Office of Inspector General

Audit Report

RCRA

RCRA FINANCIAL ASSURANCE FOR CLOSURE AND POST-CLOSURE

2001-P-007

March 30, 2001

Inspector General Division(s) Conducting the Audit	**Headquarters Audit Division** **Washington, DC** **Virginia Roll** **Barry Parker** **Cathleen Meeks** **Susan Barvenik** **Josephine Smidt** **Mike Prater**
Region(s) covered	**Region 1 (Connecticut)** **Region 2 (New York)** **Region 3 (Virginia)** **Region 4 (Alabama)** **Region 5 (Ohio)** **Region 6 (Texas)** **Region 7 (Missouri)** **Region 9 (California)** **Region 10 (Washington)**
Program Office(s) Involved	**Office of Solid Waste and Emergency Response** **Office of Solid Waste**

MEMORANDUM

SUBJECT: RCRA Financial Assurance for Closure and Post-Closure
Audit Report No. 2001-P-007

FROM: M E Prater
Mike Prater, Audit Manager
Headquarters Audit Division

TO: Michael H. Shapiro, Acting Assistant Administrator
Office of Solid Waste and Emergency Response

Attached is the subject report for our review of RCRA financial assurance for closure and post-closure care. This report contains findings that describe problems the Office of Inspector General (OIG) has identified and corrective actions the OIG recommends. This audit report represents the opinion of the OIG and the findings contained in this audit report do not necessarily represent the final EPA position. Final determinations on matters in this audit report will be made by the EPA managers in accordance with established audit resolution procedures. Accordingly, the findings described in the audit report are not binding upon EPA in any enforcement proceeding brought by EPA or the Department of Justice.

During the exit conference, and in your response to the draft report for this review, your office provided corrective actions, with milestone dates where applicable, for most of the recommendations. Your response, which is included as Appendix V, also indicates that ASTSWMO has requested that EPA discuss the report and your response to our recommendations at their April 18 and 19 mid-year meeting. For any planned actions and milestones that are developed as a result of the meeting, we would appreciate an updated response within 90 days of the report date. When we receive the updated information, we will determine whether to close this report in our tracking system.

Appendix VI of this report identifies the report distribution. We have no objections to the further release of this report to the public. Should you or your staff have any questions about this report, please contact Virginia Roll of my staff on (202) 260-5101, or Carol Jacobson, Audit Liaison, on (202) 260-7604.

Attachment

(This page was intentionally left blank.)

EXECUTIVE SUMMARY

INTRODUCTION

Congress enacted the Resource Conservation and Recovery Act in 1976 to ensure proper management of the huge quantities of waste generated each year. Hazardous waste treatment, storage, and disposal facilities regulated under the Act must develop a plan for closing their facilities when they no longer treat, store, or dispose of waste. To assure that funds will be available to pay for the potentially costly facility closure, facilities are required to meet certain financial assurance requirements. Regulations also require financial assurance for post-closure care of hazardous waste landfills, involving such activities as maintenance and groundwater monitoring. Similar requirements apply to Municipal Solid Waste Landfills. Financial assurance regulations were developed by the U.S. Environmental Protection Agency (EPA) but are primarily implemented by states.

OBJECTIVES

The overall objective of our audit was to determine whether financial assurance requirements and the implementation of those requirements provided adequate funding for facility closure and post-closure activities. We found many cases where financial assurance mechanisms appeared to be working as intended. However, in some cases, financial assurance might not provide adequate funding to ensure the facilities will not pose a threat to human health and the environment. We specifically considered the following four questions.

- Does captive insurance satisfy requirements for closure and post-closure financial assurance?
- What are the risks that funds from financial assurance mechanisms will not be available when needed?
- Are funds being assured to cover the full period of necessary post-closure monitoring and maintenance?
- What can be done to improve the review process for closure and post-closure cost estimates?

RESULTS IN BRIEF

We concluded that insurance policies written by captive insurance companies do not provide an adequate level of financial assurance for closure and post-closure. Most captive insurance companies are wholly owned subsidiaries in the corporation of the company they are insuring, and the financial strength of the captive is dependent upon the parent corporation. Therefore, if a parent company experiences financial difficulties, there is insufficient assurance that the captive insurance company will be able to provide needed closure and post-closure funds.

Although the Agency has analyzed potential failure rates for various financial assurance mechanisms, these analyses did not include all significant risk factors. Therefore, the risks that funds will not be available when needed from financial assurance mechanisms – such as insurance, surety bonds, and trust funds – may be higher than EPA estimated. Mechanism failures can result in significant closure and post-closure delays. And may result in federal or state governments assuming the financial burden.

There is insufficient assurance that funds will be available in all cases to cover the full period of landfill post-closure monitoring and maintenance. Regulations require post-closure activities and financial assurance for 30 years after landfill closure, and a state agency may require additional years of care if needed. We were told by several state officials that many landfills may need more than 30 years of post-closure care. However, most of the state agencies in our sample had not developed a policy and process to determine whether post-closure care should be extended beyond 30 years, and there is no EPA guidance on determining the appropriate length of post-closure care.

Some facilities have submitted cost estimates that were too low, and state officials have expressed concerns that the cost estimates are difficult to review. To improve the review process, software is available that can help state programs review cost estimates submitted by facilities. Several states contacted were unaware of the software and relied on reviewers' judgment to evaluate estimates.

RECOMMENDATIONS

We recommended that EPA's Acting Assistant Administrator for Solid Waste and Emergency Response provide specific guidance regarding insurance matters related to financial assurance, further develop existing financial assurance training materials, and facilitate the exchange of financial assurance information through an Internet bulletin board. We also recommended that, as resources allow, criteria be developed for the appropriate post-closure care time frames. Furthermore, we recommended that EPA help states obtain software for reviewing closure and post-closure cost estimates.

AGENCY RESPONSE

We received the Agency's response to our draft report on March 27, 2001. OSWER agreed with all of our recommendation.

(This page was intentionally left blank.)

TABLE OF CONTENTS

ABBREVIATIONS

ASTSWMO	Association of State and Territorial Solid Waste Management Officials
EPA or Agency	U. S. Environmental Protection Agency
GAO	General Accounting Office
LDR	Land Disposal Restrictions
MPCA	Minnesota Pollution Control Agency
MSWLF	Municipal Solid Waste Landfill
OSWER	Office of Solid Waste and Emergency Response
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
TSDF	Treatment, Storage, and Disposal Facility

(This page was intentionally left blank.)

CHAPTER 1

INTRODUCTION

Purpose

Before the Resource Conservation and Recovery Act (RCRA) was enacted in 1976, many cases of environmental damage occurred when hazardous waste facilities were abandoned by their owners. In recognition of this problem, the U. S. Environmental Protection Agency (EPA or Agency), under its authority granted by RCRA, established requirements on owners and operators for proper closure and post-closure care of hazardous waste treatment, storage and disposal facilities (TSDF). Financial responsibility is one of the requirements. Therefore, since the early 1980s, owners and operators of TSDFs have been required to establish financial assurance that funds will be available to properly close a TSDF and perform any necessary post-closure activities in the event that the owner or operator is unwilling or unable to conduct these activities. Financial assurance requirements were later extended to owners and operators of municipal solid waste landfills (MSWLF).

Two Division Directors in EPA's Office of Solid Waste suggested that the Office of Inspector General conduct an audit on financial assurance issues. The overall objective of our audit was to determine whether financial assurance requirements and the implementation of those requirements provide adequate funding for facility closure and post-closure activities. Under the objective, this audit addresses the following questions.

- Does captive insurance satisfy requirements for closure and post-closure financial assurance?
- What are the risks that funds from financial assurance mechanisms will not be available when needed?
- Are funds being assured to cover the full period of necessary post-closure monitoring and maintenance?

- What can be done to improve the review process for closure and post-closure cost estimates?

Background

Congress enacted RCRA to ensure the proper management of the huge quantities of waste generated in the nation each year. Under RCRA Subtitle C, EPA promulgated regulations for managing hazardous wastes from generation to disposal. Under RCRA Subtitle D, EPA promulgated regulations that apply to solid wastes that are not defined as hazardous or are excluded from Subtitle C regulations.

RCRA required EPA to develop standards for new hazardous waste TSDFs built after RCRA was enacted and for those TSDFs that were already in operation when RCRA requirements became effective (interim status facilities). To handle hazardous waste, a new TSDF must obtain a permit before it begins operating. Standards for interim status facilities are often similar to standards for new facilities. However, there are some circumstances where it would not be practical for an existing facility to immediately implement the requirements that a new facility must implement. Therefore, interim status regulations are designed to allow TSDFs, already in operation, time to implement requirements for permitted facilities.

Both interim status and permitted TSDFs are required to develop a plan for closing their facilities when they no longer treat, store or dispose of hazardous waste. Facility closure requirements are potentially costly. To assure that funds are available to pay for closure, TSDFs are required to meet certain financial assurance requirements. Owners and operators of land disposal facilities are also required to establish a plan and financial assurance for post-closure care. During the post-closure care period, activities are conducted, such as maintenance and ground-water monitoring, to preserve the integrity of the disposal system and detect releases of hazardous waste.

Owners and operators of TSDFs can demonstrate that funds are available to pay for closure and post-closure through one or a combination of the following financial assurance mechanisms.

- **Trust Fund** - If a trust fund is used, owners and operators are required to deposit money according to a phased-in schedule (known as a pay-in period). At the end of the pay-in period, the facility should have enough money set aside to cover its financial assurance requirements.

Under some of the other mechanisms (surety bonds and letters of credit), owners and operators must establish a standby trust fund. No money is deposited into the standby trust fund unless funds must be withdrawn from the mechanism. In that case, funds from the mechanism are deposited in the standby trust fund and used to cover the respective costs.

- **Surety Bond** - A surety bond guarantees that closure and post-closure obligations will be fulfilled. There are two types of surety bonds:

  Payment Bond - In the event an owner or operator fails to fulfill closure and post-closure requirements, a payment bond funds a standby trust fund in the amount equal to the face value of the bond.

  Performance Bond - A performance bond guarantees performance of closure and post-closure requirements. A performance bond can also be paid into a standby trust fund. Interim status facilities may not use performance bonds.

- **Letter of Credit** - A letter of credit is a credit document, issued to a TSDF by a financial institution, covering the costs of closure and post-closure.

- **Insurance** - The owner or operator of a TSDF may take out an insurance policy to cover the costs of closure and post-closure.

- **Corporate Financial Test** - If a facility meets corporate financial test criteria, it may satisfy financial assurance obligations solely on the strength of its financial condition. (For more information on

Subtitle C corporate financial test requirements, please see the following chapter and Appendix II.)

- **Corporate Guarantee** - A facility which is not able to meet corporate financial test criteria may arrange a corporate guarantee by demonstrating that its corporate parent, sibling corporation, or firm with a substantial business relationship with the owner or operator, meets the financial test requirements on its behalf.

MSWLFs are also required to establish plans and financial assurance for closure and post-closure care of the landfill. MSWLFs may establish financial assurance for closure and post-closure through either one or a combination of the above mechanisms or through additional mechanisms allowed under Subtitle D regulations. However, requirements for the Subtitle D corporate financial test are somewhat different from Subtitle C requirements. (Please see Appendix II for more details on Subtitle D corporate financial test requirements.) Subtitle D regulations also allow a local government financial test, local government guarantee, state assumption of responsibility, and additional state-approved mechanisms. Under some circumstances, state assumption of responsibility and additional state-approved mechanisms might also apply to Subtitle C facilities.

- Local Government Financial Test - As in a corporate financial test, a MSWLF owned by a local government can fulfill financial assurance requirements for some or all of its obligations by meeting local government financial test requirements. A local government which satisfies the financial test requirements may also guarantee financial assurance for a MSWLF it does not own or operate.

- State Assumption of Responsibility - When the state assumes responsibility for MSWLF financial assurance, the State Director either assumes legal responsibility for closure and post-closure or assures the availability of funds from state sources for those requirements.

- Additional State-Approved Mechanisms - The State Director of an approved state program may allow additional mechanisms if they meet performance criteria specified in the Subtitle D regulations. In brief, a state-approved mechanism must be legally valid, binding, and enforceable under state and federal law and ensure that sufficient funds will be available in a timely fashion for costs of closure and post-closure.

TSDFs are also required to establish financial assurance for bodily injury and property damage liabilities. In addition, financial assurance may be required when the facility must clean-up (perform RCRA corrective action) at a contaminated hazardous waste site.

Financial assurance requirements under Subtitle C and Subtitle D are primarily implemented by states. A state must become authorized by EPA to implement RCRA Subtitle C regulations. In order to become authorized, a state develops and submits for approval a hazardous waste program which is equivalent to and consistent with the federal program and provides adequate enforcement. Under RCRA Subtitle D, as amended by the Hazardous and Solid Waste Amendments of 1984, states are required to develop permitting programs or other systems of prior approval to ensure MSWLFs comply with federal criteria, which include financial assurance requirements. EPA is required by RCRA to determine whether the state MSWLF programs comply with the federal criteria. Currently, most states are authorized for RCRA Subtitle C financial assurance regulations and approved for Subtitle D financial assurance programs. Since requirements for Subtitle C and Subtitle D financial assurance are often similar, the discussions in this report apply to both Subtitle C and Subtitle D facilities unless otherwise indicated.

Scope and Methodology

The Office of Inspector General conducted the fieldwork for this assignment from September 1999 through January 2001. This audit was performed in accordance with the *Government Auditing Standards* (1994 Revision) issued by the Comptroller General of the United States as they apply to performance audits. We restricted our scope to financial assurance for Subtitle C and Subtitle D facility closure and post-closure. Therefore, we did not do audit work on any

issues exclusively associated with financial assurance for corrective action or bodily injury and property damage. We primarily concentrated audit work on the mechanisms that Subtitle C and Subtitle D facilities have in common.

To accomplish our objectives, we reviewed the applicable RCRA statute and regulations, as well as guidance and policy documents issued by EPA. We interviewed EPA officials in the Office of Solid Waste, the Office of Enforcement and Compliance Assurance, and EPA Regions. We reviewed federal and state program internal controls relative to program operations and compliance with laws and regulations. We selected nine states for our review: Alabama, California, Connecticut, Missouri, New York, Ohio, Texas, Virginia, and Washington. We chose these states to obtain a broad national understanding of financial assurance issues. We visited RCRA financial assurance state programs in California, Connecticut, and Texas, where we interviewed officials and conducted file reviews. Based on work conducted in the three states, we developed questionnaires and spreadsheets to collect opinions and data from the nine state programs on financial assurance for Subtitle C and D facilities. We also conducted phone interviews with officials in the states. Data collected included information relative to the states' experiences with financial assurance.

We selected a statistical sample of Subtitle C facilities from a nine-state subset population in the Resource Conservation and Recovery Information System (RCRIS) post-closure universe. The nine states listed above were chosen for the subset population. Data from these states represented approximately 40 percent of the RCRIS post-closure universe. We further restricted the population to privately owned Subtitle C facilities in post-closure which were expected to have established financial assurance. Since we drew the sample from the nine-state subset population, our projections were made to the population of nine states rather than to individual states. RCRIS does not contain data on financial assurance, and we only relied on RCRIS for its list of facilities in post-closure from which we drew our sample. We did not conduct a review of RCRIS internal controls. We also obtained data on active MSWLF in seven of the

above states. (For further information on sampling methods and data, please see Appendix I.)

We reviewed the Agency's performance measures established under the Government Performance and Results Act of 1993. Financial assurance for closure and post-closure is required for RCRA-permitted facilities which are tracked as part of Goal 5, established for Better Waste Management.

Prior Audit Coverage

There have been no prior Office of Inspector General audits on RCRA financial assurance. We reviewed the General Accounting Office (GAO) report, *Hazardous Waste: Funding of Postclosure Liabilities Remains Uncertain*, June 1990, which includes discussions of financial assurance and post-closure care. GAO stated that although EPA was aware of the potential for future releases from disposal facilities, it had not yet developed a strategy for addressing these long-term post-closure concerns. GAO stated that long delays in the evaluation of the effectiveness of current waste disposal requirements have the potential to result in another Superfund situation in future years.

(This page was intentionally left blank.)

CHAPTER 2

EFFECTIVE FINANCIAL ASSURANCE MECHANISMS ARE NECESSARY

Effective financial assurance mechanisms[1] are necessary to ensure that closure and post-closure activities will be conducted when needed to protect human health and the environment. We found many cases where RCRA financial assurance mechanisms appear to be working as intended. However, we found cause for concern about some mechanisms. Since there is some risk of failure for any financial assurance mechanism, the Agency developed criteria designed to reduce mechanism failure rates to a low level. While the Agency has analyzed potential failure rates for various financial assurance mechanisms, the analyses cannot always be relied on because they did not include all significant risk factors. Therefore, some financial assurance mechanisms may have failure risks that are higher than the Agency finds acceptable. Furthermore, because of insufficient EPA guidance and the complexities of insurance, captive insurance policies have not always been sufficiently evaluated to determine whether they meet regulatory requirements.

Financial assurance mechanism failures that occur when a facility owner or operator is insolvent can result in significant closure and post-closure delays, increasing the likelihood of environmental contamination and adverse human health effects. Moreover, when these failures occur, federal or state funds may have to be diverted from other public priorities since EPA or the state (and ultimately the general public) would become financially responsible for closure and post-closure.

[1]Financial assurance requirements for Subtitle C and Subtitle D are often similar. Therefore, in this report, unless otherwise indicated, the discussion applies to both Subtitle C and Subtitle D mechanisms.

Corporate Financial Test Was Designed to Exclude High Risk Firm

RCRA regulations allow a facility which meets corporate financial test requirements to satisfy financial assurance obligations solely on the strength of its financial condition and without establishing a third party mechanism or trust fund. Although there is some risk of failure for firms which pass the corporate financial test, the test is meant to reduce the risk to a low level by screening out firms with higher risks of failure. Since the risk of bankruptcy increases when a firm's net worth decreases, firms are required to have a minimum of $10 million in tangible net worth to pass the corporate financial test. The Agency has determined that firms with less than $10 million in tangible net worth went bankrupt four times more frequently than firms with tangible net worth greater than $10 million. Net worth is not the only corporate financial test requirement. Additional requirements include financial ratios or bond ratings, which make the test more difficult to pass than the net worth requirement alone. (For more details on corporate financial test requirements for Subtitle C and Subtitle D facilities, please see Appendix II.)

Regulations also require annual updates of the financial test to determine whether or not a firm's financial health has deteriorated because the Agency believes the financial test might not be a good long-term predictor of solvency. In our sample of facilities, we found examples of facilities which had established financial assurance through the corporate financial test and in a later year no longer qualified. EPA or a state program may also require reports of financial condition at any time during the year there is a reasonable belief that the owner or operator no longer meets financial test requirements. Federal regulations allow financial test requirements to be met on behalf of a TSDF or MSWLF through a corporate guarantee by another firm, such as a corporate parent, sibling, or one that has a substantial business relationship with the TSDF or MSWLF. The firm providing the corporate guarantee becomes responsible for closure and post-closure in the event of TSDF or MSWLF financial failure.

A firm using the financial test to satisfy obligations cannot guarantee it will have funds for closure and post-closure in the event that it becomes insolvent. For conducting closure and post-closure, the public bears the risk of the firm's

insolvency. A facility which cannot pass the corporate financial test must establish an alternate mechanism because the facility's risk of financial failure, and therefore the public's risk, is too high. Since the Agency excludes higher levels of assurance risk[2] through the requirements of the corporate financial test, this implies that use of an alternate financial assurance mechanism should present no more risk to the public than the corporate financial test. However, there is evidence that some currently allowed alternate mechanisms may present assurance risks higher than the corporate financial test risk. (There is further discussion about the financial test later in this chapter.)

Independence of Events is Important for Third Party Mechanism Risk

For a third party mechanism to be effective in providing financial assurance, there must be independence between the risk of facility failure and the risk that the company providing the mechanism will fail. Moreover, Agency calculations of third party mechanism risks assumed these risks were independent. However, the Agency did not take into consideration cases where there is a lack of independence between risks of facility financial failure and third-party financial failure.

The risk to the public of the corporate financial test depends on the financial strength of the firm. When a third party mechanism is used to establish financial assurance, the risk of facility failure is transferred to the company providing the mechanism, and the public risk is that the facility will become insolvent and the third party mechanism will also fail. If the risks of failure are independent,[3] the risk to the public that a facility and the company providing the third party mechanism (such as a bank or insurance company) will be insolvent at the same time is lower than either the risk of facility insolvency or the risk of insolvency of the company providing the third party mechanism. For example, a TSDF might establish financial assurance with an insurance policy. The estimated risk, in this case, that the TSDF will become

[2] Assurance risk, which is the risk of concern to the Agency, is defined as "the risk of failure of financial assurance mechanisms to provide funds for environmental obligations in a timely manner."

[3] Events are said to be independent if the occurrence of one event does not affect the probability of the occurrence of the other event. When there is independence of events, the risk of both events occurring at the same time is calculated by multiplying the separate risks together.

insolvent and the insurance company will fail at the same time is significantly lower than either the risk of TSDF insolvency alone or the risk of insurance company failure alone if the two risks are independent.

If TSDF insolvency and insurance company failure are not independent and are positively correlated,[4] the overall risk increases and may be as high as the risk of TSDF insolvency. If the TSDF does not meet corporate financial test requirements, this overall risk could be higher than the failure risk presented by a facility which passes the corporate financial test.

Independence of Events is Lacking with Captive Insurance

We believe that insurance policies issued by a "captive" insurance company do not provide an adequate level of assurance because we found no independence between facility failure and failure of the mechanism. Most captive insurance companies are "pure" captives, wholly owned subsidiaries controlled by the parent company and established to insure the parent company or its other subsidiaries. Captive insurance policies have been used to establish financial assurance for many TSDFs and MSWLFs. Even though the captive may be a legally separate corporation, the financial strength of the captive is dependent upon the parent corporation. Therefore, the requirement that captives maintain a certain level of assets does not provide assurance of funds for closure and post-closure. For example, a significant portion of the assets of one captive, established by a large waste management firm, was represented by a note receivable from the parent company. Because of the financial relationship between a captive insurance company and its parent corporation, A. M. Best, which provides ratings of insurance companies, evaluates captives based on the financial strength of the parent company.

Therefore, the risk of insolvency of a captive insurance company and the risk of insolvency of a facility insured by a captive are not independent but instead are positively correlated. Since the failure of one is closely tied to the

[4] Events are positively correlated when the occurrence of one event increases the probability of the occurrence of the other event.

failure of the other, the assurance risk of using a captive insurance policy would be too high if the insured facility or the captive cannot pass the financial test. In addition to the higher potential risk in allowing a firm which cannot initially meet financial test requirements to use a captive to "self-insure," there is no annual review of the firm's financial condition by the state agency as there is for a financial test or corporate guarantee.

The basic purpose of insurance is to distribute risks among different parties. Typically an insurance company works to diversify its risks by insuring many entities. Independence of events is also important for diversifying insurance risks. For example, when an insurance company provides fire insurance for several buildings in one city block, it may be ruined if a large fire destroys all the buildings on the block. When captive insurance is used for RCRA financial assurance, there is no diversification of risks and no independence of the events of facility insolvencies because the facilities are all part of the same corporation.

The Internal Revenue Service ruled that the "parent corporation and its domestic subsidiaries, and the wholly owned 'insurance' subsidiary [a captive insurance company] though separate corporate entities, represent one economic family with the result that those who bear the ultimate economic burden of loss are the same persons who suffer the loss…." A report issued by the Minnesota Pollution Control Agency (MPCA) listed several reasons for concern about captives. Because "the captive and the parent company are one of the same" and the "captive insurance company is not an independent entity or impartial third party," the MPCA's staff expressed the concern that captive insurance "may be nothing more than a promise to guarantee future coverage of financial assurance requirements."

Because the captive and its insured facility are members of the same economic family, a captive insurance policy establishes financial assurance in the same manner as the corporate financial test without safeguards, such as the $10 million net worth and financial ratio or bond rating requirements. RCRA regulations do not specifically address the use of captive insurance for closure and post-closure financial assurance, although there are some regulatory

requirements for insurance policies in general. We were told there are few RCRA regulatory requirements on insurance established for financial assurance because insurance is primarily regulated by states.

Regulations Not Met by Captive Insurance Policies

An insurance policy established for closure and post-closure must contain a provision allowing assignment of the policy to a successor owner or operator of the facility. The captive insurance policies in our sample would not meet this requirement. The policies were issued by a pure captive which was established to insure the parent company or its other subsidiaries. The state which licensed the captive insurance company and other states which license captives, restrict captive insurance companies from insuring companies outside of the corporate family. In some states, a captive might be allowed to insure an unaffiliated company with an "existing contractual relationship." For example, if the new owner or operator was involved in a joint venture with the facility being sold, the state might allow the policy to be transferred to the new owner or operator. This would have to be determined by the state on a case-by-case basis when the facility is sold. However, the policies in our sample cannot satisfy the provision allowing assignment of the policy to a successor owner or operator. Therefore, captive policies do not meet all financial assurance regulations. In some state programs where captive insurance policies for closure and post-closure were denied, the issue of assignment of the policy was one of the reasons for denying the captive policy. However, other state officials who expressed concerns about the risks of captive insurance for closure and post-closure did not seem to be aware of the assignment problem.

States Are Concerned About the High Risk of Captive Insurance

In some states, serious concerns about captive insurance have resulted in decisions to deny captive insurance policies for financial assurance on a case-by-case basis. For Subtitle C facilities, two states said they would allow captive insurance only if financial test requirements were satisfied. In addition, one state in our nine state sample, Virginia, has recently passed legislation which disallows captive insurance for RCRA financial assurance. In California, a regulation disallowing captive insurance for MSWLF is being proposed. In states that allow captive insurance, state program officials have expressed concerns about the risk of captive insurance

and whether they have the authority to disallow a policy issued by a captive. Moreover, insurance certificates and policies do not indicate whether or not the insurance has been issued by a captive, and there are concerns about the difficulty of identifying a captive insurance policy. We found one case where the state program was unaware that insurance for financial assurance had been issued by a captive.

The following table summarizes the responses we received from state officials on captive insurance in their states.

Table 2.1
Captive Insurance for Financial Assurance
State Responses

STATE	Subtitle C		Subtitle D	
	Allowed	Denied	Allowed	Denied
Alabama*		X		
California	X			X
Connecticut	X**		X	
Missouri	X**			X
New York		X		S**
Ohio	X		X	
Texas		X		X
Virginia		X		X
Washington	X**		X**	

S Would be subject to review and probably denied
* Alabama legislature has not passed the necessary legislation and therefore, does not have a Subtitle D financial assurance program.. However, we were told that EPA Region IV will be working with the Alabama Department of Environmental Management to facilitate adopting financial assurance requirements.
** No captive insurance policies for RCRA financial assurance have been identified

Reinsurance May Involve a Captive Insurance Company

An insurance policy issued by an independent licensed insurance company may involve a captive insurance company through reinsurance. In this type of reinsurance arrangement there may be a lack of independence between facility insolvency and insurance company failure. Reinsurance occurs when the original insurer becomes an insured (or reinsured) by a contract with another insurance company (reinsurer). For example, an insurer might want to reduce or eliminate its current potential liability for losses by taking out liability insurance with another insurance company (the reinsurer) to indemnify itself against liability on its own policies. This may be beneficial when the risk is spread to another independent licensed insurance company.

However, in one form of reinsurance, known as "fronting" in the insurance industry, the risk may be spread to a captive insurance company. Fronting insurance arrangements are legal in most states. In a fronting arrangement involving a captive, an independent commercial insurance company would issue the policy, and the captive would become the reinsurer and reimburse the independent insurance company for any claims paid by the independent insurance company. The fronting insurance company (original insurer) is ultimately responsible for the liability if the captive cannot meet its reinsurance obligation. Moreover, the fronting company can require the captive insurance company to collateralize the captive's obligation for reinsurance. However, if the facility and its captive become insolvent and the collateral does not cover the reinsurance obligation, the fronting company may experience financial problems especially if more than one facility in the same corporation is insured through a fronting arrangement. Since the risk is not adequately diversified, there is a potential for insurance company failure, as in the fire insurance block fire example on page 14. In this case, the risk that the public will have to fund closure and post-closure may be unacceptably high because there would not be independence between the risk of facility insolvency and insurance company insolvency.

Since there is no requirement that fronting arrangements have to be disclosed in an insurance certificate or policy, a state agency might not be informed when there are fronting arrangements used to establish financial assurance. State officials we contacted did not know whether or not fronting

arrangements involving captives had been established for financial assurance for the facilities in our sample. However, at least one insurance company providing insurance for RCRA financial assurance advertises on the Internet that it offers fronting arrangements. Disclosure of fronting arrangements in insurance certificates and policies could help state financial assurance programs be more effective in evaluating assurance risks and whether the policies comply with regulations. The National Association of Insurance Commissioners adopted a Model Law in 1993 requiring disclosure of fronting arrangements and disclosure of the amount of collateral established for the obligation. However, to date this legislation has not been adopted by any state.

Insurance May Be Difficult to Evaluate and Monitor

When insurance is the mechanism, a state program may be presented with a number of additional complex issues, e.g., policy terms and exclusions inconsistent with regulations, potential litigation, late or missing cancellation notices, and whether the insurer is qualified to write insurance in the state. Since insurance is primarily regulated by states, differences in state insurance regulations contribute to the complexities in evaluating insurance policies. As a result, insurance can be difficult to evaluate and monitor. We were told that the lack of a standardized insurance policy form for financial assurance adds to the difficulty. One state program found it necessary to create a team with legal expertise to evaluate insurance policies for RCRA financial assurance. Officials from another state told us they rely on the insurance certificate which must be signed by an authorized representative of the insurance company. RCRA regulations require the insurance certificate to state that "any provision of the policy inconsistent with such regulations is hereby amended to eliminate such inconsistency."

Some insurance policies, issued for financial assurance, require the insured facility to reimburse the insurance company for any claims that are paid by the insurance company for closure and post-closure. This is also known as a fronting arrangement. We were told that, in this type of policy, the insurance company would be liable if the facility owner or operator became unable to conduct closure or post-closure. One state commented that failure of an insurance company to collect deductibles, i.e., reimbursements, on a large number of such policies may have

an impact on the insurance company's ability to perform. The risk of insolvency of an insurance company might increase when it issues this type of policy. If a significant number of such policies are issued to facilities owned by one waste management company, the risk of insurance company failure may not be independent from the risk of insolvency of the waste management company. Another concern is the difficulty in evaluating these policies to determine whether they comply with financial assurance regulations.

In spite of insurance certificates which provide a warrant that policies conform with regulations, policy terms and exclusions may make it difficult for states to obtain closure and post-closure funds from insurance policies without litigation. Some officials mentioned their concern that litigation with insurance companies might sometimes be necessary. Another problem mentioned to us during our audit was insurance policy cancellations which were not reported to the state program. We were told by a state official that in some cases, facilities would obtain insurance policies for financial assurance and later cancel the policies without informing the state program. The insurance companies involved also did not inform the state of the cancellations.

In August 2000, the Agency submitted a proposed rule to the Office of Management and Budget which requires insurance companies issuing policies for RCRA financial assurance to have a high rating from insurance company raters. EPA could help states further in developing solutions to insurance problems. State officials told us they would like more training and guidance from EPA on insurance and on other mechanisms as well. They also said that better communication among states would be helpful. To assure low assurance risk when insurance is the mechanism and that policies comply with regulations, EPA should investigate complex insurance issues with states to determine states' need for guidance.

Assurance Risk for Some Surety Bonds May Be Higher Than Intended

Agency calculations of assurance risk for surety bonds were based on predictions of firm bankruptcies and surety company insolvencies. However, these calculations did not take into consideration litigation risk or the potential for lack of independence of risks. When a surety bond is the

mechanism for RCRA financial assurance, the state may have to litigate to obtain the funds. In one case, years of litigation took place when an insurance company refused to comply with the terms of a performance bond for facility closure. A surety bond is usually issued by an insurance company. However, surety bonds are not insurance, and the surety company becomes liable for closure and post-closure only when the owner or operator fails to comply with closure or post-closure requirements. In this case, the state agency was finally awarded the full amount of the bond plus interest, $2,400,000. Delays and resources spent on litigation in cases like this have negative effects on environmental programs and results.

There are controls imposed by federal regulations on surety bonds. The surety company issuing a bond for RCRA financial assurance must be on the U.S. Treasury Circular 570 list of acceptable sureties. The Surety Bond Branch at Treasury reviews quarterly and annual financial information from surety companies on the list, and a surety company has to meet financial requirements set by Treasury to stay on the list. Furthermore, Treasury sets a limit on the amount allowed on a bond issued by an authorized surety. Although a surety authorized by Treasury can issue a surety bond and then obtain reinsurance from an unauthorized surety company, there are restrictions on the amount of reinsurance allowed from an unauthorized surety. The amount of reinsurance from an unauthorized surety plus the amount of obligation retained by the authorized surety cannot go over the bond limit Treasury sets for the authorized surety.

Although there is a limit set by Treasury on each bond issued, there is no limit on the overall total amount of surety bonds issued by a surety to a company. If a surety issues a large number of bonds to facilities in one corporation, the surety bond risk might not be adequately diversified. This is another case where the financial failure of the corporation might have an impact similar to the block fire described on page 10 and could cause serious financial problems for the surety company. There may also be the reverse case where the financial problems of the surety could contribute to the financial problems of a corporation using surety bonds for many facilities. A recent case illustrates this possibility.

Recently a surety company which had issued bonds at a competitive rate and with low collateral requirements to many waste management companies was removed from the Treasury Circular 570 list because it no longer met Treasury's financial criteria. A large national waste management company entered Chapter 11 bankruptcy shortly after the announcement about the surety company's removal from the list. The removal of this surety from the Treasury list forced the waste management company to try to replace financial assurance surety bonds issued by the surety removed from the list. These surety bonds represented approximately two-thirds of the financial assurance obligation of the waste management company. Since replacement surety bonds were being offered at significantly higher rates and required higher collateralization, the removal of the surety company had a financial impact on the waste management company and, we believe, may have been one of the contributing factors to its bankruptcy. In this case, there may have been insufficient independence between the financial condition of the surety company, and the financial condition of the waste management company.

Furthermore, the assurance risk, calculated by the Agency for sureties, was based on the risk that a surety on the Treasury list would become insolvent, rather than the risk that the surety would be taken off the list. The risk of a surety being removed from the Treasury list is higher than the risk of failure calculated for firms with net worth less than $10 million and seems to be the relevant risk for financial assurance purposes. One state official suggested the imposition of additional requirements on surety bonds used for financial assurance, such as a limit on the total amount of bonds from one surety issued to a company for financial assurance. We believe this additional control would help maintain independence of failure risks when surety bonds are used for financial assurance. However, an EPA official informed us that the Treasury Department interprets its statute as disallowing additional federal requirements on surety companies. More dialogue among financial assurance program officials on this problem might be beneficial.

Trust Funds Present Risks Aside from Bank Failure Risk

Regulations require that the trust operations of a trustee be regulated and examined by a federal or state agency. These banks have a low risk of failure, and, as determined by Agency analysis, a fully funded trust fund invested conservatively has virtually no risk of failure. However, the major risk appears to be that a trust fund will not be fully funded when the facility becomes insolvent. In our Subtitle C sample, there were a significant number of facilities that went out of business or into bankruptcy with partially funded trust funds. Of the partially funded trust funds in our sample (please see the table in Appendix III, 25 percent were on schedule with their funding requirements. However, 75 percent of this group were funded insufficiently when most of the facilities experienced financial difficulties. Facilities in interim status in the early 1980s had twenty years to fund a trust fund. However, under Subtitle C, a permitted facility must fully fund a trust fund over the remaining operating life of the facility or over the term of the initial permit which is limited to10 years, whichever is shorter. Two states, New York and Missouri, reported they require trust funds to be funded within 5 years. In addition, New York requires new firms and revenue oriented facilities to fully fund trust funds when they are established. However, regulations in New York allow a pay-in period of up to ten years for MSWLFs.

Another problem sometimes occurs with trust funds. According to Subtitle C regulations, banks may only release funds from the trust on approval from EPA or the authorized state program. However, we were given examples during our audit where banks had released funds from trust funds to Subtitle C facility owners without the required approval.

Some Problems Found with Letters of Credit

We found some problems with letters of credit used to establish financial assurance for RCRA closure and post-closure. In one sample case, a bank which had issued a letter of credit for financial assurance failed. The letter of credit was no longer in effect because, unlike a savings account, a letter of credit is not guaranteed by the Federal Deposit Insurance Corporation when a bank fails. However, this was a minor problem because the facility, which was not insolvent, was able to replace it with another letter of credit. The outcome in this case was the expected outcome when there is independence of failure risks and illustrates the way financial assurance should work. When the risks of

insolvency of the facility and the bank are independent, there is a low probability that they will both fail at the same time.

The letter of credit operations of a bank issuing a letter of credit for financial assurance must be regulated and examined by a federal or state agency. This requirement helps keep the assurance risk of letters of credit at an acceptably low level. The MPCA report stated that a letter of credit is a good financial assurance mechanism because it provides full coverage and can be drawn on easily. Some disadvantages mentioned were that the bank may choose not to renew the letter of credit and the letter of credit is carried on the facility's financial statements as a liability, which reduces the facility's borrowing power. Subtitle C regulations allow the EPA Regional Administrator or authorized state program to draw on a letter of credit if the bank notifies the facility it will not renew a letter of credit and the facility does not obtain alternate financial assurance. There is no similar provision in the Subtitle D regulations. However, some states, e.g., New York, may have a similar provision for Subtitle D facilities.

Timely notifications on decisions not to renew are important. A state agency did not receive the required 120-day notification from a bank that it was not renewing a letter of credit for a Subtitle C facility's financial assurance. However, the state found out in time before the cancellation and was able to draw on the letter of credit. A different problem occurred when another state agency attempted to draw on a letter of credit established for financial assurance and the financial institution claimed it had not issued the letter of credit and refused to pay. This case has been referred for appropriate legal action.

Complexities in Overseeing the Financial Test

In addition to the risks of company financial failures, there are financial assurance risks caused by difficulties in monitoring financial tests and corporate guarantees. During our field work, we discussed with state officials the complexities of overseeing the corporate financial test mechanism. Some of the complicating factors are economic changes in the waste management industry, company mergers and acquisitions, difficulties in predicting the long-term survivability of individual firms, and evaluating financial test submissions from firms with facilities in many states.

Corporate acquisitions may occur without the state program being notified. Where the original acquired corporation may have provided a corporate guarantee, the new corporation might be unqualified or might be unwilling to provide a corporate guarantee.

A firm using the financial test must supply cost estimates for all facilities it is covering with the test mechanism. During our file review, we found correspondence which illustrated the problem states face in determining the accuracy of cost estimates submitted for the financial test. The correspondence described inaccuracies in cost estimates for out-of-state-facilities. The out-of-state cost estimates were supplied by a corporation using the financial test for facilities in several states. To verify cost estimates for facilities in other states, the state program must contact all other state programs involved. Significant resources would be required to do this for every financial test submission.

A state official suggested that a national database with financial test information would help state programs oversee the financial test mechanism. We asked other officials from the nine states in our sample whether they thought this type of a database would be useful. The majority of officials who responded to our questionnaire expressed an interest in a national database with financial assurance data and cited the benefits of increased communication among state programs. However, some state officials expressed concerns such as not having the resources to maintain the data from their states in a database. Although a national database might not be currently feasible due to resource constraints, increased dialogue among states would be possible and beneficial. Officials from three state programs suggested using the Internet for communicating financial assurance information and discussions among states. We agree with this suggestion and believe an inexpensive bulletin board could be established on the Internet with access limited to state financial assurance program officials. This suggestion is a cost-effective interim solution for improving state communication of financial assurance information and would be easy and quick to implement. In addition, an Internet bulletin board could help states share their solutions to problems.

Over One-Third of Sample Used Financial Test/Corporate Guarantee

The complexities of the financial test are further magnified for state programs by the large number of facilities using this mechanism. In our sample of hazardous waste landfills, over one-third of the facilities used the financial test or corporate guarantee. In addition, the financial test had the highest estimate in the ranges of closure plus post-closure cost estimates in our sample, more than $107 million. Therefore, adequate monitoring of financial tests and corporate guarantees is essential to avoid significant future financial burdens for state programs or the Agency. Although captive insurance policies represent the lowest percent of mechanisms in the sample, they provide very weak assurance for a high average closure plus post-closure cost estimate, over $13 million. Furthermore, they are used for financial assurance by large national waste management companies, and the probability is high that many facilities will fail if one facility using captive insurance fails. Surety bonds also represent a low percent of the sample but provide assurance for an average cost estimate of more than $13 million.

Nineteen Percent in Sample Had No Financial Assurance

In our sample of hazardous waste facilities there were 19 percent with no financial assurance. For the majority of facilities with no financial assurance, the cause appears to have been facility non-compliance with financial assurance requirements rather than failure of mechanisms. Facility non-compliance occurred in spite of enforcement efforts. Financial difficulties and bankruptcies were significant contributing factors to facility non-compliance. In some other cases, facilities had intended to clean close (completely remove waste in accordance with regulations) but were found later not to have met all requirements for clean closure. In this group of facilities, we were told that most have low levels of soil contamination and are currently performing groundwater monitoring. For more information on the distribution of mechanisms and ranges, as well as averages of closure and post-closure cost estimates for Subtitle C facilities in post-closure, please see the table in Appendix III.

Local Government Financial Test Highest Percentage in MSWLF Survey

In addition to data on hazardous waste facilities in post-closure, we requested data on active MSWLFs from the nine states in our survey. More than 30 percent of the MSWLFs we received data for used the local government

financial test and an additional 25 percent used a state-approved mechanism.[5] In contrast to hazardous waste facilities, few MSWLFs we received data for used the financial test or corporate guarantee. Not only did a high percentage of these MSWLFs use the local government financial test, but the highest estimate in the closure plus post-closure cost estimate range was for the local government financial test, close to $569 million.

The local government financial test is similar to the corporate financial test in that a local government owner of a MSWLF can fulfill financial assurance requirements for some or all of its obligations by meeting stipulated bond requirements or financial ratio requirements. However, there is no net worth requirement as there is for a corporate financial test. The reason for not imposing a net worth requirement is, due to their taxing authority, local governments are believed to be less likely than private corporations to become insolvent. In contrast to the corporate financial test, which was designed to reduce the risk of bankruptcy, the local government financial test was developed to indicate whether there would be sufficient local government resources to establish another financial assurance mechanism if the local government financial condition deteriorates below acceptable levels.

A local government which satisfies the financial test requirements may also guarantee financial assurance for a MSWLF it does not own or operate. (For more information on the local government financial test, please see Appendix II.) Given the large number of facilities using the local government financial test and the high estimated closure and post-closure costs associated with it, effective monitoring by states of the financial conditions of local governments using the test is important. Dialogue between states on their experiences with the local government financial test could help state programs increase their effectiveness, and an Internet bulletin board would facilitate the dialogue. (For

[5] The local government financial test is not available to hazardous waste facilities for closure and post-closure. Under certain circumstances, state-approved mechanisms may be available for Subtitle C facilities where the state is not authorized for financial assurance regulations. However, all states in our sample, and most other states, are authorized for these regulations.

more information on the MSWLF data from our survey, please see Appendix I and the table in Appendix IV.)

Conclusions

There are several actions the Agency should take to ensure financial assurance mechanism risks are kept at acceptable levels and to help state programs improve their oversight capabilities. The strength of third party mechanisms depends largely on independence between risks of financial failure of the facility and the third party providing the mechanism. Policies and guidance need to be developed to eliminate situations where independence is not maintained and to ensure compliance with regulations.

Captive insurance policies in our sample do not meet the intent or requirements of RCRA financial assurance regulations. The Agency should advise state programs to determine whether an insurance policy issued for closure and post-closure meets all requirements, including the requirement that the policy allows assignment of the policy to a successor owner or operator of the insured facility. The state program should obtain verification from the insurance commissioner, in the state where the insurance company issuing the policy is licensed, that the policy can be assigned to a successor owner or operator if the facility is sold outside of the corporate family of the seller.

To assure low assurance risk when insurance is the mechanism and that insurance policies comply with regulations, EPA should investigate complex insurance issues with states and the need for additional guidance on these issues.

Most states responding to our questionnaire said they needed more financial assurance training from EPA. Existing financial assurance training materials could be developed by EPA for placement on the Agency's Internet site.

Not only can EPA help states be more effective, but states can help each other by sharing solutions they have developed to financial assurance problems. EPA's help in promoting more communication between states was also requested. In addition to training sessions, workgroups, and roundtable discussion, three states suggested using the Internet to communicate financial assurance information. EPA should

work with the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) to develop a bulletin board on the Internet. A bulletin board could be set up with access limited to state financial assurance program officials and would be an easy, economical, and quick method for improving communication among states.

Recommendations

We recommend that the Acting Assistant Administrator for Solid Waste and Emergency Response:

2.1 Issue guidance to state financial assurance programs that when an insurance policy is used for closure or post-closure financial assurance:

- the insurance policy should meet all requirements; and

- the state program should obtain verification from the insurance commissioner, in the state where the insurance company issuing the policy is licensed, that the insurance policy allows assignment of the policy to the successor owner or operator of the facility, in the event that the facility is sold outside of the corporate family of the seller.

2.2 Investigate complex insurance issues with states and determine states' need for additional guidance on these issues.

2.3 Develop existing financial assurance training materials for placement on the Agency's Internet site to be downloaded by state programs.

2.4 Work with ASTSWMO to develop an Internet bulletin board to increase opportunities for information sharing among financial assurance program officials.

(This page was intentionally left blank.)

CHAPTER 3

FINANCIAL ASSURANCE MAY BE NEEDED BEYOND THE 30-YEAR POST-CLOSURE PERIOD

Financial assurance funds may not be adequate to protect human health and the environment through the full period of post-closure care. Federal regulations require post-closure activities and financial assurance for 30 years after landfill closure. However, the 30-year time frame was based on a compromise and not on scientific research evaluating specific landfill characteristics. We found there are many examples of landfills that will need more than 30 years of post-closure care. The wastes in these landfills pose a threat to human health and the environment if they are not properly contained. Potential problems after 30 years that could disturb the integrity of landfills containing these wastes include landfill liner leaks, leachate collection system breakage, and landfill cap erosion or cracks caused by natural weathering and animal penetration.

According to RCRA regulations, an agency may evaluate a landfill and require additional years of post-closure care covered by additional financial assurance. However, we found that most of the state agencies in our sample, who have the authority to extend post-closure care, have not yet developed a policy or process to evaluate these sites. Furthermore, there is no Agency guidance on how to determine the length of the post-closure care period. When it eventually becomes necessary to conduct longer term monitoring and maintenance for these landfills, financial assurance funds may not be available for extended post-closure care if the company responsible for the landfill no longer has sufficient funds or has gone out of business.

RCRA Landfill and Post-Closure Care Requirements[6]

Land disposal facilities are required to meet certain requirements to protect the environment from the migration of contaminants. Liners and leachate collection systems are

[6] For this chapter, we reviewed issues that Subtitle C and Subtitle D facilities have in common. Statements are meant to apply to both Subtitle C and Subtitle D facilities unless a distinction is made.

intended to prevent waste migration by collecting and safely removing leachate before it can migrate into the groundwater. The landfill cover is designed to prevent the inflow of liquids, primarily rain, into the waste unit and thereby reduce the amount of leachate generated. There are closure and post-closure standards in addition to landfill design requirements. At closure of a unit, if the owner and operator leave waste in place, the units must be maintained in a way that ensures they will not pose a future threat to human health and the environment. After closure, there is a post-closure period when owners and operators must conduct monitoring and maintenance activities to preserve the integrity of the disposal system and continue to prevent or control releases from the disposal units. Post-closure care consists of two primary responsibilities: groundwater monitoring and maintaining waste containment systems.

Post-closure monitoring and maintenance activities include:

- Maintenance of the integrity of the final cover
- Operation of the leachate collection and removal system until leachate is no longer detected
- Maintenance and monitoring of the leak detection system
- Prevention of erosion or damage to the final cover from run-on or run-off
- Protection and maintenance of surveyed benchmarks

Federal regulation requires a 30-year post-closure period after the date closure of the disposal facility is completed. However, the time frame may be amended by the regulating agency if it can be demonstrated that an extension would be necessary to protect human health and the environment. Owners and operators are required to provide for financial assurance for the estimated cost of post-closure care at a landfill facility for the post-closure care period.

Hazardous Waste Treatment Standards

In addition to closure and post-closure requirements for landfill design, EPA promulgated hazardous waste treatment standards under Subtitle C. The treatment standards, expressed as either concentration levels or required technologies, are designed to substantially diminish the toxicity of wastes or reduce the likelihood that hazardous constituents from wastes will migrate from hazardous waste

disposal sites. The treatment standard rules known as Land Disposal Restrictions (LDR) were promulgated in stages. The first LDR rule was published on November 7, 1986. Therefore, a hazardous waste disposed of before schedule rule implementation for that specific waste and all wastes disposed of before November 1986 did not have to meet treatment standards. Hazardous wastes already disposed of do not need to meet LDRs unless they are removed from the disposal unit. Furthermore, since the treatment standards apply only to hazardous wastes regulated under Subtitle C, municipal solid wastes are not treated according to these standards.

Over time, hazardous waste treatment standards promise to substantially reduce the threat from disposed hazardous wastes. A new hazardous waste landfill that has only received treated waste might not need the same post-closure care as landfills that were in operation earlier and received untreated waste. However, current active hazardous waste landfills and those in post-closure have received hazardous wastes that were not treated. The untreated hazardous wastes in Subtitle C landfills and municipal solid wastes in Subtitle D landfills may pose significant threats when they are not managed correctly.

Lack of Criteria for Extending Post-Closure Period

Landfill design requirements and post-closure maintenance for both Subtitle C and Subtitle D facilities are expected to prevent leakage in the short term; however, their long-term effectiveness in controlling releases of contaminants is unknown. EPA and others have stated that it is likely that some disposal facilities will leak at some period after they close. Even the most technologically advanced landfill containment systems have a finite life. However, the timing and magnitude of any resulting post-closure liabilities and effect on human health and the environment are uncertain. Many factors affect the degradation of materials, including their physical and chemical properties, the availability of oxygen and moisture within the landfill, temperature, and microbial populations. Because of the complexity and diversity of waste disposal sites in size and composition and the lack of data, it is not possible to accurately predict leakage contaminant quantities and production rates and the extent and timing of potential leakages.

EPA officials acknowledge the lack of criteria or scientific basis for establishing the 30-year post-closure time frame. Initially, the proposed post-closure care time frame for Subtitle C hazardous waste disposal facilities had been set for a period of 20 years. Comments expressed in a 1980 Federal Register Notice asked EPA to extend the time frame of 20 years of post-closure for Subtitle C facilities to as long as the wastes remain hazardous, possibly in perpetuity. However, some who commented were concerned that an extended time frame would place an economic burden on smaller businesses. Therefore, EPA made the decision to establish the time frame at 30 years, seemingly based on a compromise of these competing interests. EPA officials we spoke to agreed that the 30-year time frame was not based on specific scientific criteria or research studies. The 1980 Federal Register notice further stated that a case-by-case review would be necessary at sites due to the uncertainty caused by a lack of extensive experience with properly designed landfill operations. This review would allow for extension of the post-closure time frame.

In a 1988 Federal Register notice for Subtitle D municipal solid waste landfills, EPA officials stated that releases may occur after the 30-year post-closure period ends, and expressed concern that 30 years may be insufficient to detect releases at some landfills. The notice states that ". . . even the best liner and leachate collection systems will ultimately fail due to natural deterioration . . . " EPA also considered requiring an extended post-closure care period with an option to reduce the period only if the owner or operator could demonstrate that a reduction would not pose any threat to human health and the environment. However, EPA decided this approach would be overly burdensome to the landfill owner and operator. EPA, therefore, set the post-closure care period at 30 years, but stated that a second phase of reduced post-closure care beyond 30 years would be necessary to ensure that releases are detected. The owner or operator must continue, at a minimum, groundwater monitoring and gas monitoring beyond the first 30 years, in order to detect any contamination that might occur. The 1988 notice also discusses the importance of detecting groundwater contamination in a timely fashion.

Although Federal Register notices for Subtitles C and D discuss the need for a case-by-case facility review and a second phase of monitoring to ensure protection of human health and the environment, RCRA regulations do not provide enough criteria for determining this additional review or monitoring phase. The regulation for Subtitle C facilities only states that the post-closure care period may be extended if ". . . necessary to protect human health and the environment (e.g., leachate or groundwater monitoring results indicate a potential for migration of hazardous wastes at level which may be harmful to human health and the environment)." The regulation is broad enough to allow extensions of post-closure care for potential problems. However, the regulation implies that there should be indications from leachate or groundwater monitoring that the facility may present a risk to human health and the environment. Although there may be no releases or indications of releases at a landfill for the first 30 years of post-closure, there may be a potential for releases of hazardous waste in later years. For example, sites may contain materials which are highly resistant to decomposition and metals which remain toxic forever, and, as previously stated, it is unknown how effective current landfill practices will be in the long run in preventing these contaminants from being released. Also, many factors affect the amount and timing of potential leakages.

Need for Continuing Post-Closure Care Beyond 30 Years

EPA officials have stated that based on current data and scientific prediction, the release of contaminants may eventually occur, even with the application of best available land disposal technology. There is concern that these barriers will merely postpone the inevitable release of contaminants until after the 30-year liability has expired. As previously stated, some sites contain materials which are highly resistant to decomposition or which remain toxic forever. There have been several studies to determine the expected life span of landfill liners, and opinions on this issue vary widely. The bottom line is that not even the manufacturers claim that their liners will last forever. Many liners are only warrantied for a period of 20 years, and landfill caps are only expected to last for 20 years. Leachate collection systems have a finite life, as drains clog, and pumping capacity declines with time. Some of the older systems, which will be the first sites to end their 30-year

post-closure care period, were constructed without liners, double liner protections, or leachate collection systems that are required under today's regulations. Potential failures at landfills include:

- leachate collection systems clogging,
- leaks/ pinholes/ seams/ stress cracking/ brittle fractures/ deterioration/ chemicals passing through liners,
- erosion of the cap by natural weathering, vegetation roots penetrating cover, burrowing by soil-dwelling mammals, cave-ins by settling of wastes,
- seismic and general instability of the landfill, and
- rainfall creating more leachate that migrates into groundwater (bathtub effect).

In our sample, we found several examples of barriers failing during the first 30 years. Most of the states in our sample reported animal or weather-related damage at their sites. Repairs were required at one facility after wild pigs rooting in the near surface soil caused erosion of the landfill cap. In another state, black bears have been a problem. We found other examples of landfill caps eroding, damage to caps due to animal burrows, and a drainage channel being destroyed after heavy downpours. Other sites needed maintenance due to vegetation growth. Additionally, unexpected events other than natural erosion occurred at other sites which required maintenance activities. For example, at one site an automobile drove through the fence surrounding the facility, destroying the leachate treatment system. Another landfill site required repairs after children dug under a fence into the landfill site in order to skateboard on an old truck ramp. Officials in one state speculated that all post-closure facilities will need continuous surface and fence maintenance in perpetuity.

A study performed by the MPCA's Ground Water and Solid Waste Division in 1998, came to the conclusion that medium to large municipal solid waste landfills would need additional monitoring and maintenance after the initial 30 years of post-closure care. The report states that continual site maintenance beyond 30 years should include fencing, building care, and inspection equipment. Monitoring of gas and groundwater would also be necessary to ensure

protection to human health and the environment. Finally, mowing the cap and preventing uncontrolled rainwater and snow-melt from entering the stored waste and "reactivating" the leaching of waste would be required.

State Implementation of Post-Closure Requirements

Federal regulations require facilities to initially establish post-closure care for 30 years. For additional post-closure care, EPA or the state agency must demonstrate that an extension in the period is necessary to protect human health and the environment. Although the burden is placed on the regulating agency to demonstrate the necessity for extending the post-closure care period, none of the states in our sample had developed a policy to evaluate the adequacy of 30 years of post-closure care at specific sites. Only two state programs had extended the post-closure period beyond 30 years for a total of three hazardous waste facilities in the two states. The following table summarizes state officials' responses to our question regarding concerns about the adequacy of a 30-year post-closure care time frame.

Table 3.1
Extensions of 30-Year Post-Closure Care for Hazardous Waste Facilities by State

State	Extensions to 30 Year Post-Closure?		Number of Facilities Where Post-Closure Care Extended
	Subtitle C	Subtitle D	
Alabama	N*	**	
California	N	N	
Connecticut	N	N	
Missouri	N	N	
New York	Y	N	2
Ohio	Y	N	1
Texas	N	N	
Virginia	N	N	
Washington	N	N	

* Alabama Subtitle C program requires the full 30 years of post-closure care to be financially assured in each post-closure year.

** No information provided from Alabama's Subtitle D program.

Although only two of the state programs we contacted have extended the post-closure period beyond 30 years, several state officials from Subtitle C and D programs in our nine surveyed states expressed concerns that facilities may need more than 30 years of post-closure care to ensure protection of human health and the environment. State officials were concerned that costs are likely to continue well past the conventional 30-year post-closure care period since these landfills will still contain contaminants. The Alabama Subtitle C program requires that funds for the full 30 years of post-closure be financially assured in each year. However, Alabama has not yet extended the 30 years of post-closure care for any Subtitle C facilities. Other state programs believe that facilities will need extended care beyond 30

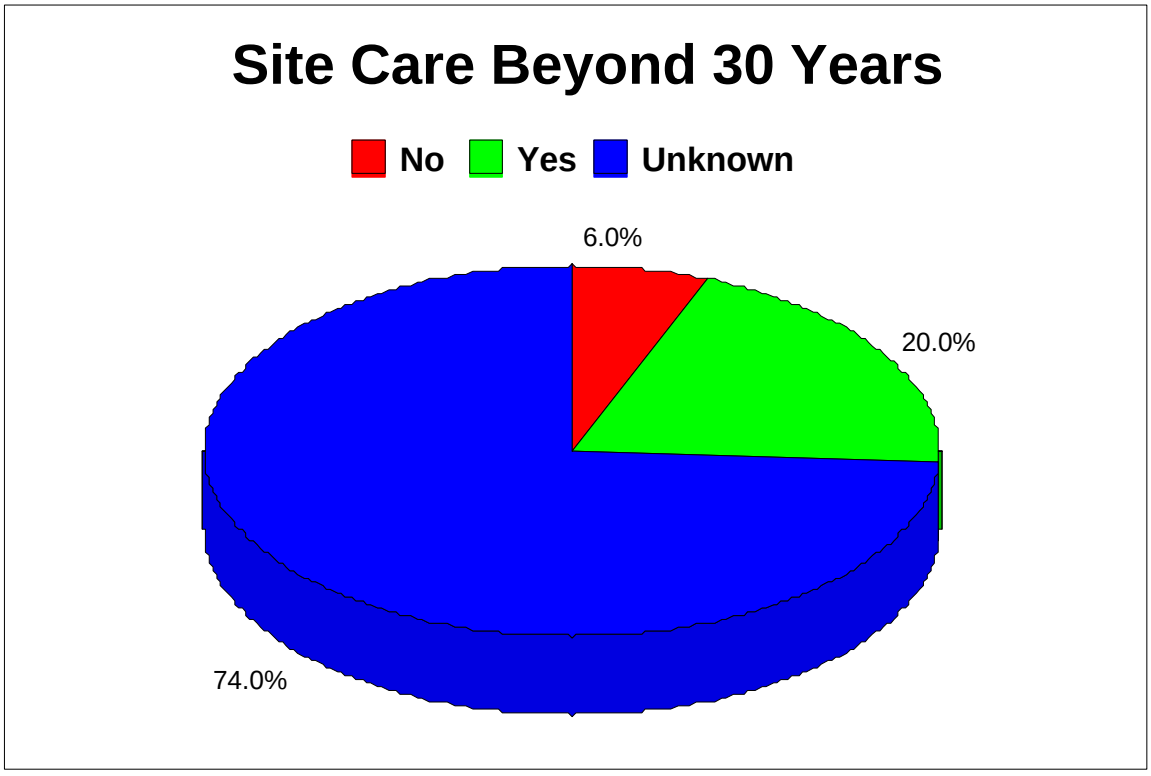
years, but have also not extended care at these facilities beyond 30 years. Although many state officials are concerned about the 30-year time frame, they explained that they are uncertain about how to evaluate the adequacy of the 30-year time frame since there are no federal criteria developed. Additionally, officials were unaware of any studies performed in this area that could be used to develop criteria. Officials stated that it would be useful to their programs if federal guidelines provided criteria regarding extending the post-closure period. There is concern that without criteria to demonstrate that an extension beyond 30 years is necessary, states may be involved in legal battles with owners and operators if they require post-closure activities beyond 30 years. Landfills may become the responsibility of state agencies' in later years. The following table illustrates state officials' responses to our question about the adequacy of a 30-year post-closure care period.

Table 3.2
State Responses on the Adequacy of 30 Years of Post-Closure Care for Hazardous Waste Facilities

State Program	30 Years - Not Enough Time	Not an Issue	Not Yet Evaluated
Alabama	X		
California	X		
Connecticut	X		
Missouri	X		
New York	X		
Ohio			X
Texas			X
Virginia		X	
Washington		X	

According to state officials, many disposal facilities may require monitoring and maintenance activities in excess of 30 years, possibly in perpetuity. Officials in one state told us that they believe all closed hazardous waste landfills will need some type of post-closure care in perpetuity. Another state program assumes that "virtually all" municipal solid waste landfills will need to extend the care period beyond 30 years. For our nine-state sample of 178 hazardous waste disposal facilities in post-closure, state officials said that one out of five of the facilities in the sample will need care beyond 30 years and that it is unknown whether almost 75% of the hazardous waste disposal facilities in our sample will need care beyond 30 years because the facilities have not been evaluated. See Figure 3.1.

Figure 3.1



There is concern that states will be left with an unfunded liability to address any remaining post-closure care necessary since at the end of the 30-year time period the facilities'

owners or operators may no longer have sufficient funds or may be out of business. For example, a corporation in one state owns a closed hazardous waste landfill that has no income or assets other than the site itself, and hopes to sell the landfill for industrial redevelopment prior to running out of money at the end of its 30-year post-closure period. In order to provide assurance that funds will be available in the future to cover long-term care costs at a given facility, it will be necessary to assess the need for additional post-closure care while the facility is in an economic position to fund the additional post-closure care.

Significant Expenditures May Be Required for Extended Post-Closure Care

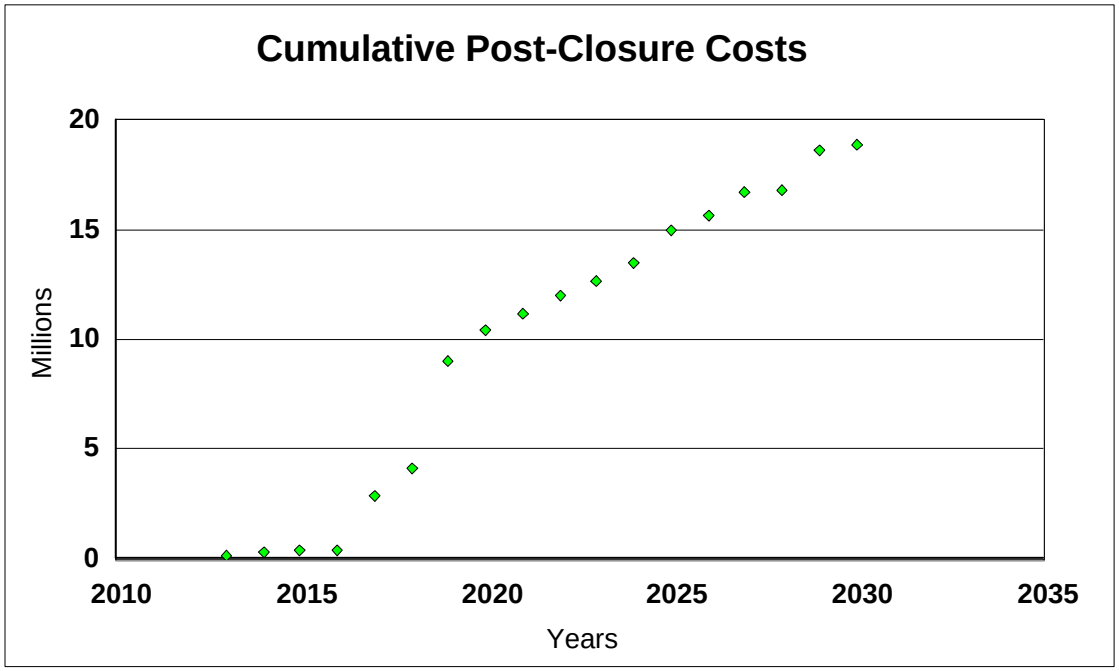
To evaluate the financial impact of not establishing financial assurance beyond 30 years for post-closure care, we asked officials from the nine states in our sample to identify the expected cost of post-closure monitoring and maintenance in the 30th year of care for the hazardous waste disposal facilities in our sample. For facilities where funds had not been established for more than 30 years, post-closure costs for year 30 ranged from approximately $400 to more than $1 million, averaging more than $96,000 per facility. Although significant expenditures are expected at these facilities in year 30 of post-closure, there is no financial assurance of funds for post-closure care during year 31 at the same facilities. The absence of funds for monitoring and maintenance of landfill facilities in year 31 could have a significant adverse effect on state programs and the environment.

Figure 3.2 on the following page illustrates potential cumulative post-closure costs after the 30th year for hazardous waste disposal facilities in nine states, assuming that the post-closure costs in future years remain at the same level as the costs in year 30 and there is no unexpected clean up needed at these sites. We based our calculations on facilities in our sample which were identified by their state programs as needing more than 30 years of post-closure care or had not been evaluated to determine whether they would need additional post-closure care. In addition, all of the facilities included in the calculation had financial assurance established for 30 years, but none had financial assurance for more than 30 years. We did not include the facilities in our

sample which do not presently have financial assurance. We also excluded all facilities from Alabama in our calculation because Alabama requires the full 30 years of funds to be maintained through year 30.

Of the hazardous waste facilities included in the calculation, year 2013 will be the first year a facility will reach year 31 of post-closure care. We assumed that the facilities included in the calculation will continue to need post-closure care for a number of years after year 30 and no financial assurance funds will have been established for the additional period. In year 2017, the nine states would be required to spend more than $2.8 million on post-closure care. By year 2030, the annual burden on states, for this group in post-closure, would be almost $19 million and growing. We have assumed all facilities will continue to need the same amount of care after year 30, and it may turn out that some will need less care. However, there may be additional costs we have not included, such as unanticipated clean up costs. See Figure 3.2.

Figure 3.2



EPA could have initially written RCRA regulations requiring post-closure care in perpetuity, placing the burden of proof on the facilities to demonstrate that a reduction in care would not pose any threat to human health and the environment. This issue was discussed in a 1988 Federal Register notice. If this had been the requirement, the owners and operators would have had a greater incentive to try to develop better solutions to contain the waste into the indefinite future. In addition, the facilities' owners and operators who profited from the operating landfills would have been required to bear the costs and responsibilities for monitoring and maintenance of thousands of closed hazardous and municipal solid waste landfills for the full period of necessary care. Instead, future generations may be left with a significant environmental and financial burden.

No Strategy Developed to Address GAO Concerns

In a June 1990 report, GAO examined land disposal practices, and the effectiveness of the funding for these long-term liabilities. In the report, *Hazardous Waste: Funding of Post-closure Liabilities Remains Uncertain*, GAO stated that although EPA was aware of the potential for future releases, it had not yet developed a strategy for addressing these long-term post-closure concerns. EPA responded that although they shared the concern of the effectiveness of long-term care, it was not a current priority in 1990. They also stated that it would take many years to obtain substantive information to determine the effectiveness of current hazardous waste requirements in protecting groundwater from contamination. Ten years have elapsed since the GAO report was published, and EPA still has not developed a comprehensive strategy to address these long-term post-closure concerns. GAO stated that long delays in the evaluation of the effectiveness of current waste disposal requirements have the potential to result in another Superfund situation in future years.

Study Conducted on Subtitle D Facilities

As previously stated, it is not possible to accurately predict leakage contaminant quantities and production rates because of the complexity and diversity of many waste sites, as well as other factors difficult to control. Therefore, EPA currently lacks the scientific basis to develop specific criteria to determine the adequacy of 30 years of post-closure care at

either Subtitle C or D facilities. Although wastes subject to Subtitle C regulation have properties making them dangerous or capable of having a harmful effect on human health the environment, there have been no studies performed at this time to evaluate the adequacy of 30 years of post-closure care for Subtitle C facilities. An official in the Office of Solid Waste (OSW) told us that studies of Subtitle C landfill characteristics are resource intensive and OSW is not currently funding work in this area. However, EPA's Office of Research and Development recently funded a study examining the adequacy of 30 years of post-closure monitoring at Subtitle D landfills.

The objective of the Subtitle D study, which was conducted at North Carolina State University, was to develop a scientific basis to determine the appropriate length of time for post-closure care at Subtitle D landfills to ensure protection of human health and the environment. Scientists state that although emissions are likely to continue well beyond 30 years, EPA lacks criteria to define an appropriate end point for post-closure monitoring. Without criteria to demonstrate that an extension to 30 years is necessary, landfills permitted in the 1990s may be state agencies' responsibilities in the 2020s. We reviewed a draft of this study, *A Critical Evaluation of Factors Required to Terminate the Post-Closure Monitoring Period at Solid Waste Landfills.* Draft results indicate that initial criteria were developed to determine the point at which a landfill becomes sufficiently stable to terminate the owner's responsibility to monitor the site. Based on the draft results, stability at a landfill is dependent on many complex factors. The study found that a 30-year post-closure period may not be adequate for a landfill to reach stability, and that additional technical criteria will need to be established to define leachate and gas stability. Scientists believe that an assessment of the first group of landfills to reach the 30-year post-closure status will need to be performed to further develop criteria.

Initial feedback on the study indicates that EPA and the stakeholders agree with the study's preliminary findings, and the scientist we spoke to believes that criteria developed

could be incorporated into an EPA policy for Subtitle D facilities. As previously stated, there are no current studies being conducted on site characteristics of Subtitle C hazardous waste landfills. We were told that findings from a study on Subtitle D facilities would not necessarily be applicable to Subtitle C landfills. Since a hazardous waste landfill may pose a significant risk to human health and the environment, a study of hazardous waste landfills to determine an appropriate length of time for post-closure care should be a priority. Also, based on the draft finding of the Office of Research and Development-funded study, further research is needed to develop substantive criteria for Subtitle D facilities. Information from these studies should be incorporated into standard EPA guidance with specific criteria so that regulating agencies can consistently evaluate facilities on a case-by-case basis. Continued delays in evaluating the effectiveness of current waste disposal practices may result in harmful effects on human health and the environment.

Conclusions

The long-term effectiveness of current land disposal practices in controlling the release of contaminants is unknown. The extent of potential post-closure liabilities at specific facilities is unknown because of the current lack of available data. The consequence of not addressing the problem of post-closure care may be that the state or federal government will be left with the financial burden of addressing any remaining post-closure care necessary at these facilities. It is important to assess the need for additional post-closure care while the facility is in an economic position to fund additional post-closure care. Rather than passing the problem of post-closure care on to future generations, the problem should be addressed now, and solutions implemented for each landfill long before the end of the 30-year period. EPA needs to assist in ensuring that the long-term stewardship of closed landfills will provide maximum protection of public health and the environment.

Recommendations

We recommend that the Acting Assistant Administrator for Solid Waste and Emergency Response:

3.1 Discuss with ASTSWMO the development of a methodology for state programs to use in evaluating facility post-closure care time frames.

3.2 Conduct further studies, as resources allow, to develop criteria for the appropriate post-closure care time frames at Subtitle C and D landfills.

CHAPTER 4

ACCURATE COST ESTIMATES ARE NECESSARY FOR FINANCIAL ASSURANCE

Accurate cost estimates are necessary to assure adequate funding for closure and post-closure activities. However, there is evidence that some facilities have submitted cost estimates that were too low. Federal regulations require that estimates for closure and post-closure care reflect costs of having a third-party conduct the required activities to ensure that adequate funds will be available even if the owner or operator goes bankrupt. State program officials have expressed concerns that underestimated costs could result in insufficient funding of financial assurance mechanisms. We were told that:

- cost estimates are difficult to review and that states use different methods to review the estimates, ranging from reviewer judgment to use of a standard software package;

- monetary incentives exist for facility owners and operators to underestimate costs for closure and post-closure activities by lowering the cost of establishing mechanisms for financial assurance (e.g., insurance premiums, surety bonds, and trust funds); and

- it is easier for facilities to meet the requirements of the financial test mechanism by underestimating costs.

Without accurate cost estimates to assure adequate funding for closure and post-closure activities, there is less assurance that human health and the environment will be protected if the owner or operator becomes financially insolvent and funds are not available for closure and post-closure. In most states, program officials are responsible for determining whether or not the cost estimates are adequate based on

closure and post-closure plans. EPA has helped some states become more effective in reviewing cost estimates, but other states could also benefit from similar assistance.

EPA Region IV Studies Show That Facilities Underestimate Costs

EPA Region IV conducted two studies that evaluated facility-submitted financial assurance cost estimates. Both studies concluded that most of the costs evaluated had been underestimated. One of the studies included a sampling from all Region IV states and found that 89 of 100 facilities had submitted cost estimates that were too low. The total amount of underestimated costs was approximately $450 million for these 89 facilities. In the other study, 35 facility-submitted cost estimates were evaluated from one Region IV state. The study found that the majority of these facilities had underestimated costs for closure and post-closure activities. Underestimated closure costs totaled $91 million, and underestimated post-closure costs totaled $1.7 million. Both studies found that some facilities had overestimated costs. However, overestimated costs do not benefit EPA or state programs since additional funds established by overestimating costs would not be available to cover closure and post-closure for facilities that did not provide adequate financial assurance.

Region IV's Improvements to the Cost Estimating Process

To address the underestimated costs, EPA Region IV developed a manual entitled "Evaluating Cost Estimates for Closure and Post-Closure Care of RCRA Hazardous Waste Management Units." The purpose of the manual was to provide EPA and RCRA Subtitle C permit writers with a consistent, accurate, and rapid method for evaluating cost estimates for closure and post-closure care of RCRA treatment, storage, and disposal units. The Manual states that the Region determined that cost estimates for closure and post-closure care for a number of facilities were significantly lower than the actual costs incurred. This indicates that methods used for estimating the costs of closure and post-closure care may have been inaccurate. Inaccurate cost estimates may be caused by underestimating costs of closure and post-closure care activities or by failing to cost all activities that must be conducted. Region IV also initiated the development of a software tool to evaluate

financial assurance cost estimates for closure and post-closure care of RCRA Subtitle C facilities. The software tool incorporated the Manual's methodology saving even more time over manual methods when evaluating cost estimates. EPA Region IV officials informed us that all eight states in their Region had been supplied with this software tool, and had used it to review facility-submitted cost estimates.

The Manual and software incorporate *Means Cost Guides* as the primary sources of cost information and are recognized as being reliable and comprehensive sources for construction cost data. Means data is often specified as the standard for construction costs both in the private sector and throughout government, including such agencies as the Federal Housing Administration, the Department of Defense, and the General Services Administration. All cost data developed by Means is supported by a system of indexes that enables clients to localize output automatically to any one of more than 900 three-digit postal codes in the United States and Canada. Updates to *Means Cost Guides* are available on an annual basis. We also were informed of another software package on the market, incorporating Means data, which can be used by states to evaluate closure and post-closure cost estimates.

Feedback from Users of Cost Estimating Software

Officials from four states in our survey reported using cost estimating software during their review process. We solicited feedback from these state program officials and received positive comments. Listed below is some of the feedback we received:

- Previous to the use of the software, the accuracy of each cost estimate review was subject to the level of expertise and knowledge of the individual inspectors performing the reviews.

- Challenging cost estimates in the past was not commonplace since having to research and look up costs in different forms of documentation was very difficult and required a lot of time.

- Prior to the use of the software, documentation and guidance varied so much that some fuel blender facilities that were very much alike were submitting estimates for closure that varied from $100,000 to $5,000,000. Since documentation for costs at this time was so inconsistent it was very difficult to even challenge the wide discrepancies for like facilities. It's a very good tool for evaluating and comparing like unit costs from different facilities.

- The software saves time and allows the reviewer to easily detect many deficiencies and discrepancies in facility-submitted estimates.

States Need to Be Informed About Cost Estimating Software

While some states reported using cost estimating software, officials in four of the nine states we contacted were unaware that software existed for reviewing cost estimates. Use of an automated software tool to review cost estimates would assist and improve state programs by providing a significant savings of time over the manual method of reviewing cost estimates. Also, the software produces a more accurate and complete method than reliance on the experience and expertise of the cost estimate reviewer. Finally, an automated program allows for a more consistent and objective baseline which can facilitate discussions with facilities on cost estimates that may need to be revised. Although the software was developed by Region IV for evaluating Subtitle C facility cost estimates, with minor modifications it can also be used to evaluate Subtitle D cost estimates.

Conclusions

To improve the cost estimating review process, we believe that EPA should inform state Subtitle C programs and EPA Regions of the option of using cost estimating software. Furthermore, for states that request it, EPA could help those states obtain software for reviewing closure and post-closure cost estimates and any existing training for using the software. In addition, EPA should modify the cost estimating software developed in Region IV for use by state Subtitle D financial assurance programs.

Recommendations

We recommend that the Acting Assistant Administrator for Solid Waste and Emergency Response:

4.1 Inform state Subtitle C and Subtitle D programs, and EPA Regions of the option of using cost estimating software. Furthermore, for states that request it, help states obtain software for reviewing closure and post-closure cost estimates. Any existing software training materials should also be made available to financial assurance programs requesting the software.

(This page was intentionally left blank)

APPENDIX I

SAMPLING METHODS AND DATA

To collect data on facilities regulated under Subtitle C, we selected a statistical sample of Subtitle C facilities from a nine-state subset population in the RCRIS post-closure universe. The nine states were Alabama, California, Connecticut, Missouri, New York, Ohio, Texas, Virginia, and Washington. Data from these states represented approximately 40 percent of the RCRIS post-closure universe. We further restricted the population to privately owned Subtitle C facilities which were expected to have established financial assurance. Therefore, we excluded, from the population government-owned facilities and facilities which were coded as non-notifiers in RCRIS. Federal and state owned RCRA facilities are not required to establish financial assurance, and non-notifiers would not be expected to have established financial assurance because they operate illegally. We also excluded local government Subtitle C facilities. Only one of the nine states in the population had a significant number of local government Subtitle C landfills in post-closure. Since we drew the sample from the nine state subset population, our projections were made to the population of nine states rather than to individual states. RCRIS does not contain data on financial assurance, and we only relied on RCRIS for its list of facilities in post-closure from which we drew our sample. We did not conduct a review of RCRIS internal controls.

Initially, there were 482 facilities in our nine state subset population of facilities in post-closure. We selected a sample of 220 facilities from this population. However, we found when we collected data that 31 of the facilities in our sample should not have been listed in the RCRIS post-closure universe, and two more facilities were government owned and should have been excluded from the subset population. Therefore, our sample size was reduced to 187. Based on our sample results, we projected the subset population size for the nine states to be 410. Please see the table in Appendix III for the distribution of mechanisms for hazardous waste facilities in post-closure and closure and post-closure cost ranges and averages.

Since facilities listed in RCRIS are regulated under RCRA Subtitle C and there is no EPA database for MSWLFs regulated under Subtitle D, we asked each of the nine states to supply us with a list of their active MSWLFs. Of the nine states, we received data from seven. We did not receive MSWLF data from Alabama or Washington State. Alabama does not have a financial assurance program for MSWLFs, primarily because the Alabama legislature has not passed the necessary legislation. Washington State was in the process of collecting the data when we made our request and had not yet completed the task when we finished our fieldwork. Therefore, the table in Appendix IV does not include data from Alabama or Washington State. Federal regulations do not require MSWLFs to send copies of financial assurance records to the state agency. However,

some states, such as New York, require MSWLFs to send in financial assurance documentation to the state program.

We selected statistical samples of MSWLFs in California, Ohio, and Texas, and those states provided MSWLF data for the sample facilities. Four states- Connecticut, Missouri, New York, and Virginia- sent us data on the universe of active MSWLFs in the state. Connecticut only had one active MSWLF. Data sent by Virginia included estimated closure and post-closure costs for less than half of their MSWLFs. However, Virginia identified mechanisms for all of their MSWLFs. We decided to include Virginia MSWLF data in the table in Appendix IV after we compared the differences in calculations when we included and excluded the Virginia data. There were no changes in the ranges of closure and post-closure costs. The only significant change in weighted average costs was in the local government financial test, which decreased by approximately 10 percent when Virginia data were included. The most significant change in mechanisms was in the number of facilities using the local government financial test, which increased by approximately 60 percent when Virginia data were included. Please see the table in Appendix IV for the distribution of mechanisms for active municipal solid waste landfills and closure and post-closure cost ranges and averages.

APPENDIX II

FINANCIAL TEST REQUIREMENTS

Note - Following are summaries of some of the financial test requirements. These are included for report discussion purposes only. This information cannot be used to determine compliance with financial test requirements. There are additional financial test requirements for reporting which are not listed.

Corporate Financial Test - Subtitle C Requirements

To pass the financial test the owner or operator of a permitted or interim status TSDF must satisfy the following criteria.

- Two of following three ratios -
  - total liabilities to net worth less than 2.0
  - sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1
  - current assets to current liabilities greater than 1.5;

- Net working capital and tangible net worth each at least six times the sum of the current closure and post-closure cost estimates and the current plugging and abandonment cost estimates;

- Tangible net worth of at least $10 million; and

- Assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the current closure and post-closure cost estimates and the current plugging and abandonment cost estimates.

Or, the owner or operator must satisfy the following alternate criteria.

- A current rating for his most recent bond issuance of AAA, AA, A, or BBB as issued by Standard and Poor's or Aaa, Aa, A, or Baa as issued by Moody's;

- Tangible net worth at least six times the sum of the current closure and post-closure cost estimates and the current plugging and abandonment cost estimates;

- Tangible net worth of at least $10 million; and

- Assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the current closure and post-closure cost estimates and the current plugging and abandonment cost estimates.

Corporate Financial Test - Subtitle D Requirements

The owner or operator of a MSWLF must satisfy one of the following three conditions:

1. A current rating for its senior unsubordinated debt of AAA, AA, A, or BBB as issued by Standard and Poor's or Aaa, Aa, A, or Baa as issued by Moody's;

2. A ratio of less than 1.5 comparing total liabilities to net worth; or

3. A ratio of greater than 0.10 comparing the sum of net income plus depreciation, depletion, and amortization, minus $10 million, to total liabilities.

In addition, the tangible net worth of the owner or operator must be greater than:

A. The sum of the current closure, post-closure care, corrective action cost estimates and any other environmental obligations, including guarantees, covered by a financial test plus $10 million except as provided in paragraph B following.

B. $10 million in net worth plus the amount of any guarantees that have not been recognized as liabilities on the financial statements provided all of the current closure, post-closure care, and corrective action costs and any other environmental obligations covered by a financial test are recognized as liabilities on the owner's or operator's audited financial statements, and subject to the approval of the State Director.

In addition, the owner or operator must have assets located in the United States amounting to at least the sum of current closure, post-closure care, corrective action cost estimates and any other environmental obligations covered by a financial test.

Local Government Financial Test - Subtitle D Requirements

The owner or operator of a local government MSWLF must satisfy either A or B as applicable:

(A) If the owner or operator has outstanding, rated, general obligation bonds that are not secured by insurance, a letter of credit, or other collateral or guarantee, it must have a current rating of Aaa, Aa, A, or Baa, as issued by Moody's or AAA, AA, A, or BBB as issued by Standard and Poor's on all such general obligation bonds; or

(B) The owner or operator must satisfy each of the following financial ratios based on the owner's or operator's most recent audited annual financial statement:

(1) A ratio of cash plus marketable securities to total expenditures greater than or equal to 0.05; and

(2) A ratio of annual debt service to total expenditures less than or equal to 0.20

The owner or operator must also prepare its financial statements in conformity with Generally Accepted Accounting Principles for governments and have its financial statements audited by an independent certified public accountant (or appropriate State agency).

In addition, a local government is not eligible to assure its obligations under CFR 40 Sec. 258.74(f) if it:

(A) Is currently in default on any outstanding general obligation bonds;

(B) Has any outstanding general obligation bonds rated lower than Baa as issued by Moody's or BBB as issued by Standard and Poor's;

(C) Operated at a deficit equal to five percent or more of total annual revenue in each of the past two fiscal years: or

(D) Receives an adverse opinion, disclaimer of opinion, or other qualified opinion from the independent certified public accountant (or appropriate State agency) auditing its financial statement as required. However, the Director of an approved State may evaluate qualified opinions on a case-by-case basis and allow use of the financial test in cases where the Director deems the qualification insufficient to warrant disallowance of use of the test.

(This page was intentionally left blank)

APPENDIX III

DISTRIBUTION OF FINANCIAL ASSURANCE MECHANISMS FOR HAZARDOUS WASTE LANDFILLS IN POST-CLOSURE*

Financial Assurance Mechanism	% of Sample	Projected # in Population	Range of Closure and Post-Closure Estimated Costs Combined	Average of Closure and Post-Closure Estimated Costs
Financial Test/ Corporate Guarantee	34%	140	$45,290 - $107,909,032	$6,640,715
Captive Insurance	3%	11	$1,781,797 - $40,574,914	$13,307,166
Insurance	5%	20	$320,558 - $37,142,139	$12,799,589
Surety Bond	4%	18	$489,517 - $68,520,883	$13,266,513
Fully Funded Trust Fund	5%	22	$66,780 - $1,032,411	$457,820
Partially Funded Trust Fund	9%	35	$55,926 - $3,047,000	$913,872
Letter of Credit	21%	86	$88,757 - $67,621,604	$3,389,952
None Established	19%	79	Data Not Available	Data Not Available

* Data for this table were obtained from nine states. Please see Appendix I for more details on sampling methods and data.

(This page was intentionally left blank)

APPENDIX IV

DISTRIBUTION OF FINANCIAL ASSURANCE MECHANISMS FOR ACTIVE MUNICIPAL SOLID WASTE LANDFILLS*

Financial Assurance Mechanism	% of Population	Projected # in Population	Range of Closure and Post-Closure Estimated Costs Combined	Weighted Average of Closure and Post-Closure Estimated Costs
Financial Test/ Corporate Guarantee	0.6%	3	$ 3,371,140 - 13,317,263	$7,990,982
Captive Insurance	1.4%	7	$ 4,388,539 - 13,712,781	$9,857,193
Insurance	6.9%	35	$ 676,487 - 20,700,960	$8,115,694
Surety Bond	18.9%	96	$ 27,940 - 46,483,632	$7,887,404
Trust Fund	6.9%	35	$ 174,000 - 22,310,485	$8,485,309
Letter of Credit	4.9%	25	$ 85,340 - 13,249,291	$2,401,695
Local Government Financial Test	31.6%	160	$ 46,786 - 568,998,563	$10,556,183
State Approved	25.4%	129	$ 498,211 - 76,944,080	$11,283,544
Combined	2.6%	13	$ 2,431,600 - 31,721,165	$14,961,777
None Established	0.8%	4	Data Not Available	Data Not Available

* Data were obtained from seven states for this table. Please see Appendix I for more details on methods and data.

(This page was intentionally left blank)

APPENDIX V

AGENCY RESPONSE

March 27, 2001

MEMORANDUM

Subject: Response to OIG Draft Audit Report: "RCRA Financial Assurance for Closure and Post-Closure"

From: Michael H. Shapiro, Acting Assistant Administrator/s/
Office of Solid Waste and Emergency Response (5101)

To: Mike Prater, Audit Manager
Headquarters Audit Division (2443)

The purpose of this memorandum is to transmit the Office of Solid Waste and Emergency Response's response to the subject Office of Inspector General (OIG) draft audit report. Thank you for the opportunity to comment on this draft report. As you are aware, we suggested this subject area as a topic for your investigation. In addition to these comments, the Office of Solid Waste (OSW) has commented on previous working drafts of the report. However, those drafts did not include recommendations or Chapter 1. Following are our specific comments to the OIG draft recommendations.

OIG Recommendations

Issue guidance to state financial assurance programs that when an insurance policy is used for closure and post-closure financial assurance,

- the insurance policy should meet all requirements; and

- the state program should obtain verification from the insurance commissioner, in the state where the insurance company issuing the policy is licensed, that the insurance policy allows assignment of the policy to a successor owner or operator of the facility, in the event the facility is sold outside of the corporate family of the seller.

OSWER Response

OSW will work with the Office of General Counsel and key state insurance commissioners to determine which insurance policies allow assignment. Depending upon the outcome of these discussions, OSW will work with interested parties, and, if appropriate, will prepare draft guidance for comment. If you have correspondence from state insurance commissioners on the issue of assignment that we could include in this guidance, we would appreciate receiving a copy of it. We would also like to receive the names and domiciles of the insurers you have identified and the owners and operators who use them. This will assist us in our communications with state solid and hazardous waste officials, insurance commissioners, and waste companies. Depending upon whether and when such correspondence is available, we expect that this process could take to the end of this calendar year to determine the need for and to prepare draft guidance for comment.

OIG Recommendations

Investigate complex insurance issues with states and determine states' need for additional guidance on these issues.

Work with the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) to develop an Internet bulletin board to increase opportunities for information sharing among financial assurance program officials.

Discuss with ASTSWMO the development of a methodology for state programs to use in evaluating facility post-closure time frames.

OSWER Response

ASTSWMO has requested that EPA discuss your report and our response to your recommendations at their April 18th and 19th mid-year meeting. At that meeting, we intend to request that they provide information to us about needs for additional guidance in the area of insurance, whether they wish to implement a bulletin board, and ideas for developing methodologies for evaluating post-closure time frames.

OIG Recommendation

Develop existing financial assurance training materials for placement on the Agency's Internet site to be downloaded by state programs.

OSWER Response

RCRA Hotline training material for the hazardous waste financial assurance requirements is located at http://www.epa.gov/epaoswer/hotline/rmods.htm. This material provides an introduction to the topic, but States sometimes request more detailed information. EPA has responded to these requests in basically two ways. First, EPA has provided twelve hours of satellite training on municipal financial assurance (except for the corporate test and guarantee), that would involve conversion to files that would be too large for use on the Internet. The second and more adaptable training materials, which EPA has presented to states in interested regions, have been based upon overheads. The overheads generally limit the amount of information on each screen because they are supplemented by the instructor. This also may not provide an effective format for web based training. Before putting information on the web, OSW will ask ASTSWMO for recommendations on the type of material, the primary audience (e.g. regulators or owners and operators, and the presumed familiarity with the material), and the level of detail that would be appropriate. Once we have ASTSWMO's feedback, and as resources allow, we will develop material for the Internet.

OIG Recommendation

As resources allow, conduct further studies to develop criteria for the appropriate post-closure time frames at Subtitle C and D facilities.

OSWER Response

Currently, the OSW is reviewing information from studies funded by the Office of Research and Development on the stability of municipal landfills and their production of leachate and gas. We are sharing this information with the states to help inform their decisions about the length of the post-closure period. As noted in your report, we currently have no additional research available on hazardous waste landfills and it is difficult to predict when funding for such studies will become available.

We also intend to seek state help in identifying municipal solid waste landfills (MSWLFs) that collect and analyze leachate for hazardous constituents. The goal would be to analyze long-term data on leachate quality to help determine the time frame at which leachate no longer poses a threat to human health and the environment. Assuming that the states decide to work with us, we would begin work later this fiscal year, and hope to complete the analysis next fiscal year.

OIG Recommendations

Inform state Subtitle C programs and EPA regions of the option of using cost estimating software and help states, that request it, obtain software for reviewing closure and post-closure

cost estimates. Any existing software training materials should also be made available to financial assurance programs requesting the software.

Modify the cost estimating software developed for Region IV so that it can be distributed to states that request the software, for reviewing Subtitle D landfill cost estimates.

OSWER Response

We will request that ASTSWMO ask which of their members desire copies of the software, and we will make copies available to those states. Our understanding is that the most recent version of the software includes information that can be used for estimating costs for municipal solid waste landfills. Therefore, we should be able to provide this information when states request copies.

Other Comments on the Report

We had some comments on the other portions of the report and appreciate your addressing those concerns at our March 22nd meeting. Accordingly, I have not included those comments in this memorandum.

As you may be aware, the Agency has been directed in its 2001 appropriation to conduct a study of existing financial assurance agreements to determine if sufficient safeguards have been properly maintained and future liabilities minimized for municipal solid waste landfills. Your report will assist us in responding to this request. We thank you for this study.

I would like to acknowledge the excellent cooperation we experienced working with OIG staff during this audit. If you have any questions, please contact Dale Ruhter at (703) 308-8192.

cc: Steve Luftig
Elizabeth Costworth
Dale Ruhter
Sonya Sasseville
Bob Hall
Bob Dellinger
Anne Andrews

APPENDIX VI

REPORT DISTRIBUTION

Inspector General
Assistant Inspector General for Office of Program Evaluation
Headquarters Audit Liaison (Carol Jacobson)
Divisional Inspectors General for Audit (and sub-offices)
Acting Assistant Administrator for Solid Waste and Emergency Response
Acting Assistant Administrator for Enforcement and Compliance Assurance
Comptroller
Agency Follow-up Official
Agency Follow-up Coordinator
Assistant Administrator for Congressional and Intergovernmental Relations (1301A)
Elizabeth Cotsworth (5301W)
Johnsie Webster (5103)
Gregory Marion (2201A)
Anne Andrews (5305W)
Stephen Heare (5303W)
Robert Dellinger (5306W)
Deborah Hanlon (5306W)
Sonya Sasseville (5303W)
Dale Ruhter (5303W)
Nina Rivera (2366A)
Betsy Smidinger (2246A)
Christine McCulloch (2246A)
Peter Neves (2273A)
Mary Bell (2273A)
Robert Hall (5303W)
Eileen Larence
Abe Oberkor, Alabama
Russell Kelly, Alabama
Sue Laney, California
Richard Castle, California
Wade Cornwell, California
David Nash, Connecticut
Kevin Sullivan, Connecticut
Inga Rubeca, Connecticut
Cindy Kemper, Missouri

Jim Hull, Missouri
Henry Hamilton, New York
Amy Feiden, New York
Pam Allen, Ohio
Sharon Gbur, Ohio
Fanny Haritos, Ohio
Matt Boyer, Ohio
Dale Burnett, Texas
John Racanelli, Texas
Darin Rice, Washington
Randy Martin, Washington
Mary Ellen Kendall, Virginia
Virginia Butler, Virginia