as a sealed source or metal component, only the volume of the object may be considered.

The NYSDEC also amended Part 382 to require the solidification of liquid waste before disposal at a land disposal facility. Acceptable solidification methods are not specified in the regulations, but will be approved in the facility permit.

Waste Minimization (Section 383-8.8)

The regulations require the facility to implement a waste minimization program, and any waste generator sending waste to the facility must first submit a waste minimization statement to the permittee. This statement must describe the waste reduction efforts that have been undertaken and the results achieved. The waste generator must certify that the method of disposal used is the most practicable method currently available that minimizes risks to human health and the environment.

Monitoring Requirements (Subpart 383-10)

The regulations require pre-operational monitoring, environmental monitoring, monitoring of individual disposal units, monitoring of associated facilities, and monitoring of the structural stability of the disposal units. Monitoring is required through the end of the institutional control period.

The pre-operational monitoring program must include background levels of radiation and radioactive materials in air, water, soils, flora, and fauna. An aerial radiation survey must be conducted of the site and the land within a five-mile radius of the site.

Once a permit is issued, the permittee must conduct an environmental monitoring program until the end of the institutional control period. Monitoring stations must be located on the disposal site, at the boundary of the site, off-site within one mile of the site boundary, and at a location away from the site, to provide background data. Direct radiation must be monitored, as well as air, groundwater, surface water and drainage systems, soil, flora, and fauna. The environmental monitoring program must include seismic monitors and an aerial radiation survey of the area conducted every five years. The environmental monitoring program must have built-in redundancy to protect against loss of monitoring ability in the event of equipment failure, loss, or malfunction.

The disposal units themselves must also be monitored. The disposal unit monitoring program must include provisions for detecting infiltration of water into the disposal units and sampling of liquids collected in the internal drainage system or the external foundation drainage system. The disposal unit must be monitored for the generation of methane and other gases within the disposal units. A separate and independent monitoring system must be provided for each disposal unit.

The permittee must also perform a structural monitoring program. The program would provide continuous assessment and verification of the performance of the disposal units and structural components through both visual inspection of ac-

cessible portions of the disposal units and remote sensing of inaccessible areas for structural deformations.

Emergency Response Planning (Subpart 383-12)

Emergency response plans must be developed. Required emergency facilities include decontamination stations, first aid facilities, warning and alarm systems, an emergency control center, and training facilities. Regular communications checks and exercises must be held, and local governments must be given an opportunity to participate.

Record Keeping, Reports, and Public Information (Subpart 383-13)

Monthly and annual reports must be submitted to NYSDEC and a permittee-operated public information center. The monthly report must include information on the waste received, the results of waste inspection and testing, and the results of the monitoring programs. The annual report must present realistic (not worst-case) estimates of the radiation doses received by the general public due to operation of the land disposal facility and an update of the performance assessment modelling that was submitted in the application. The modelling must incorporate the actual waste inventory received to that date and any changes in waste projections, facility design, or the local environment.

Site Security (Subpart 383-14)

The permittee is required to control access to the site at all times. During facility construction, operation, closure, and post-closure monitoring and maintenance, the permittee must provide 24-hour security guards, a remote surveillance system, a public address system, and radiation detectors at all entrances and exits. Security requirements are somewhat less during the institutional control period.

On-Site Environmental Monitors (Subpart 383-15)

The NYSDEC will assign staff to be on-site environmental monitors at the site, paid for by the permittee, to monitor facility operations. No waste may be inspected, accepted for disposal, treated, or placed in a disposal unit unless an on-site environmental monitor is present on the disposal site. The on-site environmental monitors will independently perform inspections of all waste received to determine compliance with Part 381, the NYSDEC regulations for transportation of LLRW.

Site Closure and Stabilization (Subpart 383-9)

The term "site closure and stabilization" encompasses both disposal unit closure and facility closure. In an operating disposal facility, individual disposal units will be filled and closed before the operation period ends, and disposal unit closure must contribute to long-term site stability.

Disposal unit closure requirements include a one-year time limit for completing closure. Closure of a below ground disposal unit must include placement of a multi-layer earthen cover over the unit. Markers must be installed to delineate disposal units that are below ground.

Facility closure measures must control erosion, mass wasting, slope failure, settlement of waste and backfill, infiltration of water, and drainage of surface waters. Decontamination criteria for any surface contamination will be set in the permit.

Where above ground disposal units have been used, facility closure must include mounding over the units or other measures to protect the units against the elements, provide an

additional barrier to the release of radionuclides, and, if required for the Class of waste contained in the units, protect against inadvertent intrusion.

Facility closure of underground mined repositories must include the sealing of all shafts and boreholes.

Post-Closure Monitoring and Maintenance and Institutional Control

The regulations also include requirements for post-closure monitoring and maintenance of closed facilities and institutional control. During post-closure monitoring and maintenance, both the environmental and structural monitoring programs must continue. During institutional control, the custodial agency (which is then the permittee) must maintain site security, implement an environmental monitoring program, conduct periodic surveillance of the site, maintain police and fire protection, and maintain the site in a neat and clean condition.

CONCLUSIONS

The regulations in 6 NYCRR part 383 are unique and comprehensive criteria for LLRW disposal facilities. Many of the criteria address issues and disposal methods that are not covered in either the NRC's or other Agreement State's regulations. In addition to providing an effective regulatory program for New York State, they may be a valuable resource for

other regulatory bodies contemplating the review and licensing of LLRW disposal facilities.

REFERENCES

1. Final Environmental Impact Statement for Promulgation of 6 NYCRR Part 382: Regulations for Low-Level Radioactive Waste Disposal Facilities (Certification of Proposed Sites and Disposal Technologies), New York State Department of Environmental Conservation (1987).
2. Final Environmental Impact Statement for Promulgation of 6 NYCRR Part 381: Regulations for Low-Level Radioactive Waste Transporter Permit and Manifest System, New York State Department of Environmental Conservation (1988).
3. Final Generic Environmental Impact Statement for Promulgation of 6 NYCRR, Subpart 383-6, Financial Assurance Requirements for Low-Level Radioactive Waste Disposal Facilities, New York State Department of Environmental Conservation (1991).
4. Final Generic Environmental Impact Statement for Promulgation of 6 NYCRR Part 383: Regulations for Low-Level Radioactive Waste Disposal Facilities (Design, Construction, Operation, Closure, Post-Closure, and Institutional Control), New York State Department of Environmental Conservation (1993).