

Landfill Post-Closure Care: Can Owners Guarantee the Money Will Be There?

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RCRA rules now require landfill owners to prove that they can afford to maintain their landfills after closure and to correct environmental problems the landfills cause. Trust funds are the most promising of the mechanisms owners may use to provide financial assurance. But there are several questions yet to be resolved on the issue of post-closure care funding.

Public and private landfill owners this year face the first compliance deadlines under the municipal solid waste (MSW) landfill regulations issued by the U.S. Environmental Protection Agency in October 1991. One requirement of the new regulations is for the owner or operator of an MSW landfill to provide assurance that it can pay for closure, at least 30 years of post-closure care, and corrective action for environmental problems caused by the landfill. Financial assurance for post-closure care has emerged as a major concern of owning landfills in this country. [Mechanisms must be in place by April 1994; however, EPA is proposing to postpone the compliance date to help communities that are having difficulties implementing programs. See "Top of the Heap on page 5 of this issue -Ed.]

Under the regulation -- Subtitle D of the Resource conservation and Recovery Act (RCRA) -- closure costs include preparation of a closure plan, installation of additional gas monitoring wells, final drainage construction, and site landscaping. Post-closure care includes ground water and gas monitoring, leachate collection and treatment, gas recovery and management, and final cover maintenance.

The philosophy behind the financial assurance provisions is to assure proper funding when a landfill is developed, so that routine maintenance and any necessary remediation work can continue for at least 30 years, even if the owner or operator is no longer in business or financially solvent at that time. Issues that need to be incorporated into the financial assurance aspects of RCRA for MSW landfills include the length of time post-closure care must be provided, the magnitude of funding needed for future long-term care, appropriate financial assurance instruments, and mechanisms to ensure that funds will be available exclusively for post-closure care and remediation of contaminated ground water.

Why 30 Years Isn't Enough

The Subtitle D regulations prescribe composite-lined and covered landfills for MSW management. This is a "dry tomb" approach primarily aimed at reducing the amount of water entering the landfill and the escape of leachate from the landfill. Unfortunately, there is a misconception that Subtitle D's "stricter" construction requirements, siting limitations, and monitoring requirements will eliminate the problem of leachate polluting ground water.

However, the new provisions only postpone ground water pollution; they will not prevent it.¹ The landfill poses a threat to ground water quality for as long as wastes remain buried in the landfill ~ typically forever.

The EPA has recognized the inability of landfills designed and operated according to Subtitle D to provide long-term protection of ground water quality. In promulgating the Subtitle D regulations, the EPA stated, "Even the best liner and leachate collection system will ultimately fail due to natural deterioration, and recent improvements in MSW landfill containment technologies suggest that releases may be delayed by many decades at some landfills."²

Despite this acknowledgment, EPA established a minimum 30-year period for post-closure care. Thirty years is only a very small portion of the time over which the wastes in the lined landfill will represent a threat to ground water quality and hence of the time over which post-closure maintenance and funding will be required. The failure to properly acknowledge, and require financial assurance for, the perpetual threat of landfill leachate to ground water quality is one of the most significant deficiencies of Subtitle D.

Because the regulations establish this 30-year concept, landfill applicants typically prepare post-closure financial assurance plans presuming that the landfill will require no more than 30 years of post-closure care. Thus, the regulations discourage development of programs to provide adequate funding for the long-term.

In a review of post-closure funding for hazardous waste landfills, the U.S. General Accounting Office concluded that, "EPA only requires funding assurances for maintenance and monitoring costs for 30 years after closure and corrective action costs once a problem is identified. No financial assurances exist for potential but unknown corrective actions, off-site damages, or other liabilities that may occur after the established postclosure period." The GAO findings are equally applicable to the MSW landfill rules. By the time ground water pollution is discovered, it will be too late to develop sufficient funding to pay for corrective action. Once the landfill is closed, the best source for funding disposal fees on wastes the landfill receives -- is gone.

For these reasons, landfill owners and operators and/or the public need to establish funding programs during the active life of the landfill to pay for perpetual care. The costs include expenditures for not only long-term maintenance, but also for arresting the spread of pollution that occurs, and for remediation of the ground water to the extent possible. The fund should be sufficient to cover plausible worst-case scenario contingencies, including the need to remove and treat the buried wastes in order to remove the source of ground water pollution when the pollution cannot be stemmed by other means.

The Magnitude of Funding Requirements

Because the Subtitle D regulations are new, historical figures are not available on what the true costs of long-term post-closure care will be. However, there are indications that the available estimates considerably understate the funds needed for post-closure care.

The Subtitle D rules include several estimates of the additional costs of designing, constructing, operating, closing, and providing post-closure care for a landfill beyond those of an unlined landfill. The EPA's projected "best estimate" for the additional cost was \$2 to \$4 per household per year. This translates to an increase of less than 1/2 of 1 cent per person per day, or from \$1 to \$2 per ton of MSW generated. The EPA's cost estimate for the post-closure care component of those figures, however, was limited to costs for the first 30 years of post-closure care. It also did not include any funds for ground water remediation.

In Washington State, for example, total costs for closure and routine post-closure tasks of lined landfills were estimated to be between \$80,000 and \$175,000 per acre.³ These estimates did not consider long-term post-closure care costs beyond 30 years, or any amount for ground water remediation.

By excluding costs beyond the 30-year period and most of the likely corrective action, these estimates miss the most significant costs to be incurred and grossly underestimate the true post-closure costs associated with Subtitle D landfills. The misrepresentation of costs will dissuade communities and regulatory agencies from adopting a more appropriate approach for managing MSW. communities will avoid developing funds large enough to manage the eventual problems their landfills will cause. And, they will avoid initially adopting more expensive approaches that treat the wastes to produce residues that do not represent a perpetual threat to ground water quality.

While actual figures are not yet available for post-closure or remediation costs for "modem" lined landfills, experiences at unlined landfills provide insight into some of the clean up costs. An unlined MSW landfill in the San Gabriel Basin of southern California polluted the area ground water; the cost for pumping and treating the contaminated ground water and for purchasing replacement water has been estimated to be more than \$100 million dollars. Landfill owner/operators -- or communities where landfills are sited--must consider these potential expenses while designing their financial assurance programs. The programs must provide a mechanism to ensure that sufficient funding is available to handle such needs. It is precisely the lack of such funding mechanism and the high costs that have prevented communities across the U.S. from taking action to clean up ground water pollution that has already occurred at thousands of existing unlined landfills.

The post-closure costs for lined landfills could exceed the high costs associated with some unlined landfills. The ground water quality monitoring programs commonly used for lined landfills (one or two upgradient wells and a few downgradient wells placed hundreds or more feet apart) were designed for unlined landfills. They do not take proper account of the manner in which leachate will leak from lined landfills. Such monitoring programs are not adequate to detect leachate migration from lined landfills before widespread ground water pollution has occurred.^{4,5,6} The extensive ground water pollution that can result from such monitoring programs will necessitate greater expenditures for ground water remediation than if the incipient pollution had been detected.

The California Water Resources Control Board has recognized this situation and has specified that the magnitude of post-closure care funding must be tied to the adequacy of the ground water

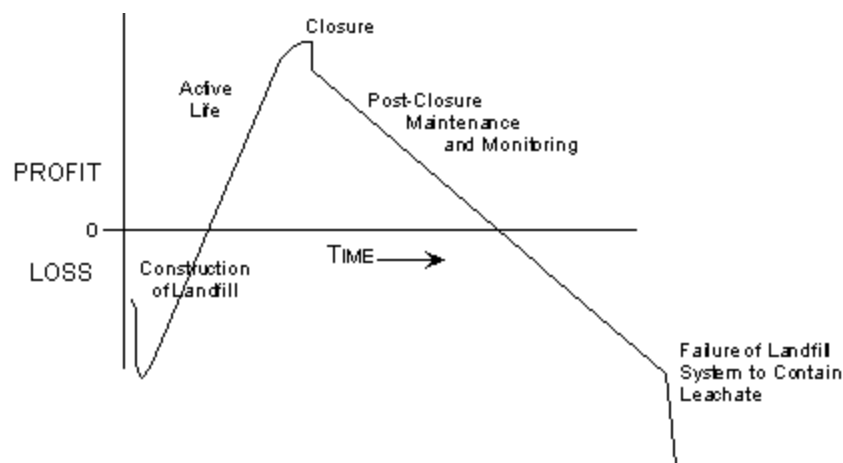
monitoring program developed by the owner/operator. Those landfill owner/operators who propose to use a traditional ground water monitoring program will have to set aside greater funds for post-closure remediation than those who develop a more reliable program.

Who Will Pay the Bill?

There are significant questions about the different approaches and abilities of private waste management companies and public entities to meet post-closure care maintenance and contingencies. H. Lanier Hickman Jr., Executive Director of the Solid Waste Association of North America notes that both public agencies and private companies will have difficulty keeping "safety net" funds available for future needs of a closed landfill.⁷ "A surplus of cash allows a company to declare an extra dividend; the stockholders expect it," Hickman said. "Surplus funds in a government bank account allow elected officials to engage in all sorts of interesting dances with the electorate."

In order to remain in business, private landfill companies must generate a net profit from the landfills they develop. A net profit cannot be generated from a landfill, however, if post-closure care consumes the profits from the landfill operation. Figure 1 presents a conceptual illustration of the income and expenditures associated with operating a covered and composite-lined landfill. The owner has significant expenses associated with establishment of the landfill. Once the landfill starts to accept wastes, the owner can rapidly recover the initial investment, and the landfill can become highly profitable.

Figure 1. Conceptualization of costs of operating a covered and composite lined landfill.



In one case, a landfill company spent \$60 million to purchase a gravel pit in southern California for the purpose of developing a 200-acre landfill. The company estimated it would generate a profit of \$12 million/year during the approximately 20-year active life of the landfill. At that rate, the company would recover its initial investment in about five years; for the next 15 years the company would make a profit of about ~80 million. The cost of closing the landfill and

especially conducting post-closure care will, however, consume those profits. A private landfill company cannot accept the true post-closure care responsibilities and remain financially stable. It is clear that unless significant changes are made in the provisions for post-closure care funding of Subtitle D landfills, or a significantly different approach is taken for MSW management, future generations will have to bear the costs and responsibilities that are abrogated by private landfill companies.

While it may appear that publicly owned landfills would have a significant advantage over private landfills in terms of post-closure care funding, in reality the difference may be small. Governing bodies for public landfills likely will be reluctant to tax the public to generate the funds to spend on perpetual post-closure care and ground water remediation for landfills that contain the "forgotten" wastes of previous generations.

Trust Funds Stand Out

The regulations define several mechanisms that a landfill owner or operator may use to prove financial assurance: trust funds, surety bonds, letters of credit, insurance, corporate financial tests, corporate or government guarantees, state-approved mechanisms, and state assumption of responsibility. Landfill owners may also elect to use a combination of these options. (See accompanying box for a brief review of some of these mechanisms.)

A trust fund, a protected reserve of actual dollars, is the surest way for a landfill company or community to guarantee it can continue to pay the post-closure costs for a landfill. The magnitude of a trust fund would be site-specific, but as discussed earlier, the projected costs are substantial. Landfill owners can build trust funds by charging waste generators for the fund with the collection and disposal fees. In this way, those who are responsible for generating the wastes will pay for postclosure care, rather than pass those costs on to future generations.

Conclusion

The new regulations require landfill owners to accept long-term financial responsibility for protecting public health and environmental quality associated with waste management.

Those regulations do not go far enough, either in articulating the need for perpetual postclosure care for "dry tomb" landfills, or requiring adequate financial assurance from private and public landfill owner/operators. As issued, RCRA financial assurance regulations will not ensure that those who generate wastes disposed of in a lined landfill will pay the LO~ cost for their management for as long as they represent a treat to ground water resources.

Financial Assurance Mechanisms: A Mini Analysis

The Solid Waste Association of North America (SWANA) has published a technical policy that discusses strengths and weaknesses of several financial assurance options. While each of the mechanisms may provide financial assurance in specific cases, SWANA has endorsed trust funds as "the most fair and equitable means to assure the availability of adequate and guaranteed funds

at the time they are needed." Following are brief reviews of the mechanisms, based on comments from SWANA and other sources.

-Insurance: Premium costs and high deductible limits have prevented wide utilization of insurance. Insurance companies usually are not interested in taking the risk posed by an MSW landfill.

-Letters of Credit: These could be difficult to obtain. If letters of credit were available, the cost may be so high as to make it uneconomic to obtain them.

-Bonds: General obligation bonds and tax exempt bonds are available. General obligation bonds depend upon citizen support, which may not always occur. Tax exempt bonds usually depend upon a revenue stream; such a revenue stream will not be available after a facility closes. Consequently, tax exempt bonds are not a readily available option.

-Net worth: The pledge against net worth to ensure that an owner or operator can meet future needs would appear attractive to an owner/operator. However, the assurance provided by such an instrument would be questionable at best. Critical to the evaluation of the suitability of such an approach would be how the net worth would be determined and how its availability would be assured in perpetuity. Unlike private companies, local governments can argue they will always be there, but this is no guarantee that they will have the funds or that they can raise funds for perpetual post-closure care and remediation.

-Trust funds: These funds clearly designate monies for a specific purpose and isolate those funds for that purpose only. A trust fund can be established by any landfill owner and can be funded as desired, presumably by the users of the landfill. Trust funds have the potential to hold available sufficient monies to meet plausible worst-case scenario post-closure care and remediation needs.

SWANA's policy document on financial assurance (#T-8, "Providing Financial Assurance for Municipal Solid Waste Facilities") may be obtained by contacting: SWANA, 8750 Georgia Ave., Silver Spring, MD 20910; (301) 585-2898.

Notes:

¹ Lee, G. F., and Jones, R. A., Municipal Solid Waste Management in Lined, Dry Tomb Landfills: A Technologically Flawed Approach for Protection of Groundwater Quality," notes from UCLA University Extension short course, 1992.

² EPA, "Solid Waste Disposal Facility Criteria; Proposed Rule," Washington, D.C., 1988.

³ Correll, J., "Landfill Closure in the '90s," Solid Waste & Power, March/April 1992.

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⁷ Hickman, L., "Financial Assurance Will the Check Bounce?" Municipal Solid Waste News. March 1992.

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"Solid Waste Disposal Facility Criteria, Final Rule," Title 40, Code of Federal Regulations, Parts 257 and 258, *Federal Register*, October 9, 1991.

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***Reference as: "Lee, G. F. and Jones-Lee, A., 'Landfill Post-Closure Care: Can Owners Guarantee the Money Will Be There?' Solid Waste and Power, 7:35-39 (1993)."***

# Landfill Post-Closure Care: Can Owners Guarantee the Money Will Be There?

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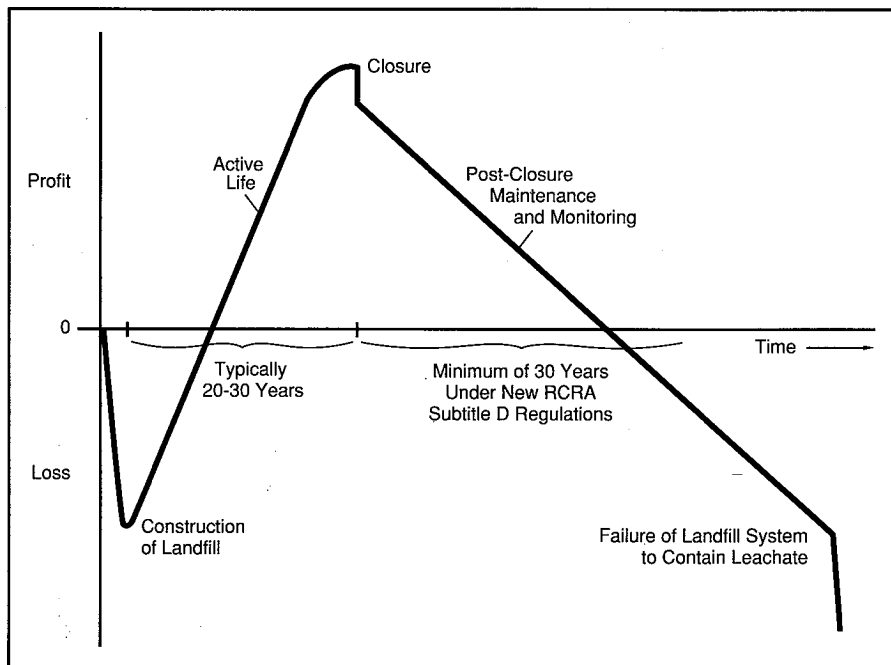


Figure 1: Conceptual cash flow projection for lined landfills, incorporating costs for long-term post-closure care.

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### Conclusion

The new regulations require landfill owners to accept long-term financial responsibility for protecting public health and environmental quality associated with waste management. Those regulations do not go far enough, either in articulating the need for perpetual post-closure care for "dry tomb" landfills, or requiring adequate financial assurance from private and public landfill owner/operators. As issued, RCRA financial assurance regulations will not ensure that those who generate wastes disposed of in a

lined landfill will pay the total cost for their management for as long as they represent a threat to ground water resources. □

*Dr. Lee and Dr. Jones-Lee may be contacted at G. Fred Lee & Associates, 27298 E. El Macero Dr., El Macero, CA 95618; (916) 753-9630.*

### Notes:

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