REGULATION OF RADIOACTIVE MIXED WASTE AT THE WASTE ISOLATION PILOT PLANT (WIPP) UNDER THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

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ABSTRACT

This paper discusses Resource Conservation and Recovery Act (RCRA) (1) compliance issues pertinent to the placement of radioactive mixed waste in the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. The discussion focuses on the "mixed waste" issue, the WIPP as an "interim status" facility, effects of RCRA land disposal prohibitions on the WIPP, regulation of geologic repositories as "Subpart X" miscellaneous units, and various inconsistencies between U.S. Department of Energy (DOE) requirements for the WIPP and the RCRA regulations. An approach to permitting the WIPP as a RCRA compliance facility is also addressed.

INTRODUCTION

Compliance by the WIPP with the Resource Conservation and Recovery Act has been clouded by a number of uncertainties, several still in need of resolution. These have included the RCRA exemption for "byproduct" material, the applicability of certain RCRA provisions to placement of hazardous wastes in geologic formations, and various inconsistencies between RCRA regulations and WIPP requirements derived from the Atomic Energy Act of 1954 (AEA) (2). An overview of the WIPP, the RCRA, and the "mixed waste" issue is pertinent to an understanding of problems facing the WIPP in terms of RCRA compliance. The permitting of WIPP under RCRA presents an "unconventional" regulatory compliance situation demanding regulatory flexibility.

Overview of WIPP

The WIPP was authorized by the Department of Energy National Security and Military Applications of Nuclear Authorization Act of 1980 (Pub. L. 96-164) for:

> [T]he express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States. . . .

A concomitant part of the WIPP mission includes the receipt, handling, and storage for experimental purposes of a limited quantity of high-level radioactive wastes. While all high-level wastes will be removed following experimental storage, radioactive transuranic (TRU) wastes placed in the WIPP facility will be readily retrievable for five years following placement. Although the primary purpose of the WIPP is to dispose of TRU wastes, an undetermined portion of the wastes to be shipped to the WIPP from other U.S. Department of Energy (DOE) defense installations is "mixed waste" that is co-contaminated with both TRU and hazardous chemical components. While the radioactive elements of these radioactive "mixed wastes" are regulated under the Atomic Energy Act, the hazardous chemical components are regulated under RCRA.

The WIPP is also subject to another U.S. Environmental Protection Agency (EPA) regulatory strategy: the Environmental Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes (40 CFR Part 191). Although these standards are not concerned with hazardous chemical wastes, there are some relationships between 40 CFR Part 191 and RCRA in the WIPP context.

RCRA provides for a "cradle to grave" regulation by the EPA or an EPA-authorized state of the generation, transportation, treatment, storage, and disposal of hazardous waste. A waste is "hazardous" if: (a) it is not specifically excluded from regulation; (b) it is listed as a hazardous waste in the EPA regulations (3); (c) it is ignitable, corrosive, reactive, or EP Toxic according to "characteristics" tests; or (d) the generator identifies the waste as hazardous by applying knowledge of its characteristics considering the materials or processes used. An elaborate permitting system is established for owners and operators of facilities which treat, store, or dispose of hazardous waste in what are generally referred to as hazardous waste management units (HWMUs) or treatment, storage, and disposal (TSD) facilities.

Although RCRA became the law of the land in 1976, the initial implementing regulations were not published by the EPA until May 19, 1980. Congress enacted a number of major amendments to RCRA with passage of the Hazardous and Solid Waste Amendments of 1984 (HSWA). Revisions were made to technical requirements for TSD facilities and restrictions were placed on the land disposal of hazardous waste, including limitations on waste placement in salt dome formations, salt bed formations, underground mines, and caves.

Beginning in 1981, EPA promulgated voluminous standards for "conventional" types of TSD units: containers, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, under-ground injection wells, and research and development facilities (4,5). Because these regulations do not apply to all existing, new, and evolving HWM technologies, EPA published in December 1987 standards for owners and operators of "miscellaneous units" which include geologic repositories. These new 40 CFR Part 264 Subpart X requirements (6) will have considerable impact on any WIPP RCRA compliance strategy.

Two types of exclusions from the operation of RCRA have caused considerable uncertainty with respect to WIPP compliance: the "solid waste" exclusion and the "inconsistency" exclusion. The RCRA definition of "solid waste" excludes from RCRA regulation "source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended." Because a "hazardous waste" must first qualify as a solid waste, these radioactive materials are totally exempted from RCRA regulation.

The other exclusion provides that RCRA does not apply to activities or substances regulated by the Atomic Energy Act if the RCRA requirements are "inconsistent" with the AEA. Several "inconsistencies" with respect to the WIPP are discussed in this paper.

DOE and the "Mixed Waste" Issue

The DOE's position with respect to compliance with RCRA by DOE facilities and the regulation of mixed waste has been evolving since 1982 or earlier: from viewing RCRA and the AEA as being in irreconcilable conflict, to requiring de facto technical compliance with RCRA, to the most recent position of accepting dual RCRA/AEA regulation while adapting RCRA requirements to address national security and technical inconsistencies. Some of the historical highlights are as follows:

- DOE Order 5480.2 (7) mandated that DOE facilities comply with RCRA regulations "to the extent practicable," while emphasizing that AEA authorized facilities were not bound by EPA or state regulations conforming with RCRA.
- A June 1983 DOE headquarters document, "Guidance for Preparing Implementation Plans for Hazardous and Radioactive Mixed Waste Management," (8) provided that DOE facilities generating low-level radioactive mixed waste were to comply with RCRA "at the earliest possible date" but that high-level and TRU mixed waste were exempt from RCRA.
- In a December 1983 memorandum to the Secretary of Energy, the DOE's General Counsel was firm in his position that DOE defense installations were totally and without qualification exempt from regulation under RCRA (9).
- In an early effort to resolve the mixed waste controversy, the DOE and the EPA entered into a Memorandum of Understanding (MOU) on February 22, 1984 (10). The purpose of the MOU was to establish a program for mixed waste management that was "comparable to" the technical requirements, recordkeeping, and reporting obligations of the RCRA regulations.
- A federal court in Tennessee decided in April 1984 that the DOE must seek a permit under RCRA for disposing of hazardous waste at the Y-12 plant at the Oak Ridge National Laboratory (11). The court held that the application of RCRA to DOE facilities was not inconsistent with the Atomic Energy Act and that RCRA and the AEA were not in "irreconcilable conflict." The Tennessee case did not deal with the mixed waste issue nor with the definition of by-product material.

On November 1, 1985, DOE published a notice of proposed rulemaking in which it proposed to clarify RCRA's applicability to DOE radioactive wastes (12). The proposed rule would have classified waste "directly yielded in the process of producing or utilizing special nuclear material," even if it contained hazardous chemicals, as "byproduct material" to be regulated exclusively by the DOE under the AEA. Any radioactive waste other than direct process waste would have been considered "mixed waste" subject to regulation under both RCRA and the AEA.

The final rule was published on May 1, 1987 (13). In commenting on its proposed distinction between "direct process wastes" and wastes further re- moved from the physical process of producing and utilizing special nuclear material, the DOE stated as follows:

DOE has concluded after further analysis that the better view of the law is one that avoids such artificial distinctions and that affords the greatest scope to the RCRA regulatory scheme, consistent with the requirements of the AEA. . . .DOE believes that the definitional exclusion and the language of section 1006(a) [of RCRA] are correctly understood to provide for the regulation under RCRA of all hazardous wastes, including waste that is also radio-active.

Thus, the effect of the final rule is that all DOE radioactive waste of whatever type (low-level, high-level, or TRU) which contain RCRA-hazardous components will be subject to regulation under both RCRA and the AEA. However, when there are conflicts between the requirements of RCRA and the AEA, the DOE believes that RCRA requirements must yield.

WIPP RCRA COMPLIANCE ISSUES

The RCRA compliance issues discussed below arise in several contexts: need for further interpretation as to applicability to the WIPP, uniqueness of the WIPP facility to which RCRA regulations were not originally intended to apply, and inconsistencies or conflicts between RCRA requirements and implementation of the WIPP mission. Each of these issues, and others, will require negotiation and resolution with regulators at the EPA and State of New Mexico levels.

Interim Status Authorization

RCRA §3005(a) requires that each person owning or operating an existing facility for treat-ment, storage, or disposal of hazardous waste obtain a permit from EPA or an authorized state. Because permit finalization can require several years, §3005(e) allows facilities not having a finally effective RCRA permit to operate under "interim status." The Act provides that owners or operators of facilities in existence on the effective date of statutory or regulatory changes (under RCRA) making the facility subject to permitting requirements can qualify for interim status by: (1) filing the "preliminary notification" of hazardous waste management activity required by RCRA §3010(a), and (2) making application for a RCRA permit. The effect of having interim status is that qualified owners or operators are "treated as having been issued such permit until such time as final administrative disposition of such application is made" [RCRA §3005(e)(1)(C)].

The WIPP qualifies as an "existing facility" for which interim status can be granted. The WIPP was in existence on the date of enactment of Section 3004(b) of the Hazardous and Solid Waste Amendments of 1984 (November 8, 1984) requiring permits for placement of hazardous waste in salt dome formations, salt bed formations, underground mines, and caves. The WIPP was also in existence when the DOE final rule in 10 CFR Part 962 was published on May 1, 1987. Further, the WIPP was in existence when the regulations in 40 CFR Part 264, Subpart X pertaining to miscellaneous units were finally promulgated on December 10, 1987.

Part A of the WIPP RCRA application should be submitted within six months of the effective date of the final Subpart X regulations on miscellaneous units. Because the WIPP does not qualify as any one of the types of HWM units to which the current RCRA standards apply (containers, tanks, surface impoundments, etc.), only the Subpart X regulations render the WIPP "subject to the requirement to have a RCRA permit." WIPP will not become "subject to" the Subpart X standards until the date it first begins receiving mixed waste which will be several months following submittal of Part A.

The WIPP facility will qualify for interim status with submittal of Part A of the RCRA permit application to EPA or the State of New Mexico (if the State has authority to regulate mixed waste at the time the submittal is made). The exact route by which the WIPP can receive interim status authorization--through EPA or New Mexico--is currently unresolved.

Effects of Land Disposal Prohibitions on the WIPP

The Hazardous and Solid Waste Amendments of 1984 (HSWA) prohibit, according to an established schedule ending in 1990, the land disposal of all listed and characteristic hazardous wastes unless they are first pretreated to substantially diminish their toxicity or reduce the migration of their hazardous constituents (14). Exceptions to these restrictions are provided if the EPA determines that the prohibition is "not required in order to protect human health and the environment for as long as the wastes remain hazardous" [RCRA §3004(d)].

In order to comply with deadlines established by the HSWA, listed hazardous wastes not directly restricted from land disposal are to be evaluated by EPA no later than May 8, 1990. It is expected that all untreated hazardous wastes (allowing for certain exceptions and exemptions) will be prohibited or restricted from land disposal within the next three years. The land disposal restrictions apply to operators, transporters, interim status facilities, and facilities which have received a finally effective RCRA permit.

The WIPP qualifies as a "land disposal" facility under all applicable criteria. Some undetermined portions of the TRU radioactive mixed waste destined for shipment to WIPP contain hazardous waste constituents that are subject to the HSWA land disposal restrictions. However, two types of exceptions to these restrictions are applicable to WIPP wastes: (1) the "no migration" exemption and (2) the treatment standard variance. These are discussed briefly as follows:

"No Migration" Exemption The land disposal prohibitions apply unless the EPA makes a determination that the prohibition is not required to protect human health or the environment. In order for the EPA to make such a determination, it must be demonstrated to a "reasonable degree of certainty that there will be no migration of hazardous constituents from the disposal unit. . .for as long as the wastes remain hazardous." According to the EPA draft Guidance Manual for Hazardous Waste Disposal in Geologic Repositories (15), "geologic repositories have been identified as one of the few types of units that would be able to meet such a stringent demonstration."

In order to obtain the "no migration" exemption, a strong case could be documented for the WIPP as follows:

The setting of the facility will effectively preclude releases to the accessible environment.

The salt bed formations are not hydrologically connected to existing or potential underground sources of drinking water; the facility is hydrologically isolated.

The facility will remain structurally stable and free of significant fractures for as long as the wastes remain hazardous. There will be no migration to air, surface water, or soil.

After closure, the facility will provide protection against waste migration equivalent to that provided by the natural environment. Man-made barriers and engineered systems along will not be relied upon to provide a long-term no migration assurance.

- Treatment Standard Variance. The HSWA land disposal prohibitions apply only to untreated hazardous waste. They do not apply to waste that has been treated to achieve the treatment standards established under RCRA §3004(m) which are intended to substantially diminish the waste toxicity or its likelihood of migration. The basis and procedures for obtaining a variance from a "treatment standard" are as follows:

  Where the treatment standard is expressed as a concentration in a waste or waste extract and a waste cannot be treated to the specified level, or where the treatment technology is not appropriate to the waste, the generator or treatment facility may petition the Administrator for a variance from the treatment standard. The petitioner must demonstrate that because the physical or chemical properties of the waste differs significantly from wastes analyzed in developing the treatment standard, the wastes cannot be treated to specified levels or by the specified methods. (Emphasis added, 40 CFR §268.44.)

  DOE facilities shipping wastes to the WIPP ("generators") should qualify for a variance from the pretreatment requirements because the treatment technologies contemplated by the EPA are "not appropriate" to mixtures of radioactive TRU waste and chemical hazardous waste. Wastes intended for placement in the WIPP are unique. They were not considered by the EPA when it developed treatment standards for specific waste groups.

If neither the no migration exemption nor the treatment standard variance can be granted for the WIPP wastes restricted from land disposal, then it can be concluded that there is an "inconsistency" between the requirements of RCRA and those of the Atomic Energy Act of 1954 of the type contemplated by RCRA §1006(a). In such an event, the DOE should request a variance from the 1984 HSWA land disposal prohibitions and pretreatment requirements.

Permitting WIPP As A "Subpart X" Miscellaneous Unit

The WIPP qualifies as a "miscellaneous unit" under the definition in 40 CFR §260.10 in that it is not a container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, or underground injection well. Compliance with regulations governing miscellaneous units is particularly appropriate for a unique, one-of-a-kind facility that was originally designed to accommodate radioactive waste rather than hazardous chemical waste.

Since 1981, the EPA has promulgated technical and performance standards for conventional hazardous waste treatment, storage, and disposal units: containers, tanks, surface impoundments, waste piles, land treat-ment units, landfills, incinerators, and underground injection wells. The EPA refers to hazardous waste management technologies not covered by the standards in 40 CFR Parts 264 and 265 as "miscellaneous units" for which RCRA permits cannot currently be obtained. In order to fill the gap between regulated and unregulated units and to allow the permitting of new and existing units not covered by existing regulations, the EPA finally adopted 40 CFR Part 264, Subpart X on December 10, 1987.

As a follow-up to Subpart X, the EPA on July 9, 1987 circulated a "first draft" of a Guidance Manual for Hazardous Waste Disposal in Geologic Repositories (15). The document is intended to provide guidance with respect to permitting and performance standards for geologic repositories which fall within the definition of Subpart X miscellaneous units.

The Subpart X regulations allow for a "customized" permitting process designed to fit a particular waste management situation. In other words, each permit would be tailored by the EPA to particular circumstances and risks associated with a particular type of waste management unit, considering the nature of the technology, type and form of waste material, site location, hydrogeologic characteristics, and other factors. The EPA intends to customize requirements on a case-by-case basis by developing design, construction, operation, monitoring, and closure specifications through the permitting process.

The WIPP should be permitted as a "miscellaneous unit" under Subpart X. The DOE requirements for the WIPP location, design, construction, and operation--together with DOE's intent to comply with EPA environmental standards in 40 CFR Part 191 (16)--are either as stringent or more stringent than the Subpart X requirements.

Waste Characterization

RCRA requires that sufficient detailed information on the physical and chemical characteristics of hazardous waste be known to treat, store, or dispose of the waste without endangering human health or the environment (4). This information may be supplied by the generator and can be obtained through analyses of representative samples of the waste or from knowledge of the waste or the process by which it is generated (17). If the generator cannot provide the necessary information, then the owner or operator of an off-site disposal facility such as WIPP is required to ensure that the waste characterization requirements are met (4).

All information on physical and chemical characteristics of the waste will be derived from process and waste knowledge provided by the generators shipping waste to the WIPP. This approach will be adequate for wastes that will be treated prior to shipment to WIPP, wastes that are currently generated, and wastes that were generated in the recent past. The process knowledge approach will also be adequate for wastes which will be generated in the future because more detailed records on the chemical components of the mixed wastes are being maintained by generators. For wastes generated in the more distant past, however, records may be inadequate for characterizing the waste. In this case, a variance from or a waiver of the waste characterization requirements will be necessary.

Ground Water Monitoring

RCRA, in 40 CFR Part 264, Subpart F, describes ground water monitoring requirements which are applicable to regulated land disposal units. These requirements establish a program to detect, evaluate and, if necessary, correct ground water contamination during the active life of the unit and the thirty-year post-closure care period.

Both upgradient and downgradient wells must be installed to monitor the ground water for hazardous constituents. The detection program must be capable of showing whether a plume of contamination has migrated to the "point of compliance." This is defined as "a vertical surface located at the hydraulically downgradient limit of the waste management area that extends down into the uppermost aquifer underlying the regulated units."

The EPA draft Guidance Manual for Hazardous Waste Disposal in Geologic Repositories (15) states that the permit conditions specifying monitoring requirements will be decided on a case-by-case basis and will depend on the repository setting and the nature of the wastes. Thus, repository ground water monitoring requirements may differ considerably from those required of other land disposal units. Due to the unique nature of geologic repositories, the EPA, in fact, believes there may be instances where the need for comprehensive ground water monitoring may be waived altogether.

Ground water monitoring as required by Subpart F was not originally intended to apply to deep geologic formations and is not appropriate for the WIPP. For example, under Subpart F, a ground water monitoring system must be installed at the point of compliance. Meeting this requirement could weaken WIPP's structural integrity, creating conduits for saturation of the repository and eventual waste migration.

The WIPP can demonstrate that there is no possibility for the movement of liquids to the accessible environment during the active life of the facility. The goal of the proposed ground water performance standard in "Subpart X" is attainable by the WIPP. A waiver of ground water monitoring requirements is appropriate.

Impact on Generators

The RCRA compliance activities undertaken at the WIPP will impact mixed waste management activities at DOE defense facilities shipping TRU wastes to the WIPP (the "generators"). RCRA waste characterization requirements will necessitate that generators maintain accurate waste characterization records. Where detailed analytical data cannot be obtained, knowledge of the process from which the waste was derived will need to be applied. Specific information required from generators will include:

- Specification of the RCRA-hazardous chemical components of TRU mixed waste to be shipped to the WIPP (waste listed or designated under 40 CFR Part 261).
- Specification of waste not listed but which possesses (or is likely to possess) hazardous waste "characteristics" (ignitability, reactivity, corrosivity, EP toxicity).
- Identification of wastes that are or will be prohibited from land disposal.
- A description, in as much detail as possible, of the process by which each hazardous chemical component was, is, or will be generated.

In order to facilitate the compilation of this and other needed information, a generator RCRA Interface Working Group (IWG) has been established. The first meeting was held in Carlsbad on January 20-21, 1988.

PERMITTING APPROACH FOR THE WIPP

Permitting the WIPP facility to comply with RCRA is a complex process involving a number of uncertainties. However, the major implementation steps (not necessarily in sequence) can be briefly summarized as follows:

(1) Resolve outstanding regulatory uncertainties with regulatory agencies.

(2) Submit Part A of the RCRA permit application to obtain interim status authorization.

(3) Prepare documentation to demonstrate how the WIPP will comply with interim status requirements.

(4) Submit Part B of the RCRA permit application as a "Subpart X" miscellaneous unit. Include the "no-migration" exemption petition or submit the petition independently.

(5) Assist generators (DOE facilities shipping waste to WIPP) in preparing petitions for variances from pretreatment requirement for wastes restricted from land disposal.

SUMMARY

The WIPP will comply with both the procedural and substantive requirements of the RCRA although certain regulatory uncertainties must yet be resolved. Petitions for variances from several RCRA provisions including those concerning land disposal prohibitions, ground water monitoring, and detailed waste analysis will be appropriate. The overall strategy is to permit the WIPP as a "miscellaneous unit" under 40 CFR Part 264, Subpart X (6)

REFERENCES

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