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**THE IMPLICATIONS OF RCRA REGULATION FOR THE
DISPOSAL OF TRANSURANIC AND HIGH-LEVEL WASTE**

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ABSTRACT

In May of 1987 the Department of Energy (DOE) published a rule interpreting the definition of "byproduct" under the Atomic Energy Act. This byproduct rule clarified the role of the Resource Conservation and Recovery Act (RCRA) in the regulation of DOE's radioactive waste management activities. According to the rule, only the radioactive portion of DOE's mixed radioactive and hazardous waste (mixed waste), including mixed transuranic (TRU) and high-level waste (HLW), is exempt from RCRA under the byproduct exemption. The portion of a waste that is hazardous as defined by RCRA is subject to full regulation under RCRA. Because the radioactive and hazardous portions of many, if not most, DOE wastes are likely to be inseparable, the rule in effect makes most mixed wastes subject to dual regulation. The potential application of RCRA to facilities such as the Waste Isolation Pilot Plant (WIPP) and the HLW repository creates unique challenges for both the DOE and regulatory authorities. Strategies must be developed to assure compliance with RCRA without either causing excessive administrative burdens or abandoning the goal of minimizing radiation exposure. This paper will explore some of the potential regulatory options for and recent trends in the regulation of TRU and HLW under RCRA.

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INTRODUCTION

The Resource Conservation and Recovery Act (RCRA) of 1976 and its implementing regulations created a complex hazardous waste management system for owners and operators of facilities that generate, transport, or treat, store, or dispose (T/S/D) of hazardous waste. The intent of RCRA Subtitle C, codified in Title 40 of the Code of Federal Regulations (CFR), is to protect human health and the environment from releases or

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potential releases of hazardous chemicals into the environment. Subtitle C defines the universe of wastes requiring RCRA regulation on the basis of characteristics exhibited by wastes or by listing particular waste streams and chemicals.

Radioactive wastes are not covered by these waste definitions. In fact, source, special nuclear, and byproduct material as defined by the Atomic Energy Act (AEA) of 1954 are specifically excluded from RCRA regulation by the hazardous waste statute itself. Historically, therefore, radioactive wastes have not been regulated as hazardous wastes under RCRA. Because of recent developments, however, radioactive waste that is mixed with hazardous chemicals has become subject to regulation under RCRA. The implications of RCRA regulation of "mixed" waste differ somewhat depending on the degree of radiation hazard posed by the radioactive component. The higher the radiation level of the waste, the more problematic is its regulation according to standard RCRA procedures. This discussion focuses on waste characterized by long-lived radioactivity and potential for high hazard to personnel, the transuranic (TRU) and high-level wastes (HLW).

All of the HLW destined for the geologic repository mandated by the Nuclear Waste Policy Act and the TRU wastes destined for the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico, are covered by AEA's definitions for source, special nuclear, and byproduct material. Both radioactive waste types could, however, also be construed as mixed waste if their nonradioactive components meet RCRA's definitions. Many TRU wastes are contaminated with solvents and heavy metals classified as hazardous under RCRA and are clearly mixed wastes. Thus, regulation of some TRU wastes under RCRA is certain, and an application for a RCRA permit for the WIPP is already being prepared. The situation for HLW is not as certain. Much HLW does contain RCRA-regulated heavy metals. Depending on the process that generated the waste, these metal species may be present at levels that are sufficient to exceed RCRA's regulatory thresholds. But the behavior of these materials under the conditions of EPA's waste characterization tests also depends to an important degree on waste form. Vitrified HLW, for example, is not likely to leach sufficient quantities of these metals to deem it to be hazardous under RCRA. At the moment, therefore, it is unlikely, or at best uncertain, that vitrified HLW will be interpreted to be a mixed waste.

The purposes of this paper are to review the history of mixed waste regulation, discuss the areas of potential concern in regulating high-hazard mixed wastes under RCRA, and evaluate the potential options for dealing with the problems created by dual regulation.

REGULATORY HISTORY

The AEA originally authorized the Atomic Energy Commission (AEC) to regulate all uses of atomic energy and nuclear materials. When the AEC was replaced by the Nuclear Regulatory Commission (NRC) and the Energy Research and Development Administration (ERDA), the direct predecessor of

DOE, the NRC was given licensing authority only over the commercial nuclear industry. The ERDA/DOE retained discretionary authority to protect public health and safety from its own activities involving source, special nuclear, and byproduct materials.

Section 11 of the AEA defines the terms "source," "special nuclear," and "byproduct material." The byproduct definition, an important consideration in RCRA regulation, is as follows:

"The term 'byproduct material' means (1) any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material, and (2) the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material."

Source, special nuclear, and byproduct material themselves are specifically excluded from RCRA's statutory definition of "solid waste." In addition, Section 1006(a) of RCRA states that "Nothing in this chapter shall be construed to apply to... any activity or substance which is subject to...the Atomic Energy Act of 1954, except to the extent that such application (or regulation) is not inconsistent with the requirements of such Act...." Technical differences do exist between the requirements for handling radioactive materials vs hazardous chemicals, e.g., prevention of radiation exposure, differences in disposal design criteria, etc. These differences were construed as representing "inconsistencies." Initially, therefore, DOE managed its wastes as though they were completely unregulated under RCRA because of the statutory exclusion and the inconsistency interpretation. The NRC similarly exercised sole regulatory authority over commercial radioactive wastes without regard to the possible presence of RCRA hazardous components.

Many radioactive wastes are, however, mixed with RCRA-regulated hazardous constituents, such as organic chemicals and heavy metals. In 1984, the Legal Environmental Assistance Foundation brought suit against DOE for failure to comply with RCRA in managing its hazardous wastes. A Federal court in Knoxville, Tennessee ruled that application of RCRA to DOE's hazardous wastes was not inconsistent with the AEA, and DOE was ordered to seek a RCRA permit for its Y-12 Plant. Subsequently, all DOE installations that manage hazardous wastes were required to apply for RCRA permits and establish RCRA compliance programs. The situation with regard to mixed radioactive and hazardous wastes was, however, still not perfectly clear. The DOE had not yet promulgated its final "byproduct" rule and the definition of what materials DOE intended to continue to exempt from RCRA regulation on these grounds was therefore not uncertain.

Meanwhile, the NRC had been studying the mixed waste problem for wastes under its jurisdiction for some time and was actively negotiating agreements for dual regulation of commercial mixed waste with the Environmental Protection Agency (EPA). Ultimately, the EPA elected to formalize its obligation, and that of the states that are authorized to

administer the RCRA program in lieu of EPA, to regulate the hazardous portion of mixed waste, whether it originated from DOE or the commercial sector. On July 3, 1986, EPA published a notice informing the states that in order to obtain and maintain authorization to administer Subtitle C of RCRA, they must also gain authority to regulate the hazardous components of mixed waste. Authorized states were required to modify their programs within one year of the notice date or, if a change in a state statute is required, within two years of the notice. The EPA's notice also acknowledged the DOE controversy over the "byproduct" definition, the preeminence of AEA requirements in cases of inconsistency between AEA and RCRA, and the applicability of the requirements of AEA and Executive Orders concerning national security information and restricted data.

In November, 1986, DOE informally proposed to the EPA that HLW and TRU wastes be exempted from regulation under RCRA because the practices in place for managing the radioactivity of these materials also result in control of their chemical hazards. In response, EPA formed the Mixed Energy Waste Study (MEWS) task force to evaluate DOE's proposal. In a June, 1987 memorandum, J. Winston Porter, EPA's Assistant Administrator for Solid Waste and Emergency Response, made the following statement: "In March of this year, the MEWS task force issued its final report which indicated that to a large extent, DOE management of high-level and transuranic mixed wastes were equivalent or superior to RCRA requirements. Certain areas of their waste management operations, however, such as groundwater monitoring and chemical analysis of wastes were clearly deficient. To date, no category of DOE mixed waste has been exempted from RCRA regulation as a result of the findings of the MEWS task force...Thus, all DOE mixed wastes are subject to RCRA regulations independent of the nature of the radioactive component."

The role of RCRA in mixed waste management at DOE facilities was finally clarified by DOE's final rule published on May 1, 1987 (10 CFR 962), which made DOE mixed waste streams also subject to dual regulation. In DOE byproduct waste streams containing both hazardous chemicals and radionuclides, only the radionuclides themselves are now excluded from RCRA regulation. The nonradioactive portions of such waste streams are subject to regulation under RCRA if they meet the definitions of hazardous waste. As a consequence of these developments, management and disposal methods for mixed wastes have also changed greatly throughout the DOE system and most DOE sites have applied for RCRA T/S/D permits. The dual regulation of mixed waste requires that waste management practices and regulatory compliance activities be modified to accommodate RCRA's requirements.

PROBLEMS IN RCRA REGULATION OF RADIOACTIVE WASTES

The RCRA regulations for managing hazardous waste were not formulated with the radioactivity of mixed wastes in mind. Radioactivity requires avoidance of personnel exposure and creates problems in applying RCRA's

standard methods of handling, storage, treatment, and disposal. The fact that many of the wastes under consideration here are derived from classified defense activities also requires that special attention be paid to safeguarding national security interests. Sect. 1006 of RCRA directs that AEA supersede RCRA where their requirements are inconsistent. In assessing the tractability of the problems associated with managing radioactive waste under RCRA, a determination of whether the areas of concern constitute inconsistencies between the two statutory authorities must be made. Irreconcilable conflicts could exist where there is no alternative technology available or when no flexibility for negotiating regulatory alternatives exists.

Although the MEWS task force concluded, in general, that deep underground repositories represent a disposal technology that is superior to the near-surface land disposal allowed by RCRA, there were, nevertheless, four aspects of DOE's TRU and HLW management programs that do not comply with RCRA requirements. These were waste characterization, groundwater monitoring, inspection of storage areas, and independent oversight. It is in these areas that the application of standard RCRA procedures may present safety or security problems. The waste characterization and inspection requirements would appear to be the most problematic because of the potential for waste management personnel to suffer radiation exposures in excess of acceptable levels. There is, however, some flexibility already built into the existing requirements and other mechanisms exist for negotiating viable alternatives where none exist at the moment. For example, RCRA's waste analysis requirements do not dictate the necessity for laboratory testing. They may instead be met by evaluating information on the processes that produced the waste and inferring the presence of hazardous constituents. Therefore, waste characterization requirements are not likely to produce an irreconcilable conflict with AEA.

Inspection requirements would be more difficult to meet, but it is technologically feasible to use alternatives to visual inspections by people, and solutions to this problem may be negotiated under some of the options discussed below. Inspections and independent oversight also need not pose national security risks. Any required inspections could be carried out by EPA personnel who have proper security clearances. There are already provisions in RCRA for maintaining confidentiality, and the dissemination of restricted information would not be required (Finamore 1985). The NRC's regulation of the HLW repository will also provide the independent oversight found lacking in DOE's practices by the MEWS task force. The requirement for groundwater monitoring could represent the most serious technical obstacle. Groundwater wells may represent a threat to the integrity of a deep geologic repository and its ability to isolate wastes from the environment. Resolution of conflicts in this area may have to rely on the application of regulatory flexibility in negotiating reasonable technical alternatives. Mechanisms for such negotiations exist and will be discussed below.

Thus, it is unlikely that the areas identified as problems represent irreconcilable conflicts between statutory requirements. In fact the MEWS task force concluded that RCRA regulation of HLW and TRU waste management would not significantly change management of these wastes at DOE facilities.

POTENTIAL OPTIONS FOR RESOLVING CONFLICT

Several avenues for resolving any problems or uncertainties in RCRA regulation for HLW and TRU waste exist. These include resolution through interagency negotiation between DOE and EPA and use of vehicles, such as a Memorandum of Understanding (MOU), to formalize agreements; the possibility for a legislative solution in the form of a statutory amendment to RCRA or the AEA; and flexible interpretation and use of existing regulatory mechanisms, or modifications to them, by EPA. It should be noted that many of the options discussed are based on both legislative and regulatory precedents for the avoidance of dual regulation. The existence of these precedents argues for the desirability, in general, of such a goal. Furthermore, avoidance of dual regulation is frequently justified by the argument that regulations under the many statutory authorities available to EPA provide equivalent protection in cases of overlap. (See, for example, the discussion of permits-by-rule, below.) A similar argument could readily be made for the regulation of the HLW repository, which is to be licensed by statutory requirement by the NRC and must conform to many requirements for the control of radiation hazards that are far more strict than the requirements of RCRA. The political climate will also obviously influence the viability of each option. In addition, the time required to implement effective solutions via the various options might be critical for specific projects and might therefore influence their appropriateness.

Interagency Agreements

A MOU between DOE and EPA that addresses some of the key concerns common to most mixed waste management, such as the need to minimize radiation exposures, already exists, but only in draft form. For these issues, the MOU, if it can be finalized, potentially provides a mechanism for the two agencies to agree that alternatives to the standard RCRA approaches to waste management are necessary and acceptable. With such an agreement already in place on across-the-board issues, other negotiations, such as those required to permit a particular DOE facility, could proceed beyond basic issues and focus on questions not already covered. Such additional questions are anticipated to be largely site-specific concerns.

Legislative Solutions

The Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978 provides a precedent for statutory change to exclude selected forms of

mixed waste from RCRA regulation. The management of mill tailings has some elements in common with that of HLW because, unlike TRU waste disposal, HLW disposal will be regulated by the NRC as is management of uranium mill tailings at active uranium mills. Uranium mill tailings are a waste that is "mixed" in that it contains both byproduct radionuclides and nonradioactive chemicals that potentially meet the definition for hazardous. The UMTRCA, however, amended the AEA's definition of "byproduct material" to include the "tailings or wastes produced by extraction or concentration of uranium or thorium from any ore processed primarily for its source material content." As a result, both the radioactive and nonradioactive components of tailings are covered by the definition of "byproduct" material, and RCRA does not apply to tailings even if the materials in the nonradioactive component otherwise meet RCRA's definition.

Although RCRA does not apply to uranium mill tailings, they are still managed under appropriate standards that protect human health and the environment. Section 192 of 40 CFR contains EPA's implementing regulations for radiation control for tailings. These regulations provide (1) health and environmental protection standards for DOE's Uranium Mill Tailings Remedial Action Program (UMTRAP) for residual radioactive material (mostly tailings) from inactive uranium mills and (2) health and environmental protection standards for management of uranium byproduct material at facilities licensed by the NRC (which has additional licensing regulations). Although DOE is self-regulated in its management of UMTRAP materials, the Department abides by these EPA standards. Subpart D of these regulations applies the groundwater protection standard of RCRA (40 CFR 264) to uranium mill tailings sites. Because RCRA does not apply to any component of uranium mill tailings, however, the rest of RCRA's implementing regulations do not apply to these materials. The absence of direct RCRA regulation of all aspects of uranium mill tailings management, however, allows for protection from personnel exposure without violating the appropriate regulatory authority. The suggestion is that an amendment, either to RCRA or AEA, could provide a similar clearcut exemption of HLW from dual regulation. The fact that the HLW repository will be licensed by the NRC and will conform to stringent environmental protection standards for radioactive materials supports such an option.

Flexibility in Implementing or Modifying Existing Regulations

The existing RCRA permitting provisions under Subpart X for "Miscellaneous Units" could also provide a flexible alternative for resolving concerns about national security and personnel exposure. Or modification of other elements of RCRA's existing regulations could provide alternatives for addressing radiation hazard concerns.

Subpart X Permitting

Subpart X of 40 CFR 264 (52 FR 46946), covering the management of new and existing miscellaneous T/S/D units, provides a mechanism for

permitting a geologic repository. "Miscellaneous unit" is an inclusive term covering T/S/D units that are not described by the other subparts of Part 264, not regulated as underground injection wells under 40 CFR 146, and not eligible for research, development and demonstration permits. Geologic repositories and thermal treatment units other than incinerators are specific examples of miscellaneous units. In contrast to the technological standards of 40 CFR 264 Subpart I through O applicable to other types of T/S/D units, the standards for miscellaneous units are generic and qualitative. The EPA requires that the permit applicant translate these general standards into specific design and management practices for a given unit. This provides increased regulatory flexibility while ensuring compliance with the environmental performance standard of protecting human health and the environment.

The flexible provisions of Subpart X provide a means for permitting unique facilities and for EPA to make case-by-case assessments of their technical merits. Their significance to DOE is in the fact that this permitting mechanism can be used to negotiate nonstandard alternatives for meeting RCRA requirements while minimizing problems such as employee exposure to radiation. The DOE is currently preparing a Part B application under Subpart X for a RCRA permit for the WIPP. In the unlikely event that the HLW repository also requires a RCRA permit, analyses and assessments required for NRC licensing of the repository could also suffice to fulfill the information requirements for Subpart X permitting.

Permit-by-rule

Permitting-by-rule is another regulatory mechanism under RCRA that affords exemptions of certain waste management activities from RCRA permit requirements. Facilities that meet the permit requirements of other specified EPA regulatory programs are deemed to have RCRA permits without undergoing the RCRA permitting process. Under the current regulations, permits-by-rule are available for activities covered by EPA's ocean dumping regulations, for underground injection controls (UIC) under the Safe Drinking Water Act (SDWA), and for National Pollutant Discharge Elimination System permits under the Clean Water Act. Avoidance of dual regulation and equivalency of protection under different EPA statutory authorities are among the underlying justifications for permitting-by-rule.

Extension of the permit-by-rule concept to the HLW repository would avoid dual regulation if EPA were to promulgate a rule adding 10 CFR 60 licensing by the NRC as a basis for permitting-by-rule under RCRA. To justify issuance of such a rule, EPA would first need to assess the level of protection afforded by NRC licensing under 10 CFR 60. Although the repository is to be licensed by the NRC, the NRC's enforcement of the EPA regulations in 40 CFR 191 provide additional grounds for issuing a permit-by-rule for NRC-licensed repositories. The 40 CFR 191 rule, however, was remanded to EPA for reconsideration of its groundwater

protection standards and its reproposal is currently delayed because of funding uncertainties within EPA (NWN 1988).

Class Variance

The RCRA regulations contain a few provisions that allow variances from regulation for broad classes of wastes or activities. Delisting of specific wastes and variances from classifying recycled materials as solid wastes are the two types of variances that wholly exclude a waste from RCRA. More narrow variances from specific provisions, such as the land disposal restrictions, are also possible. If the need were justified, EPA could promulgate a variance rule to exempt classes of activities in which compliance with RCRA increased personnel exposure to radiation or to accommodate a conflict with the AEA. In fact, EPA issued a Notice of Proposed Rulemaking indicating a regulation would be promulgated to provide for such variances. That regulation, however, has since been indefinitely postponed.

DISCUSSION

Each pathway discussed above has unique advantages and liabilities. For example, interagency agreements do not require Congressional action or EPA rulemaking and, therefore, should be straightforward and easy to develop. The existence of a draft MOU that has never been finalized, however, undermines the argument for ease of development. In addition, the absence of public review and comment might lessen the credibility of such agreements in the eyes of the public.

The legislative solution obviously requires Congressional action. The Congress might amend the AEA by revising the definition of "byproduct material" to include the nonradioactive constituents of HLW. This would have the effect of exempting the HLW repository from RCRA regulation in the same way as uranium mill tailings are exempt. The political acceptability of a legislative solution could be enhanced if HLW not destined for the repository (i.e., certain DOE wastes that remain in their current locations) were excluded from the exemption. Alternatively, the Congress might be asked to amend RCRA with a statutory exclusion for specific waste types, e.g. spent fuel and certain kinds of defense HLW, or specific facilities, such as the HLW repository. Finally, RCRA might be amended to add specific exclusions from RCRA management practices that conflict with requirements for safe handling of radioactive materials. The advantages of Congressional action include clarity, permanency, and credibility to the public. The disadvantages are in timing, given the slowness of the legislative process, and in managing the unpredictability of the political climate.

The existing regulatory framework already contains mechanisms for variances, permits-by-rule, and flexible permitting under Subpart X. Both variances and permit-by-rule require rulemaking activities by EPA, and the regulatory process can be slow and cumbersome. In addition, permits-by-rule are currently applicable only for overlaps among the

regulatory programs that are EPA's responsibility to administer. Granting a permit-by-rule for a facility permitted by the NRC, such as the HLW repository, differs radically from the precedent established by the existing permits-by-rule approach. A permit-by-rule for the HLW repository would have to be tied to EPA's own HLW rule, which has been remanded, and that might suffice only if the HLW rule is in line with the SDWA. Therefore, it is unlikely that EPA will be able to modify regulations to accommodate a permit-by-rule in the near future, and this may not prove to be a very useful option in practical terms.

The most appropriate option for dealing with inconsistencies between AEA and RCRA appears to be a class variance from requirements that could result in excess personnel exposure or endanger national security and permitting under Subpart X. The variance was suggested and postponed by EPA. The Subpart X permitting is currently available. Its primary disadvantage is that it would impose dual permitting requirements on the HLW repository, and it is not yet clear that HLW even meets RCRA's definitions of hazardous waste. Because the WIPP is exempt from NRC regulation, application for a RCRA permit for WIPP does not create a dual permitting situation. Application for a full RCRA permit under Subpart X does, however, have the advantage of demonstrating DOE's commitment to regulatory compliance to the public.

CONCLUSION

Regulating mixed waste under RCRA is likely to create additional administrative burdens but is unlikely to impose major changes in radioactive waste management at DOE facilities. The existing regulatory framework provides sufficient flexibility to accommodate resolution of concerns for minimizing excess personnel exposure to radiation. Permitting under Subpart X and variances for activities that might result in excess radiation exposure or endanger national security could provide appropriate relief from strict adherence to RCRA with only modest changes in the current regulatory structure.

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