

THE IMPACT OF 10 CFR 61 ON UTILITY
RADIOACTIVE WASTE OPERATIONS

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ABSTRACT

Over the past five years, the Nuclear Regulatory Commission (NRC) has been developing regulations to govern the siting, operation, close out, and long-term control of low-level radioactive waste disposal sites. During this period, the NRC published a regulation advance notice, a preliminary draft, a proposed version, and a draft environmental impact statement. Four regional workshops were also sponsored by the NRC to provide the opportunity to discuss the regulations with various industry representatives. The resulting regulation, Title 10 to the Code of Federal Regulations Part 61 (10 CFR 61) "Licensing Requirements For Land Disposal of Radioactive Waste," was finally issued in November, 1982.¹

Although 10 CFR 61 applies primarily to the operator of waste disposal sites, it also has significant impact on the waste generator. This paper analyzes the impact on waste generator operations in the following five areas:

- . Waste classification
- . Waste packaging and shipping
- . Package labeling
- . Operating costs
- . Waste volume reduction programs

WASTE CLASSIFICATION

In addition to the group and quantity classifications of radioactive waste specified in 49 CFR, 10 CFR 61 introduces three new categories of waste classification. These classifications, which are designated Class A, B, and C, group radioactive wastes based on the wastes' long-term physical stability. Waste stability is intended to ensure that the waste does not structurally degrade and affect the overall stability of the site through slumping, collapse, or other failure leading to water infiltration.

A structurally stable waste form will generally maintain its physical dimensions and form under expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and internal factors; i.e., radiation effects and chemical changes. This stability can be provided by the waste form itself, by processing the waste into a suitable form or, alternatively, placing the waste in a disposal container or a structure that provides stability after disposal.

The requirements for a structurally stable waste form are a factor in limiting exposure to an inadvertent intruder because they provide for recognizable and nondispersible waste. An inadvertent intruder is defined as "a person who might occupy the disposal site after closure and engage in normal activities such as agriculture, dwelling construction, or other pursuits in which the person might be unknowingly exposed to radiation from the waste."

Protection of the inadvertent intruder and physical stability of the disposal site are the major considerations in classifying waste as Class A, B, or C. Subpart C section 61.55 and 61.56 of 10 CFR 61 described how to classify radioactive waste as Class A, B, or C.

The requirement to classify waste in accordance with 10 CFR 61 will impact waste generator operations. The magnitude of this impact will vary depending on the existing procedures for radioactive waste classification already in use by the waste generator. For waste generators with thorough procedures for estimating waste package activity already in place, the impact of 10 CFR 61 will be small. Such procedures, which account for package geometrical shape, package dimensions, waste density, average activity in a package and other characteristics of the waste, are already in place at a number of power plants.² These waste generators also have a thorough waste sampling and counting program to periodically verify the accuracy of activity estimating techniques.

Other waste generators estimate activity in packages based on worst case activity concentrations rather than attempting to quantify the specific activity concentrations of various isotopes. The impact of 10 CFR 61 on these waste generators will be considerable. The worst case estimating approach, which was acceptable before implementation of 10 CFR 61, does not allow the waste generator to properly classify the

waste in accordance with 10 CFR 61 requirements. The new waste classification requirements will therefore require that a thorough quantitative waste activity estimating program be established.

Since most waste generators lack the proper counting and analytical equipment on site to identify concentrations of isotopes such as Sr⁹⁰ in their waste streams, they must periodically have an independent radiological laboratory do the analysis. Depending on the location of the laboratory, this requirement could result in long time delays for results and complicated transportation problems. There are few laboratories in the United States with the capability to conduct the necessary analysis. Significant time delays could occur in receiving sample results.

The logistics of shipping small samples could also become complicated. The waste generator will either have to supply a small exclusive-use vehicle for transporting these samples to a laboratory or hire a common carrier to supply the service. Right now, small exclusive use vehicles are not readily available and the cost will be high because of the limited volume of such sample radioactive material.

Personnel training is another area where new waste classification requirements will affect the waste generator's operations. It is clear that the new waste classification, segregation, packaging and labeling requirements in 10 CFR 61 will require a higher level of expertise for existing technicians, inspectors, supervisors and managers. Waste classification is complicated and a formal training program is essential to verify compliance with 10 CFR 61 and 49 CFR requirements. Since the waste classification requirements in 10 CFR 61 do not become effective until early 1984, waste generators have time to develop and conduct initial and refresher training programs.

WASTE PACKAGING AND SHIPPING

Subpart C section 61.56 of 10 CFR 61, provides rules for the packaging of radioactive waste in Classes A, B, and C. These requirements are based on handling the waste at the disposal site and on meeting the stability requirements discussed earlier. Since most of these requirements have already been imposed at the Barnwell disposal site by the State of South Carolina, implementing these regulations should not have a large impact on the waste generator's operation.

In South Carolina, the State already has rules in place that are at least as restrictive as 10 CFR 61 rules. For example, 10 CFR 61 section 61.56a2 allows waste generators to package Class A liquid radioactive waste in sufficient absorbent material to absorb twice the volume of the liquid. The State of South Carolina requires that liquid wastes, except for those institutionally generated aqueous or biological waste forms, be solidified before they are acceptable for disposal at the Barnwell site. In this case, the State requirements are more restrictive. With respect to liquid radioactive waste processed to stable form or packaged in high integrity containers, the NRC essentially adopted the rules which the State of South Carolina has had in place since 1981.

Waste generators are already meeting the requirements of 10 CFR 61 in the areas discussed above. However, one new requirement which will have some impact on waste generator operations is section 61.56b3. This regulation requires that void spaces within the

waste and between the waste and its package must be reduced as much as practicable. The purpose of this regulation is to maintain the physical dimensions of waste packages, thereby minimizing the possibility of trench cave-in or slumping.

10 CFR 61 does not include specific criteria for meeting this requirement. The NRC does, however, suggest that filling voids with other wastes or inert materials would be appropriate. Waste generators may have to initiate new procedures concerning the filling of waste packages for Class B and C waste to eliminate void space. Such procedures will most likely result in increased waste handling and higher associated personnel radiation exposure.

Shipping requirements for radioactive waste packages should not be affected by the new 10 CFR 61 requirements. During the initial review of 10 CFR 61, many commentors expressed concern over perceived requirements for segregating Class A waste from the Class B or C waste during transport to the disposal site. This perception is incorrect. The NRC has clarified that there is no intent to prohibit waste of more than one class from being shipped on the same transport vehicle.

PACKAGE LABELING

10 CFR 61 section 61.57 requires that waste packages be identified as Class A, Class B or C waste. Generators can meet this requirement by color coding packages, by requiring special labels consistent with already established Department of Transportation requirements, or by various other methods that can be postulated. Since the identification label is for the benefit of the disposal site operator, specific implementation requirements are up to the individual site operators.

The labeling of waste packages should not have significant impact on waste generator operations because labels are already required by DOT regulations. The main impact of the labels required by 10 CFR 61 may be confusion between Class A or Class B labels and Type A or Type B labels required by the DOT.

OPERATING COSTS

The perception among most people commenting on 10 CFR 61 was that the new requirements would result in increased cost to the waste generator and the disposal site operator. These cost increases are associated with 1) requirements for waste classification, 2) package filling techniques, 3) additional package labeling and 4) waste segregation in packaging by the waste generator and in trench location by the waste disposal site operator.

The magnitude of the cost increase for an individual waste generator to implement the 10 CFR 61 requirements is difficult to determine. However, burial site rates have already changed to reflect disposal site operator estimated of the costs associated with 10 CFR 61 implementation.

New rate increases, particularly in South Carolina, appear to be high for the regulations imposed by 10 CFR 61.³ Costs associated with waste segregation and duplication of handling equipment to operate two trenches are understandable. Large rate increases have been justified by contending that 10 CFR 61 requires existing waste disposal sites to do the following:

- implement security requirements of 10 CFR 70;
- modify and rewrite the environmental impact statement, and remedial action and decommissioning plans;
- increase the number and extent of lab analyses required to document environmental safety of the site;
- construct a hydrology computer model for the site.

The State of South Carolina, as an agreement state, regulates those aspects of 10 CFR 61 which will apply to the Barnwell site. As discussed earlier, South Carolina laws already have requirements in all of the above areas with the exception of the computer model. Therefore, one might expect that the amount of changes in burial site activity associated with these requirements should be minimal. Since South Carolina has not yet specified what changes other than waste segregation will be required for continued operation of the Barnwell site, the high rate increases published in November, 1982, seem premature.

Regardless of what the regulatory agencies have intended, prices have been increased significantly and justified on the basis of 10 CFR 61. These price increases affect the waste generator's operating costs more than any other aspect of 10 CFR 61. For example, Table I shows a typical utility's disposal cost for a spent resin shipment before and after the January 1, 1983 rate increase. The increased rates result in a 140 percent cost increase to the waste generator.

Table I
CASK SHIPMENT

Waste Package

Liner Size: 183 ft³
Curie Content: 12 Ci
Radiation Level: 11 R/hr
Weight: 11,000 pounds

Barnwell Disposal Site

1982 Prices

Category	Rate	
Disposal	12.00/CuFt	2196.00
Radiation Surch	-----	1000.00
Weight Surch	350.00/Cont.	350.00
Curie Surch	-----	-----
Cask Hand. Fee	375.00/Cask	375.00
Perpetuity Fund	2.00/CuFt	366.00
Total		4287.00
Barnwell Tax	2.4%	102.89
Grand Total		4389.89

1983 Prices

Disposal	13.20/CuFt	2415.60
Radiation Surch	30.00/CuFt	5490.00
Weight Surch	750.00/Cont.	750.00
Curie Surch	750.00/Ship.	750.00
Cask Hand. Fee	500.00/Cask	500.00
Perpetuity Fund	2.00/CuFt	366.00
Total		10271.00
Barnwell Tax	2.4%	246.00
Grand Total		10518.00

% Increase 140%

WASTE VOLUME REDUCTION PROGRAMS

Some commentors on 10 CFR 61 have expressed concern that the new waste classification schemes would result in discouraging volume reduction by the waste generator. Their reasoning is that since volume reduction increases the concentrations of radioisotopes in a package, the classification of the package would change and require higher costs for disposal. The NRC disagrees with this concern and contends that although a higher waste classification may result in more stringent requirements, the cost of processing, shipping, and disposal of a small volume of Class B or C waste may not be higher than the cost of processing, transporting, and disposing of a larger volume of Class A waste.

It appears, that the NRC's opinion is valid. The magnitude of volume reduction would have to be extremely large to change the classification on a typical utility's waste and may only be achievable with radioactive waste incineration. If this method of volume reduction does result in a waste product not suitable for near surface disposal, then the NRC will consider special approval for such wastes. In the near future, the classification rules of 10 CFR 61 should not affect the waste generator's volume reduction program.

CONCLUSION

The implementation of 10 CFR 61 will have a significant effect on the waste generator's operations. Many of the requirements in 10 CFR 61 are already being met by waste generators shipping to the Barnwell, South Carolina, disposal site. However, the new waste classification requirements have already resulted in large disposal cost increases - whether justified or not - and in cost increases associated with isotope concentration determination. Now more than ever before, a thorough understanding of the complicated waste classification scheme and the associated packaging, labeling, and handling requirements is necessary to avoid expensive penalties and operating delays. Improved radioactive waste packaging and shipping training programs must be implemented by the waste generators to verify that radwaste is managed in a proper, cost-effective manner.

Over the next year, waste generators will not only see increased costs associated with 10 CFR 61 implementation, but also an increased workload on technicians and management responsible for radwaste shipping operations.

REFERENCES

- Final Environmental Impact Statement on 10 CFR Part 61, "Licensing Requirements For Land Disposal of Radioactive Waste", Appendix F
- "Determination of the Ci Content of Packaged Radioactive Waste Using Measured Dose Rates," W. B. Bowman II and D. L. Swindle, Carolina Power and Light Company, Raleigh, North Carolina, Health Physics Pergamon Press, 1976 Vol. 31 (November), pp. 445-450, (Printed in Northern Ireland)
- Chem-Nuclear Systems, Inc. Letter, November 24, 1982