

REGULATORY BARRIERS TO HAZARDOUS WASTE TECHNOLOGY INNOVATION

T. L. Kuusinen and M. R. Siegel
Pacific Northwest Laboratory
Richland, Washington*

ABSTRACT

The primary federal regulatory programs that influence the development of new technology for hazardous waste are the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, also commonly known as Superfund).

Two important aspects of RCRA that can create barriers to hazardous waste technology innovation are technology-based waste pre-treatment standards and a cumbersome permitting program. By choosing a technology-based approach to the RCRA land disposal restrictions program, the U.S. Environmental Protection Agency (EPA) has simultaneously created tremendous demand for the technologies specified in its regulations, while at the same time significantly reduced incentives for technology innovation that might have otherwise existed. Also, the RCRA hazardous waste permitting process can take years and cost hundreds of thousands of dollars. The natural tendency of permit writers to be cautious of unproven (i.e., innovative) technology also can create a barrier to deployment of new technologies. EPA has created several permitting innovations, however, to attempt to mitigate this latter barrier. Understanding the constraints of these permitting innovations can be important to the success of hazardous waste technology development programs.

BACKGROUND

The purpose of this paper is to summarize regulatory impediments to hazardous waste technology innovation. In this paper the term "hazardous waste" includes radioactive waste and radioactive mixed waste. The paper focuses on those problems that are most amenable to legislative or regulatory "fixes" as opposed to those that result more from institutional attitudes, such as a reluctance by regulators to accept new technologies. However, instances of where such institutional issues could be addressed by statutory or regulatory changes will be discussed. Non-regulatory barriers, such as uncertain markets and lack of development capital, which may also act as barriers to new technology innovation, are not discussed in this paper.

The regulatory programs that most impact the development and application of new waste treatment technologies are those promulgated under RCRA and CERCLA. In general, the impediments to the development and application of new technologies fall under two headings: those related to regulatory standards and those related to permitting.

It is widely recognized that the successful and cost-effective remediation of hazardous waste sites in this country, especially many of those managed by the U.S. Department of Energy (DOE), will depend upon the successful deployment of new waste treatment technologies. However, DOE, like private parties responsible for site remediations, frequently encounters regulatory "schizophrenia". This is

manifested by the regulators' theoretical recognition of the need to encourage development and application of new and innovative technologies; yet at the same time the regulators are reluctant to approve their use in the field. In addition, a root cause of regulatory barriers to technology development is that regulatory schemes intended to apply to traditional technologies are often applied to new and innovative technologies.

While the RCRA and CERCLA regulatory schemes are generally intended to ensure high levels of protection based upon relatively complete data on site conditions, this level of certainty may not be achievable using unproven technology. The unfortunate result is a Catch-22; a new technology will not be implemented because it does not have a proven track record, but a track record cannot be established without implementing the technology on at least some limited basis. The regulatory system must be capable of accommodating new unproven technologies that hold the promise of providing long-term benefits. This should be possible to accomplish without compromising health and safety at contaminated sites.

The CERCLA program has established an internal advocate function for promoting technical innovation. As such, the Superfund Innovative Technology Evaluation (SITE) program holds much promise for demonstrating and diffusing new technologies at CERCLA sites. As EPA's own Office of Inspector General has concluded, however, this promise has yet to be significantly realized (1). Of the EPA on-scene coordinators and remedial project

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managers contacted by the Office of Inspector General, roughly 30 percent either had not heard of the SITE program or were not familiar enough with it to respond to basic questions. The RCRA program, the source of many of the regulatory barriers cited in this paper, lacks an internal innovation advocate altogether.

REGULATORY STANDARDS

Treatment, storage, and disposal of hazardous and radioactive waste is heavily regulated by the federal government and the states. Therefore, technical performance alone is not the sole determinant of the success of specific technologies being developed by DOE. Statutes and regulations often define the performance criteria that waste management technologies must meet. The regulatory requirements normally depend not on the technology itself, but rather the legal classification of the waste being treated or otherwise managed.

Regulatory requirements can impact waste treatment technology development in a number of ways. First, as noted above, regulations could mandate specific performance criteria for specific waste streams being treated by the technology. For example, under the RCRA Land Disposal Restrictions (LDRs) program, certain radioactive lead solids must be treated by macroencapsulation. Unless a specific technology qualifies as Best Demonstrated Available Treatment (BDAT) under this program, or otherwise qualifies as an equally effective alternative treatment, it is unlikely that the technology will be used in the field.

LDRs potentially pose the greatest regulatory impediments to developing and applying new waste treatment technologies. This is especially true where the LDRs dictate the use of a specific technology for treating wastes prior to land disposal. The LDRs apply both to CERCLA sites, through the requirements to apply applicable or relevant and appropriate requirements (ARARs), and to RCRA operations. In many cases, the BDAT standards and similar technology-based requirements offer few incentives or rewards to those seeking to develop and deploy better technologies. In fact, those who want to apply innovative technologies face increased regulatory barriers and their associated costs. While those seeking to use a technology other than a specified BDAT at a site can apply for a variance, this process usually entails considerable time and expense. The system offers little encouragement for technology innovators to risk their financial investment on technologies that, at best, must face a torturous regulatory process with little guarantee of ultimate success.

In addition, it appears that several promising technologies, such as those that use biotechnology, may face serious LDR-related barriers to implementation despite their great potential for safeguarding health and the environment. EPA should seriously consider whether the strict applica-

tion of LDR requirements at CERCLA and RCRA corrective actions sites affords long-term environmental and health benefits.

PERMITTING

A hazardous waste generator may store waste onsite for up to 90 days, provided certain conditions are met. Any other treatment, storage or disposal (TSD) of hazardous waste requires a permit. A notable exception is for the onsite management of CERCLA wastes.

The process of acquiring a TSD permit can cost several hundred thousand dollars and typically takes two to four years (2). Also, there is a natural tendency for permit writers to more closely scrutinize permit applications involving use of emerging technology because it has not yet been proven safe and effective. This tendency can create a significant barrier to the development and diffusion of innovative technologies. However several permitting innovations, discussed below, allow exemptions and variations for special circumstances.

Sample Exclusion

EPA and all RCRA-authorized states have adopted rules to allow hazardous waste samples to be sent for composition analysis to a laboratory without a TSD permit, provided the laboratory meets certain conditions.

Treatability Exemption

Certain types of low-volume waste treatability studies may also be exempted from federal permitting requirements. This is a relatively recent change in the federal permitting program published on June 19, 1988. Because it is considered "less stringent" than the pre-existing TSD permitting program, states are not required to adopt it in order to retain RCRA authorization, and few have done so.

In states that have adopted the treatability exemption (and states without RCRA authorization where the EPA regional office is responsible for permitting), waste samples undergoing treatability studies are exempt from regulation if the testing facility, including a mobile treatment unit, meets all of the following requirements:

- notifies EPA or the state at least forty-five days before conducting tests and has an EPA ID number
- receives no more than 250 kg per day of waste, does not store more than 1 kg of acutely hazardous waste, 500 kg of contaminated soil or water, or 1000 kg total hazardous waste (not including testing residue) at any given time
- returns waste and residue from studies to generator within specified time limits

- does not engage in open burning or land placement of waste
- maintains certain records for three years, reports certain information annually, and informs EPA or the state when it plans to stop testing at the site.

Research, Development and Demonstration (RD&D)

Permits

Facilities anticipating numerous treatability studies, which would exceed any of the above criteria, could apply for an RD&D permit. EPA developed RD&D permits specifically to streamline the permitting process for innovative and experimental technologies for which permit standards (e.g., performance specifications) do not yet exist. Again, this is a discretionary permitting innovation in RCRA-authorized states and has not been widely adopted. During the first three years in which RD&D permits were available, EPA had issued 13 permits out of 39 applications it had received (3).

RD&D permits are valid for one year, with up to 3 one-year renewals, and they limit waste receipts to the quantity needed to demonstrate technology performance. EPA or the authorized state can establish whatever requirements deemed necessary to protect human health and the environment, but must include public participation and financial responsibility. Experience with the RD&D permitting program is limited, but where such permits have been issued their processing has averaged twelve to eighteen months, compared to the typical two to four years for a traditional TSD permit (2).

Permit Modification Rule

Simplifications to the TSD permit modification process were promulgated by EPA on September 28, 1988. This rule simplifies the process of incorporating innovative treatment processes at facilities with existing TSD permits, but again is considered less stringent than the base program and is only available in a few states.

Subpart X

On December 11, 1987 EPA added a new Subpart X to 40 CFR 264 to establish standards for miscellaneous units not covered by other TSD permitting standards. By setting generic standards for nonconventional units, EPA hoped to create a better-defined framework for processing TSD permits for innovative technology. However, this is still a full TSD permit and should be expected to take a similar amount of time and money to acquire as other TSD permits. Additionally, EPA has had little experience preparing Subpart X permits, and most RCRA-authorized states have yet to promulgate conforming regulations.

Mobile Treatment Units

EPA published a proposed rule June 3, 1987 that would have simplified permitting procedures for transportable treatment technologies. Under current procedures, mobile treatment units must undergo a full Part B permitting process at every operating location. Publication of a final rule apparently has fallen low on EPA's list of priorities.

Subpart Y

When EPA issued its treatability study regulations on July 18, 1988 it stated an intent to develop a new Subpart Y to 40 CFR 264 to establish permitting standards for experimental facilities that test multiple types of waste treatment technologies. However, EPA has not yet proposed a rule in this area.

RECOMMENDATIONS

The following are specific steps that should be considered for reducing or eliminating regulatory impediments to the development and use of new waste treatment technologies:

Move toward the Greater Use of Performance-Based Standards

EPA should be encouraged to establish performance-based standards to achieve consistent risk levels for releases and residual contaminant levels in all environmental programs. Standards should be designed, to the maximum extent feasible, to specify the required level of performance while allowing maximum flexibility in selecting the means to achieve the desired end result.

Provide Special Statutory and/or Regulatory Programs to Encourage the Use of New Technologies at Federal Facilities

Hazardous waste sites managed by federal agencies, such as DOE and the Department of Defense, offer unique test beds for new technologies that lack a proven track record. While the goal of protecting public health and the environment should not be compromised, many of the factors that complicate Superfund-lead or Potentially-Responsible-Party-lead sites do not exist at federal facilities. For instance, there are not the concerns about the use of unproven technologies depleting the Superfund if they failed or the litigation concerns and expenses that surround Potentially-Responsible-Party-lead sites.

DOE is in a unique position to take a long-term view concerning the need to develop these new technologies. Again, without compromising the protection of public health and the environment, DOE might be more willing to take a chance with new technologies, recognizing that while some may not perform up to expectations, over time its

environmental restoration and waste management programs will benefit from them. These types of opportunities may not exist at more traditional Superfund sites. In this vein, special statutory or regulatory provisions that offer federal agencies special incentives to develop and deploy new technologies should be considered.

Do Not Allow Regulatory Detail to Outweigh Environmental Benefit

Technologies that clearly provide substantial environmental benefits, in terms other than financial cost, should not be rejected because of regulatory detail that serves no useful purpose at a particular site. For instance, questions have been raised about the possibility that small amounts of hazardous materials may migrate to surrounding soils as a result of the use of in situ vitrification. For the purpose of this discussion, one can assume that this contamination does in fact occur, that the amount of resulting contamination poses no discernible risk to public health and the environment, and that the use of in situ vitrification does in fact otherwise remediate the site to acceptable levels. A strict interpretation of RCRA regulations could require that the surrounding soils be subject to LDR requirements, thereby making the use of in situ vitrification financially impractical at most sites. The end result would be a net loss to the environment. Regulators should have the flexibility to apply common sense in clear instances such as this to protect the environment and the public.

Require That States, as Part of the RCRA Authorization, Adopt EPA's Innovative Permitting Strategies for New Technologies

EPA has adopted certain regulations (Subpart X, Permitting Standards for Miscellaneous Units) and is considering certain additional regulations (simplified permitting procedures for mobile treatment units, and Subpart Y, Permitting Standards for Experimental Facilities). States are currently not required to adopt innovative permitting strategies as part of their RCRA authorization and few have done so. Requiring states to take such action will encourage the development and use of new technologies by streamlining the regulatory process and by providing relatively uniform national regulatory procedures.

Promulgate Standards that Streamline the Regulatory Process for New Technologies

EPA should finalize regulations dealing with permitting of mobile units. In addition, it should modify permitting procedures requiring that all operating conditions be spelled out in advance, thereby requiring permit modifications to accommodate changes in use and deployment. Other actions that can be taken include "hammers" for permits for innovative technologies (e.g., permits or variances are automatically granted if not approved within six months), revising RCRA delisting regulations to apply to processes rather than specific sites, and developing specialized permits to allow a facility to test a range of technologies, rather than having the permit specify performance requirements for every technology to be tested.

Create an EPA Headquarters Position of a RCRA Innovation Advocate

A new position should be created at the division director level within EPA's Office of Solid Waste, with counterparts in each of the EPA regional offices having the responsibility to review all permits related to the actual development and implementation of new technologies. The position would be explicitly linked to EPA's SITE program to help move technologies beyond research and development to their actual implementation.

REFERENCES

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