

## LIMITED BRC RULEMAKING: REGULATORY APPROACH AND EXPERIENCE IN TEXAS FOR SHORT-LIVED RADIOACTIVE WASTE

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### ABSTRACT

In 1987, the Texas Department of Health (TDH) implemented a rule to allow, under certain conditions, wastes containing limited concentrations of short-lived radionuclides (less than 300-day half-life) to be disposed of in Type I sanitary landfills. The rule was based on a technical analysis that demonstrated the degree of safety for approximately 340 m<sup>3</sup> of radioactive waste generated annually in Texas and identified major restrictions and conditions for disposal.

TDH's Bureau of Radiation Control staff have been able to maintain an account of licensees utilizing the rule during the past years. Several research and industrial facilities in the state have saved significantly on waste disposal expenses.

Public concerns and economic impacts for licensees as well as other regulatory aspects and experiences with the rule are discussed.

### INTRODUCTION

Federal and state agencies responsible for the regulation of radiation have recognized the need for establishing levels of radioactivity at which regulation of materials containing such would no longer be necessary in the same manner that much more radioactive materials are regulated. For example, the Low-Level Radioactive Waste Policy Amendments Act of 1985 directed the Nuclear Regulatory Commission (NRC) to develop standards and procedures for considering and acting upon petitions for below regulatory concern radioactive waste disposal. The NRC and the Texas Department of Health had already developed a *de minimis* biomedical waste disposal rule for tritium and carbon-14 which places limits on concentrations that can be disposed of without regard to radioactivity. The Environmental Protection Agency has also considered guidelines for disposal of very low concentrations of radioactive waste in sanitary landfills as part of their low-level radioactive waste disposal rulemaking (1). The EPA has also developed guidelines that would allow sludges from water treatment facilities containing low concentrations of naturally occurring radioactive material (NORM) to be disposed of at sanitary or industrial landfills (2).

Although efforts for a generic policy on the below regulatory concern concept have faced much criticism and opposition, the need for some cutoff level still remains. Since state radiation control programs regulate NORM as well as, in many cases, other radioactive material, they are faced with deciding on the concentration of NORM that must be disposed of in regionally controlled sites, concentrations that could go to sanitary landfills, and those that may be exempted from control.

Likewise, some short-lived radioactive wastes do not require burial in a facility with stringent long-term stability and performance requirements as do longer-lived and more concentrated materials.

In Texas, a cooperative effort has taken place between two state agencies in order to address certain short-lived

wastes that could be disposed of in sanitary landfills with an adequate level of protection and assurance of safety.

### TECHNICAL ANALYSIS AND RULEMAKING

The Texas Low-Level Radioactive Waste Disposal Authority was created to site, develop, and operate a facility for the disposal of low-level radioactive waste that is generated in Texas and possibly, to a limited extent, in certain other states. As part of its responsibility for the safe disposal of low-level waste, the Authority decided to investigate the use of permitted sanitary landfills for the disposal of wastes containing only low concentrations of short-lived radionuclides. Under contract, a technical analysis was prepared that demonstrated that, under certain conditions and restrictions, wastes containing the isotopes studied (radionuclides with half-lives less than 300 days) could be disposed of safely in permitted sanitary landfills (3). The restrictions were primarily limits on the radionuclide concentrations and total activity disposed of annually.

The technical analysis, in part:

1. conducted multipathway risk assessments using IM-PACTS/BRC computer modeling;
2. obtained radionuclide concentration and annual total radioactivity limits from the results of the risk assessments by limiting the health impacts to guideline values used by the analysis, i.e., ten microsievert (uSv) per year to an individual in the critical population group; and
3. presented other restrictions or conditions that emerged from the analysis.

The dose guideline of ten uSv (one millirem) per year was chosen for several reasons. It is easy to scale to other dose criteria. The number is reasonable and compatible with that given in proposed 10 CFR Part 20 for "below regulatory concern." This dose is also very small when compared to variations in natural radiation background levels.

The analysis was based on the projected volume of waste in Texas that could fall within the half-life and concentration

criteria, approximately 340 m<sup>3</sup> per year. It also took into account multiple generator use of a large metropolitan landfill as well as one large generator utilizing a small landfill. The most restrictive concentrations and annual activities from all scenarios were used in the final limits. Examples of concentration and annual generator limits are shown in Table I using both SI units and conventional units. The standard "sum of the fractions" rule applies to both concentration and total annual activity limits for wastes containing mixtures of radionuclides.

In the development of rules based on the technical report, the Agency decided not to implement them as a blanket allowance similar to the biomedical waste rule for carbon-14 and tritium. Instead, the rule requires prior approval of the licensee's procedures and a specific license amendment to assure that the licensee has the administrative and technical capability to separate the waste, account for concentrations, and properly package the short-lived waste for transport. Further computer modeling was performed by Agency consultants and NRC during the rulemaking process to assure that the derived limits were reasonable and based on sound assumptions.

The disposals are limited to permitted Type I municipal solid waste facilities. If the wastes also contain hazardous wastes, they must be disposed of at authorized hazardous waste facilities. Type I landfills must meet certain criteria, including trench liners, restricted access, and daily cover, that should limit exposure to the public and the environment from the waste. Special wastes, such as animal carcasses and infectious material, require burial in an assigned area at such sites.

Because the disposals were limited to these controlled and regulated landfills, the rule was not referred to as "below regulatory concern" rulemaking. Also, additional controls were still placed on the generator through the license amendment process.

All interested persons were given an opportunity to comment during the rulemaking process. The rules were also coordinated with regulatory programs for both solid waste and hazardous waste management in order to assure that they would not conflict with their existing rules. Comments from NRC on the technical analysis were resolved in the final rulemaking. Although representatives of the Sierra Club had a few comments, they generally supported the rule.

Once the rules were adopted, regulatory guidance was provided to short-lived waste generators that sought authorization to use the waste disposal method. The guidance provided information on the procedures necessary for license

amendment, including those for physical delivery to the landfill, compliance surveys to ensure that no unauthorized radioactive material or higher concentrations of short-lived waste are included, and packaging, including defacing labels and prevention of loss of material from the transport vehicle. The Agency also asks for information on personnel involved and the location of the landfill to be used.

#### RULE UTILIZATION AND IMPACTS

Since 1987, nine Texas licensees have been authorized to dispose of their short-lived solid radioactive waste at local Type I sanitary landfills. Currently, eight such licensees permitted under the rule are disposing of approximately 150 m<sup>3</sup> of solid short-lived waste by this method. The licensees consist of six educational/research institutions, most of which also have either a medical or veterinary school, one research laboratory, and one industrial well logging and tracer company. The licensee previously licensed was a waste processing facility.

Of the 203 m<sup>3</sup> of solid radioactive waste generated annually by the eight licensees presently authorized, 149 m<sup>3</sup>, or 74 percent of the waste is disposed of in sanitary landfills. The total waste volume for these facilities does not include very short-lived nuclear medicine waste that is held for decay and disposed of as nonradioactive. The other 54 m<sup>3</sup> is longer-lived material that is sent to a low-level waste disposal site. Figure 1 shows a graphic representation of the solid waste volume distribution.

As a result of the rule, these licensees have noted significant reductions in their waste disposal budgets. In the first year the rule was in effect, one university licensee saved approximately \$15,000 over the previous year's expenditures on low-level waste disposal. Another licensee reported in 1991 that the cost to dispose of the short-lived waste at municipal landfills was \$1,863. This same waste, compacted and shipped out via commercial waste broker would have cost \$38,340 to dispose of in a low-level waste facility.

With the implementation of additional waste surcharges and closing of low-level waste sites before the new disposal sites are available, the Agency expects to receive several more requests for license amendments to dispose of short-lived waste in sanitary landfills. In June 1991, letters were sent to all Texas licensees that generate low-level waste to warn them of the possibility of penalty surcharges in 1992 and closure of existing sites to Texas generators in January 1993. The licensees were asked to review their need for additional storage

TABLE I

Concentration and Annual Generator Limits For Commonly Used Nuclides

| Nuclide | Concentration Limit    |                      |                        | Annual Generator Inventory Limit |         |
|---------|------------------------|----------------------|------------------------|----------------------------------|---------|
|         | (Bq/m <sup>3</sup> )   | (Ci/m <sup>3</sup> ) | (mCi/ft <sup>3</sup> ) | (Bq/yr)                          | (Ci/yr) |
| P-32    | 7.4 x 10 <sup>12</sup> | 2                    | 56                     | 1.85 x 10 <sup>12</sup>          | 50      |
| S-35    | 3.3 x 10 <sup>11</sup> | 9                    | 250                    | 7.4 x 10 <sup>12</sup>           | 200     |
| Co-57   | 2.2 x 10 <sup>9</sup>  | 0.06                 | 1.7                    | 7.4 x 10 <sup>10</sup>           | 2       |
| Tc-99m  | 3.7 x 10 <sup>10</sup> | 1                    | 28                     | 1.11 x 10 <sup>12</sup>          | 30      |
| I-125   | 2.6 x 10 <sup>10</sup> | 0.7                  | 20                     | 7.4 x 10 <sup>11</sup>           | 20      |
| I-131   | 1.5 x 10 <sup>9</sup>  | 0.04                 | 1.1                    | 3.7 x 10 <sup>10</sup>           | 1       |

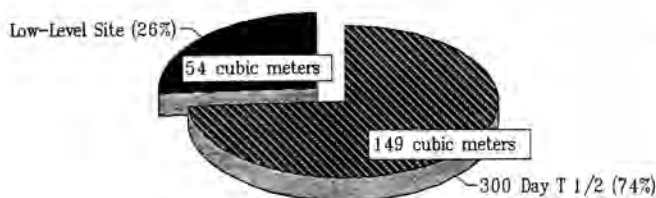


Fig. 1. Radioactive waste disposal method distribution of authorized Texas licensees based on annual waste volume generated in 1991.

capacity to hold their waste from the time that existing sites are no longer available to them until the Texas low-level waste site opens. The licensees were also requested to apply for any needed license amendments for additional storage areas at their facilities. As a result of the letters, some licensees have expressed intent to apply for use of the short-lived waste rule.

Other issues that have faced licensees in using the short-lived waste rule are the education of and coordination of anticipated disposals with the landfill operators. One licensee met several times with city government officials to reassure them that the waste could be disposed of safely at their facilities. Some sanitary landfills are also placing sensitive radiation monitors at their entrances that may detect some of the deregulated material. This has, on occasion, caused Agency personnel to be called to the landfills to investigate. However, most occurrences of this nature have been due to

scrap NORM-contaminated oilfield pipe or equipment setting off the alarms.

In conclusion, this approach to limited alternative waste disposal was not implemented as an overall exemption for all radioactive waste streams. However, it did address, through sound, technically-based rulemaking, a method of disposal for a significant volume of short-lived waste in Texas. This has proven to have substantive economic benefit to some generators, a majority of which are state educational institutions with limited waste budgets.

Communication among appropriate agencies and interested groups during the rulemaking process was an important factor in the final adoption of the rules. Also, continued cooperation of the licensees and continued communication with concerned individuals, such as landfill operators, has enabled the Agency to maintain and utilize the rule successfully.

#### REFERENCES

1. U.S. ENVIRONMENTAL PROTECTION AGENCY, Office of Radiation Programs, "Proposed Low-Level Radioactive Waste Standards, 40 CFR 193, Background Information Document," draft (1985).
2. U.S. ENVIRONMENTAL PROTECTION AGENCY, Office of Drinking Water, "Suggested Guidelines for Disposal of Naturally Occurring Radionuclides Generated by Drinking Water Treatment Plants" (July 1990).
3. V. C. ROGERS, et al., "Disposal of Short-Lived Radionuclide Wastes in a Sanitary Landfill: Final Report," Rogers and Associates Engineering Corporation for the Texas Low-Level Radioactive Waste Authority (February 1987).