

M I N N E S O T A



MMSW Landfill Liability Report

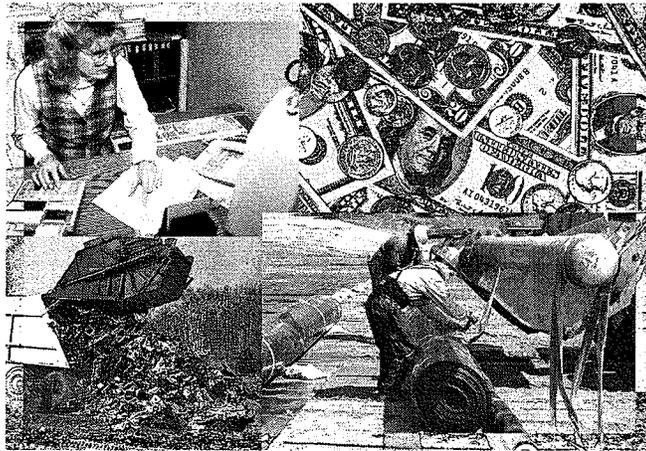
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Minnesota Pollution Control Agency
Ground Water and Solid Waste Division

January 1998

MMSW LANDFILL LIABILITY REPORT



Methods to Address Landfill Liabilities at Mixed Municipal Solid Waste Landfills

Presented to:

The Minnesota Legislature

January 15, 1998



Minnesota Pollution Control Agency

Ground Water and Solid Waste Division

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Special thanks to the Perpetual Care Workgroup.

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Executive Summary

This report fulfills two statutory requirements and covers two additional topics that have been raised by legislators in hearings and correspondence with the Minnesota Pollution Control Agency (MPCA). All relate to the land disposal of mixed municipal solid waste (MMSW). The report addresses the status of individual MMSW landfill owners' compliance with conventional financial assurance rule requirements, individual MMSW landfill owners' estimates of perpetual-care costs or costs after the conventional 30-year postclosure-care period, options to pay perpetual-care and other costs through expanding the Closed Landfill Program (CLP) to take on additional landfills, and issues associated with old municipal dumps that operated years ago.

Only one of the four subjects, conventional financial assurance, is required by statute and rule. The other three subjects are in various stages of discussion among policymakers. A number of controversial issues would have to be resolved before making changes to statutes that would expand the CLP to incorporate funding of perpetual-care costs at open MMSW landfills, or that would expand the state's responsibility to care for old municipal dumps.

In responding to report requirements made by the Legislature in its 1997 statutory charge, the MPCA offers options and suggestions on methods to expand the CLP. However, the MPCA wishes to be clear that it is neutral on the concept of expanding the CLP to include all 29 open Minnesota MMSW landfills. Such a decision would have long-term financial consequences that need full discussion by a wide range of stakeholders. The MPCA has opposed, and will continue to oppose, taking on major new landfill security-and-care duties without the revenues to pay for them. The continued economic vitality of the existing Closed Landfill

Program is important to stakeholders involved in setting up the initiative in 1994, particularly the small business community.

Listed below are summaries of report findings and observations from the MPCA on promising avenues for policy development, as well as issues needing further discussion and information.

Conventional Financial Assurance at Open MMSW Landfills

- Outside of some confusion regarding reporting requirements for facility owners using the dedicated trust fund option, compliance status for MMSW landfills is very good. A review of 1996 financial assurance information shows current financial assurance costs of \$94.4 million of which 55 percent are covered with cash in a trust fund or a third party guarantee (i.e. letter of credit or surety bond).
- Some facility cost estimates may be low based upon MPCA first-hand experience conducting closure, postclosure care and contingency actions at facilities under the Closed Landfill Program. The MPCA staff plans to review adjusted cost estimates in the Annual Reports that will be submitted by February 1, 1998, in light of new cost information obtained by the CLP. The MPCA staff believes that increased experience in reviewing mechanism reimbursement requests and in conducting long-term care responsibilities at facilities in the CLP will improve the accuracy of approved cost estimates.
- The MPCA does have some concerns with respect to the ability of facility owners using, or moving toward using, letters of credit and



surety bonds because these mechanisms do not show how the facility owner will fund costs after facility closure. Use of third party guarantees may also be a problem if the Legislature decides to expand the CLP to arrange for immediate transfer of facilities with third party guarantees to the state following closure of MMSW landfills. The MPCA's experience in the CLP with facilities that had financial assurance requirements that were covered by a letter of credit was that the facilities found it difficult to produce a lump sum of cash as part of the binding agreement to enter the program.

- The MPCA staff is concerned that reliance on third-party guarantees to cover a significant portion of financial assurance costs may place the state in a position in which it is dependent on the continued financial health of the facility owner in order to ensure coverage of long-term costs. Because of the noted concerns, the MPCA will continue to work with the EPA and other states to exchange information on the effectiveness of financial assurance mechanisms.
- Current interest in limiting greenhouse gases may increase the number of MMSW landfills required to install active-gas collection systems. This step would increase the estimates for both conventional financial assurance and perpetual-care costs at some MMSW landfills.

Perpetual Care for MMSW Landfills

- In response to legislative inquiries about unfunded costs of land disposal, the MPCA finds that some costs will continue at MMSW landfill facilities beyond 30 years of postclosure care, and on into the indefinite future. In that respect today's financial assurance requirements do not cover the full time span over which some costs will occur. Because no lined landfill has existed in

Minnesota for 30 years, the long-term costs estimated in this report must be understood in the context of the assumptions on which they are based.

- The present value of perpetual care for the 29 open MMSW landfills is \$13.8 million, which assumes that this sum would be set aside today and allowed to gather interest over the next 46 years prior to any expenditures from the fund. If the state were to wait 16 years (the average remaining operating life that is estimated for open MMSW landfills) before setting up the fund, \$30 million would be needed to cover perpetual-care costs because of the loss of compounded interest earnings. The MPCA and the solid waste industry will be better able to estimate costs after further actual experience accumulates regarding the longevity of liners, covers, landfill gas-collection networks and leachate systems.
- During the discussions leading to this report, some MMSW landfill owners and operators in Minnesota stated that they felt it was either premature or simply unfounded for the MPCA to calculate the costs of perpetual care for landfills. They further stated that some methods of paying for these costs risked putting Minnesota landfills at a competitive disadvantage compared to landfills in neighboring states. A compilation of stakeholder themes and concerns is provided in the body of the report, and comment letters are attached as an appendix.
- This study also has implications for estimating the unfunded long-term costs at other types of regulated facilities, such as MSW combustor ash, industrial and demolition-debris landfills. The MPCA staff will be reporting in 1998 on the financial assurance status of these facilities.



Expanding the Closed Landfill Program to Accept Open MMSW Landfills

- In response to the 1997 legislative inquiry, this report considers three principal options that would arrange for the state to begin taking on some aspects of care at MMSW landfills that are now open, but will be closing eventually. Assumptions, estimated costs, advantages and disadvantages of each option are laid out in the body of the report. The MPCA believes that if the Legislature wants to pursue an expansion of the CLP, discussions should begin with Option 6(B), which would provide for state care only after facility owners have closed their landfills and have completed 30 years of postclosure care using their own financial assurance funds. The present value-cost of this option is \$14.8 million, which is composed of \$13.8 million in perpetual-care costs and \$1 million to remediate adjacent disposal areas.
- One option to expand the CLP, Option 6(C), sets out a "one-time window of opportunity" that would set a near-term deadline for a landfill to close and qualify into the CLP, assuming certain conditions were met (primarily, hydrogeologic separation from any ongoing land disposal activities). This option is chiefly for landfills that contained MMSW but were disposing of other wastes under the same permit in 1994, and therefore were not eligible for the original CLP. This option would also apply to 17 closed, old demolition-debris landfills that historically accepted MMSW. Based on anticipated closure of 9 MMSW landfills, and 17 closed demolition landfills, the present value cost of this option is \$16.3 million.
- The Benton County request for state reimbursement of some of its settlement costs arising out of cleanup at the Greater Morrison Sanitary Landfill appears to be a unique case. While the MPCA has concerns about the precedent this would set for reimbursement of other response costs, it is safe to say that if the Legislature follows the action it took in Fiscal Year 1998 and allows payment from the Solid Waste Fund to Benton County on a schedule matching the principal due on its bond payments (\$85,000 per year, up to a total of \$737,500), this would not cause a significant effect to the Solid Waste Fund. The greater effect would be through precedents this would set for other payments outside of the main structure of the Closed Landfill Program. There is no environmental gain to be achieved by making reimbursements for past costs to Benton County or to other responsible parties at currently open landfills.
- The MPCA staff projects that on or about fiscal year 2003 the CLP will achieve a "break-even" point in which revenues exceed expenses that are anticipated on a long-term basis. As this point approaches, the state will have decisions to make on how to spend the available funds that will accrue over time, or alternatively, whether to lower the waste-tax rate on consumers and businesses. Considering the needs of the current program and MPCA activities, and assuming that the tax rate is left at its current level, the state could pursue any of the three options listed in this report for expanding the Closed Landfill Program. The state could also pursue incentives for source reduction, discussed below.
- Up-front source reduction efforts that minimize the amount and toxicity of material landfilled are likely to be more cost-effective per ton than land disposal. The state should allocate a percentage of the Solid Waste Fund as direct incentive grants to the business community to support source reduction and reuse activities. Source



reduction and reuse are at the top of the state's waste management hierarchy. If the state decides to expand the current CLP to take on additional landfills that are now open, source reduction would offer the additional benefit of reducing the amount of landfill acreage for which the state may assume eventual responsibility.

Old Municipal Dumps

- At least 80 old municipal dumps in Minnesota have already undergone investigation and remediation or are in the process now. The report sets out current estimates and target dates for the MPCA to review and prioritize additional old dumps needing work. The state will continue to refine and improve cost and environmental information about old municipal dumps that need priority attention.
- The Legislature should consider statutory changes that would allow waste from old municipal dumps on publicly owned land to be relocated (under the condition that there be no out-of-pocket cost to the CLP) onto CLP landfills that are undergoing cover construction and that can use the excavated waste as material to achieve desired slopes. The CLP will be constructing covers at approximately 20 of its closed landfills in the future.



Chapter I. Introduction

This report fulfills two statutory requirements and covers two additional topics that have been raised by legislators in hearings and correspondence with the Minnesota Pollution Control Agency (MPCA). (See Appendix A for statutory mandates.)

They include:

(1) Status of Conventional Financial Assurance at MMSW Landfills. This is part of the Economic Status and Outlook Report required under Minn. Statute §115A.981, Subd. 3 and due December 1, 1997. Under Minnesota law, every two years the MPCA commissioner must submit an Economic Status and Outlook Report to the Legislature. This report is due in odd-numbered years. The MPCA is required to report on facility funds needed to meet the expected costs of landfill closure and expenses incurred during the conventional postclosure-care period. Under current requirements, conventional financial assurance requirements for MMSW landfills span the period from closure through the 30th anniversary of closure. Specifically, one part of the statute asks for a report on "statewide and facility-by-facility requirements for proof of financial responsibility under section 116.07, subdivision 4h, and how each facility is meeting those requirements." The report must also provide "statewide and facility-by-facility estimates of the total potential costs and liabilities associated with solid waste disposal facilities for closure and postclosure care, response costs under chapter 115B, and any other potential costs, liabilities, or financial responsibilities."

(2) Request to Study Expansion of the Closed Landfill Program. During the 1997 regular legislative session, the Minnesota Legislature required the MPCA to do a Closed Landfill Cleanup Eligibility Study (Minn. Session Laws 1997, Chapter 216, sec. 157, and due January 15,

1998). The legislation requires the MPCA to estimate the impact of accepting additional landfills into the Closed Landfill Program (CLP), which was created by the Minnesota Landfill Cleanup Act of 1994 (Minn. Stat. Chap. 115.39 - .445). The CLP provides funding and state responsibility for the care and cleanup of 106 closed MMSW landfills in Minnesota, many of which had been moving toward cleanups to be paid for out of Superfund litigation. The additional facilities to be studied for inclusion in the CLP are permitted MMSW landfills in the state that were open between April 9, 1994, and January 15, 1998. The legislature asked for (1) information on past settlements by public entities for the 29 facilities, (2) an estimate of the facilities' landfill liabilities after facility closure, (3) a discussion of the amount necessary to cover reimbursement costs for persons who have paid for cleanup at any of the 29 facilities, and (4) an analysis of funding sources.

(3) Request to study Long-term Costs at MMSW Landfills. This is an evaluation of sources other than an expansion of the CLP to fund landfill costs that will be incurred after the conventional 30-year postclosure care period at MMSW landfills. This part of the report arises out of a staff commitment made during the presentation of the MPCA's 1995 Economic Status Report to the Legislative Commission on Waste Management (LCWM), when a legislator asked for follow-up information on landfill liabilities after the conventional financial-assurance period. The MPCA staff promised to provide information about expected expenses during what was then termed the "post-postclosure-care period" and to identify options to fund these expenses. While researching and consulting stakeholders on this subject, the MPCA staff decided to change the descriptive term to "perpetual care" to be consistent with other state and local



programs around the nation that require funds for long-term care (e.g., for cemetery maintenance).

The MPCA staff convened a Perpetual Care Workgroup (Workgroup) to advise on costs and funding mechanisms. The Workgroup was composed of public and private MMSW landfill owners, waste-industry consultants, waste haulers and counties with and without landfills in their boundaries. The Workgroup met eight times from March to November 1997. Workgroup members provided valuable insights in the MPCA staff's preparation of this report.

(4) Information on Old Municipal Dumps.

Legislators and interested parties have called on MPCA staff intermittently to ask about bringing certain old dumps into the Closed Landfill Program or to suggest other ways to provide state assistance for their cleanup. Therefore the MPCA staff is taking this opportunity to provide information on the status of old municipal dumps, to describe state and local programs already in place, and to lay out options as to additional steps that could be taken to identify and handle those that are determined to be an environmental priority. Such dumps operated from the 1800s through the late 1980s, when the last of them were phased out in deference to landfills with permits and to waste-processing plants. As will be discussed, merely ascertaining the number of dumps that need attention over and above current programs will take a significant effort. The open-dump discussion is treated in an appendix because the population of sites is different than those in the main body of the report, and because there was no formal legislative request to study this subject.

The MPCA staff chose to combine the subjects because they all relate to sites where mixed-municipal solid waste (MMSW) has been, or is being, landfilled. The report ends with a chapter on "MPCA Findings," which suggests promising

avenues for policy development and further discussions in the 1999 legislative session. Landfill terminology used in this report is explained more fully in Appendix G.

While the MPCA does provide funding recommendations on expanding the Closed Landfill Program (CLP) as requested by the Legislature in its statutory charge, the MPCA is concerned about the concept of expanding the CLP to include all open Minnesota MMSW landfills. The MPCA suggests methods to accomplish that, if the Legislature wishes to proceed, and also lays out alternatives that would not involve folding all such landfills into the main structure of today's CLP. Further policy options exist but are too numerous to be fully developed in this report. In addition, field experience is needed to refine some key numbers in the area of perpetual care.

It is important to note that only one of the four subjects, conventional financial assurance, is directly tied in current statute to the day-to-day duties of operators of MMSW landfills. The other three subjects are in various stages of discussion among policymakers. Key controversies would have to be discussed and resolved before making changes to statutes and rules on these issues.

The examination of landfill liabilities provides a good opportunity to look for up-front solutions to minimizing landfill liabilities. Up-front source reduction efforts that minimize the amount and toxicity of material landfilled can be a more cost-effective means of minimizing landfill liabilities than trying to manage environmental problems later. To this end, the MPCA plans to shift more of its resources from waste management and landfill cleanup issues toward source reduction in the future. The MPCA encourages the Legislature, other government agencies, and private businesses to evaluate and support source reduction efforts wherever possible.



Chapter II. Background

Below is a description of each subject area in this report.

A. Conventional Financial Assurance

Under Minnesota law, every two years the MPCA commissioner must submit an Economic Status and Outlook Report to the Legislature (hereinafter referred to as the "Economic Status Report"). This report is due in odd-numbered years. Please see Appendix A for a copy of the statutory report requirements.

The MPCA is required to report on facility funds needed to meet the expected costs of landfill closure and expenses incurred during the conventional postclosure-care period. Minnesota has required financial assurance of MMSW landfills since 1990. Some industrial and demolition landfills are required by their permits to provide financial assurance. Conventional financial assurance requirements for MMSW landfills span the period from closure through the 30th anniversary of closure.

Specifically, one part of the statute asks for a report on "statewide and facility-by-facility requirements for proof of financial responsibility under section 116.07, subdivision 4h, and how each facility is meeting those requirements." The report must also provide "statewide and facility-by-facility estimates of the total potential costs and liabilities associated with solid waste disposal facilities for closure and postclosure care, response costs under chapter 115B, and any other potential costs, liabilities, or financial responsibilities." (Minn. Stat. §115A.981, subd. 3).

In the interest of focusing staff effort on a single area, the 29 open MMSW landfills, this report does not evaluate financial assurance compliance and

liabilities associated with MMSW combustor ash, industrial waste, and demolition landfills. In addition, this report will not cover remaining economic report requirements on the extent to which consumer prices reflect solid waste management costs. It is the MPCA's intent to address these issues in a separate report to be delivered in July 1998.

Information sources

Conventional financial assurance information comes from:

- Annual Reports provided by MMSW landfill owners,
- Technical staff's review of financial assurance information, and
- Financial reports from trustees on account balances, and updates from financial institutions on letters of credit.

B. Perpetual Care for Landfills

This part of the report arises out of a staff commitment made during the presentation of the MPCA's 1995 Economic Status Report to the Legislative Commission on Waste Management. In responding to a legislator's inquiry on landfill liabilities after the conventional financial-assurance period, the MPCA staff promised to provide information about expected expenses during what was then termed the "post-postclosure-care period" and identify options to fund these expenses.

While researching and consulting stakeholders on this subject, staff decided to change the descriptive term to "perpetual care." This term has been used by state and local governments that require cemetery operators to pay money into a trust fund sufficient to maintain a cemetery into the indefinite future, after all plot sales are complete and the revenue stream ends.



In its simplest form, a perpetual-care trust fund earns interest, and the interest beyond losses from inflation is sufficient to meet all costs, both routine and contingent — contingent problems that have an element of uncertainty, but that have happened at such facilities in the past, such as flood damage. A perpetual-care arrangement can be sustained for extremely long time periods if the principal balance is protected.

In 1984, the state established a program called the Metropolitan Landfill Contingency Action Trust Fund (MLCATF), which required that metropolitan landfill owners pay \$0.50 per cubic yard into a dedicated fund to be used by the state for perpetual-care expenses at metropolitan landfills as well as for emergency expenses occurring sooner than 30 years after landfill closure (Minn. Stat. 473.845). In 1994 all revenues within this dedicated fund were transferred into the CLP to cover expected costs of metropolitan landfills that left MLCATF coverage and entered the new program. The state's ability to address perpetual-care costs at the remaining metropolitan landfills covered by MLCATF needs more analysis, given the facts that the MLCATF legislation limits state responsibility for addressing perpetual-care costs to the amount of available funds, and that the MLCATF balance zeroed out in 1994. Since that time, additional landfill revenues have brought it back to more than \$1 million, compared to a pre-1994 balance of \$9.5 million.

No similar law providing state care following the conventional 30-year postclosure period applies to Greater Minnesota landfills. However, the state adopted a Greater Minnesota Landfill Cleanup Fee (GMLCF) in 1989, which requires landfill owners in Greater Minnesota to pay \$2.00 per cubic yard to the County within which they are located (Minn. Stat. 115A.923). The receiving county has the authority to spend this money on the following activities: landfill abatement; cost of closure; postclosure care; response actions; or for

purposes of mitigating and compensating for the local risks, costs, and other adverse effects of the landfill (Minn. Stat. 115A.919).

The majority of counties that own MMSW landfills apply their GMLCF revenues to financial assurance trust funds. The majority of remaining counties apply the GMLCF funds to source reduction, recycling and other waste-related activities such as dump remediation. Some hold a portion of the funds in a dedicated account to be available for future landfill-related costs. However, there is no guarantee that the GMLCF revenues will be available in the future to cover perpetual-care costs at a given facility. Therefore, a perpetual-care funding requirement, if passed in statute or rule, would be a new requirement for landfills located in Greater Minnesota. If perpetual-care costs are funded directly by landfill owners, this funding option would most likely raise the prices of Minnesota MMSW landfills even higher than prices at landfills in other states.

Current average Minnesota MMSW landfill tip fees are already 38 percent higher, or over \$18.00 per ton more, than average tip fees in the neighboring states of Iowa, Wisconsin, North and South Dakota, and Michigan.¹ Requirements that increase the gap between state and out-of-state landfilling prices have the potential to increase the flow of Minnesota-generated waste to out-of-state landfills. Already, an article titled "Interstate Movement," which was published in the June 1997 edition of *Waste Age* magazine has identified Minnesota as tied for seventh place among states in its export of MMSW. Financial pressures that increase waste exports also increase the potential of future liabilities for Minnesotans because our state has more rigorous financial assurance standards to assure coverage of conventional financial assurance costs.

¹ "Solid Waste Price Index," *Solid Waste Digest - Midwest Edition*, Volume 7, Number 11, November 1997.



In addition to the state of Minnesota's Metropolitan Landfill Contingency Action Trust Fund, the state of Michigan has adopted a licensing-fee program that sets aside funds for perpetual-care costs of landfills in that state. These funds are available after the owner/operator's duties have ended or after failure of the owner/operator to take appropriate action (Michigan Statute 324.11550).

Perpetual-Care Workgroup Concerns and Issues

During Workgroup meetings, the following topics attracted much discussion and in some cases, controversy. This is not a complete listing of all controversies but indicates the range of opinions aired by Workgroup members.

1. Discussion on the length of the perpetual care period. How many years will pass before a landfill's contents will need no special care. Technical aspects of this include the service life of synthetic and clay liners; gas-production timelines; and the amount of time that must pass before the leachate composition reaches drinking water standards.
2. Operators' opinion that there is already an "uneven playing field" between Minnesota and neighboring states. They feel this problem has not been alleviated by new federal regulations on financial assurance.
3. The opinion of facility operators that state and local waste fees and taxes are too high already.
4. Some operators questioned a "one size fits all" approach to the amount of money a given landfill should set aside. Some argued that landfills should get credit for extra care in siting and construction, because these would lower the risks.
5. The lack of knowledge about plausible long-term costs, because of the relatively short period of time that lined landfills have been in existence. Some facility operators felt that the performance of caps, liners, leachate systems and gas collection needed another five or 10 years to evaluate before estimating the costs of perpetual care.
6. Some landfill operators felt that perpetual-care costs should not be the responsibility of landfill operators but rather all of society because all of society uses landfills — either directly for burial of unprocessed waste, or indirectly for bypass and residuals from processing plants. This idea prompted the reply from other stakeholders that customers who pay for having their waste processed are distinguishable from those who have their waste landfilled directly — even though waste processing does produce some residues, the two groups should not pay equivalent taxes or fees.
7. Counties now hosting landfills expressed the concern that changes to local fees on landfilled waste will cause increases in other local fees.
8. One member expressed concern on the effect the status quo option would have on future taxpayers if there is no attempt to address perpetual-care costs during a landfill's operating life.
9. Uncertainty about the future of landfill design and operations hampered estimates of costs — specifically regarding whether landfills will be dry-tombing waste or recirculating leachate to accelerate decomposition. Members discussed that future technology may be able to handle problems that are expensive today. Perhaps economics of the period will justify digging up all old landfills 50 years from now and recycling whatever is left, thus leaving relatively clean sites.
10. That additional effort and expense to ensure perpetual care might not produce a measurable environmental gain. Perhaps



other disposal problems such as old municipal dumps which do not have the protective systems of today's landfills, nor financial assurance, should receive priority.

11. Generalizations about facility perpetual-care costs may overestimate costs at facilities that were located and designed to minimize long-term risks and expenses.

The MPCA staff said they would consider and report the concerns of Workgroup members but that in some instances the members might not support the recommendations of the MPCA in this report. Therefore the MPCA makes no representations that all or most of the Workgroup members support cost estimates or recommendations contained in this report. The Workgroup did have the opportunity to comment on multiple drafts of the Cost Matrices and Funding Options, and on draft versions of this report. The MPCA staff believes that they have been very responsive to workgroup members comments and that most are reflected in this report.

Information Sources

Information on perpetual-care costs and the means to pay for them comes from:

- A preliminary MPCA staff report to legislators delivered in November 1995 and finalized in January 1996, on the estimated costs of routine operation and maintenance during the perpetual-care period for each MMSW and combustor-ash landfill. This report did not address contingency-action costs, such as the expenses of a major ground water cleanup.
- The MPCA's contracting experience in the Closed Landfill Program. The MPCA is responsible for the care and cleanup of 106 closed landfills, which makes it the largest single project manager for landfill care in the state. Because of this the MPCA has access to actual, current cost information

based on competitive bids. On the other hand, the MPCA has limited information as to costs at lined landfills, because only four of the 106 that qualified for the program have waste that was disposed on a liner with leachate collection.

- Information and comments offered from stakeholders serving on a Perpetual Care Workgroup, which met eight times at the MPCA's St. Paul office. This Workgroup included representatives from landfill operators, solid-waste consultants, waste haulers and counties with and without landfills inside their borders.
- MPCA-approved closure, postclosure-care, and contingency-action plans for MMSW landfills.
- MPCA Landfill Gas Study prepared for the MPCA by the Barr Engineering Company, November 1994.

The estimated lined-cell acreage at the time of closure, and the number of operating years remaining, inevitably includes some uncertainty. In these estimates, staff took into account locations where there is a reasonable likelihood that the facilities will be larger in size than the currently permitted size, because the site's planned "ultimate capacity" looks beyond the current permit.

Data limitations

It is important to realize that today's landfills have not been in existence long enough to know long-term costs with any certainty; this caution is particularly strong when it comes to the possible costs of corrective action occurring more than 30 years after closure. To illustrate the prodigious time-spans involved: a landfill operating today might operate for another 30 years, which means that it would complete final closure work in 2027. Thirty years of conventional postclosure care brings the facility to the year 2057, at which point the perpetual-care period begins. Calculations used by



MPCA staff focus on the first one hundred years of perpetual care, which brings that facility to the year 2157, or 160 years from today.

It is reasonable to believe that the time a given landfill will need care is not perpetual in the sense that it literally extends forever, but rather that it is open-ended so that care will end when the value of surrounding property has raised the value of the landfill to the point at which it could be sold on the open market. Under this concept, it is likely that at some, or even most landfills, the net property value of the filled ground will eventually rise to a point where it will be sufficient to cover the remaining costs of remediation and maintenance. If this concept is accepted, then the principal role of government is to ensure that enough money is available so that the facility does not cause an environmental problem before it goes back on to the land market with a positive net value.

However, it is also important to point out that state-of-the-art landfills do not have a market value following closure that is equivalent to the same acreage of vacant commercially zoned land. It is likely that in most cases the highest and best use of a filled area will be a recreational area, parking lot or wilderness area rather than a site for a building. Current practice also prohibits planting trees or other deeply-rooted vegetation on filled ground.

The state's experience with pre-1970 old dumps and even with old unlined MMSW landfills is not directly applicable because the waste was of much different composition and toxicity than the material going into today's regulated landfills. The covers on old dumps were permeable and they were not built with either gas-collection systems or bottom liners. The higher protection offered by today's landfills and the hazardous-waste regulations that restrict the kinds of waste being disposed, however, do not compel the conclusion that today's landfills inevitably will be less expensive than old, unlined landfills over long time spans. Some might be more expensive to operate in a closed status because they

are more highly engineered, have machinery that needs maintenance and replacement, and need regular cover repair to keep percolating water from reaching dry waste that has never decomposed or leached.

Because today's landfills are much more expensive to build per acre than were old unlined landfills, there is growing industry pressure to make them steeper and higher than the old landfills because this packs more waste onto each acre of lined ground. All other factors being equal, steep-sided landfills have a higher risk of slumping than low-profile landfills and this contingency would be expensive to repair. They are also more expensive to maintain.

The MPCA staff fully acknowledges that more experience and time is needed to improve certain costs and probability estimates that are critical to reliably estimating the costs of perpetual care. Factors such as the long-term integrity of the clay and synthetic materials that line the bottoms of MMSW landfills, the ability of leachate-collection systems to remain effective and resist the clogging action of biofilms and sedimentation over many decades, the resistance of slopes to slumping, the risk of subsurface fire at dry-tomb landfills, and the long-range methane production curves for dry-tomb MMSW landfills after they have been capped. Today's state-of-the-art lined, gas-collecting landfill has not been in existence long enough to judge such factors with certainty or to know how site-specific conditions may cause a given landfill to deviate from the norm.

However, MPCA staff believes that while some costs are conjectural, many are not. The MPCA believes that for the foreseeable future, medium to large landfills will need the following: 1) continual site maintenance including fencing, building care and inspection of equipment; 2) monitoring of gas and ground water; 3) maintaining the integrity of the cover by preventing uncontrolled rainwater and snowmelt from entering the stored waste and "reactivating" the leaching of waste (and in the case



of MMSW, reactivating gas production); and mowing of the cover. Some of these costs are virtually certain to continue well past the conventional 30-year postclosure-care period, and perhaps for many decades to come. Such timelines pose a challenge, but are not unknown to governments and businesses. Designers of courthouses plan for 100-year useful lives, and some timber companies plan their harvests on 200-year projections.

The perpetual-care cost estimates are based on today's technology and rule requirements. While changes in technology have the potential to reduce landfilling and remediation costs, changes in what we know about today's landfill impacts on human health and the environment may require changes in regulations that increase the costs of land disposal. The MPCA staff believes that using today's technology and rules as a reference point gives readers a single starting place from which to make their own projections, using their own assumptions as to what the future holds. During review of this report, some legislative reviewers said that environmental laws governing landfills may change in the near future. A government decision to lower the 2.5 million metric-ton threshold for landfills required to have active gas-collection systems is an example of such a change.

C. Acceptance of Open MMSW Landfills into the Closed Landfill Program

Background

During the 1997 regular legislative session, the Minnesota Legislature mandated a Closed Landfill Cleanup Eligibility Study (Study) that in part requires the MPCA to estimate the impact of accepting additional landfills into the CLP. These would be permitted mixed-municipal solid waste landfills in the state that were open between April 9, 1994, and January 15, 1998. Because the MPCA

knew the Study would require duplication of the financial assurance cost information which is included in the Economic Report and duplication of perpetual-care cost information and discussion of perpetual-care funding options that was to be included in the Perpetual Care Report planned prior to this request, the MPCA decided to combine all report requirements into one comprehensive report. Please see Appendix A for a copy of Minn. Session Laws 1997, Chapter 216, sec. 157, requesting the Study.

This Study relates to a possible expansion of the Minnesota Landfill Cleanup Act of 1994 (Minn. Stat. Chap. 115.39 - .445). This legislation created the Closed Landfill Program (CLP) to provide funding and state responsibility for the care and cleanup of 106 closed MMSW landfills in Minnesota, many of which were moving toward cleanups to be paid for out of Superfund litigation. This program stopped that line of litigation by raising revenue and arranging for permanent care by the state. The MPCA has now had almost three years of experience implementing the CLP. During this period, the MPCA has set up water sampling contracts, lab analysis contracts, well drilling contracts, maintenance contracts, and operation contracts for the landfills in the program. The MPCA has also coordinated the design and/or construction of over 21 projects for covers or active-gas systems. The program has no delineated endpoint, because it is not known how long the landfills qualifying for the program, totaling about 2,000 acres of filled ground, will need care and cleanup.

CLP revenues and expenses

Currently, the CLP is paid for by a combination of bond proceeds and the Solid Waste Generator Assessment. It may also receive additional income from recovery of insurance proceeds in the future. The current Solid Waste Generator Assessment will be repealed and collections will shift to be part of a new Solid Waste Management Tax on January 1, 1998. Despite the change in revenue methods, the MPCA expects to receive the same amount in



waste-derived revenues to the Solid Waste Fund, \$22 million. Given no additional legislative action, this amount is expected to be relatively stable into the future. The fact that the MPCA never received the anticipated amount of Solid Waste Generator Assessment fee revenue (\$23.2 million expected per year, compared to actual receipts of slightly less than \$22 million annually) has, fortunately, been offset by cost savings attributable to the purchasing power and economies of scale of such a large landfill-care program.

At this time, the MPCA has a better understanding of the revenues available and the costs for remediation and long-term care for the program. The latest information on the status of the program is presented in the Landfill Cleanup Program 1997 Annual Report.

Experience has shown that it is significantly more cost effective for one entity to manage a large number of closed landfills than for an owner to manage a single landfill. In the Closed Landfill Program, it is possible to use specialized staff to evaluate environmental impacts and contractors to correct problems on a large number of landfills, while individual owners must hire consultants and contractors every time a problem is encountered at their landfill. The state also benefited from the general downturn in demand for environmental contracting services and testing, which kept bid prices below anticipated levels.

Experience has also shown some negative effects on CLP finances. Financial assurance balances to be transferred for use by the CLP were lower than expected because closure expenses absorbed essentially all of public owners' financial assurance funds, and the Solid Waste Generator Assessment revenue never reached the projection of \$23.2 million. Evaluation of some sites has convinced the MPCA that they need expensive remediation work not originally anticipated. For example, an active gas-collection system was deemed necessary at Waste Disposal Engineering landfill. While MPCA staff

did not predict the need for active gas collection at the Waste Disposal Engineering Landfill, staff did plan on a certain percentage of sites among the population of landfills needing active gas extraction. In this respect, some theoretical expenses are already becoming concrete expenses. The Closed Landfill Program also has recently decided to install active gas-collection systems at 10 landfills of medium size even though the systems are not required by federal clean air regulations. This will bring the total of landfills in the CLP that are equipped with active-gas collection to 21.

At this point it is relevant to discuss income prospects under the Insurance Recovery Effort authorized under Minn. Stat. 115B.445 (1996). This was intended to recover a portion of the state's landfill-care costs from insurers who issued coverage for environmental damages to policyholders who operated or sent waste to landfills. The state recently made its first formal settlement offers and will begin to negotiate voluntary settlements with the insurance industry early in 1998. During 1997 the state obtained \$1.06 million in a settlement during the liquidation of Iowa National Mutual Insurance Company. The state has also made settlement offers to four other bankrupt carrier groups, totaling about \$4.6 million. Further, the state has sent settlement offers to about 60 carrier groups identified as insuring parties associated with the Oak Grove Landfill in Anoka County.

Further detail on the experience and expectations of the insurance recovery program can be found in a separate report prepared by the MPCA and the Attorney General's Office, also due in January 1998. In addition, the MPCA reports yearly on the Closed Landfill Program and includes a status report on insurance recovery with every update. For the time being the MPCA is not planning or suggesting alternative methods to spend insurance recoveries other than as set by statute, which directs that insurance-recovery proceeds be deposited in the Solid Waste Fund.



Long-term projections and the “break-even point”

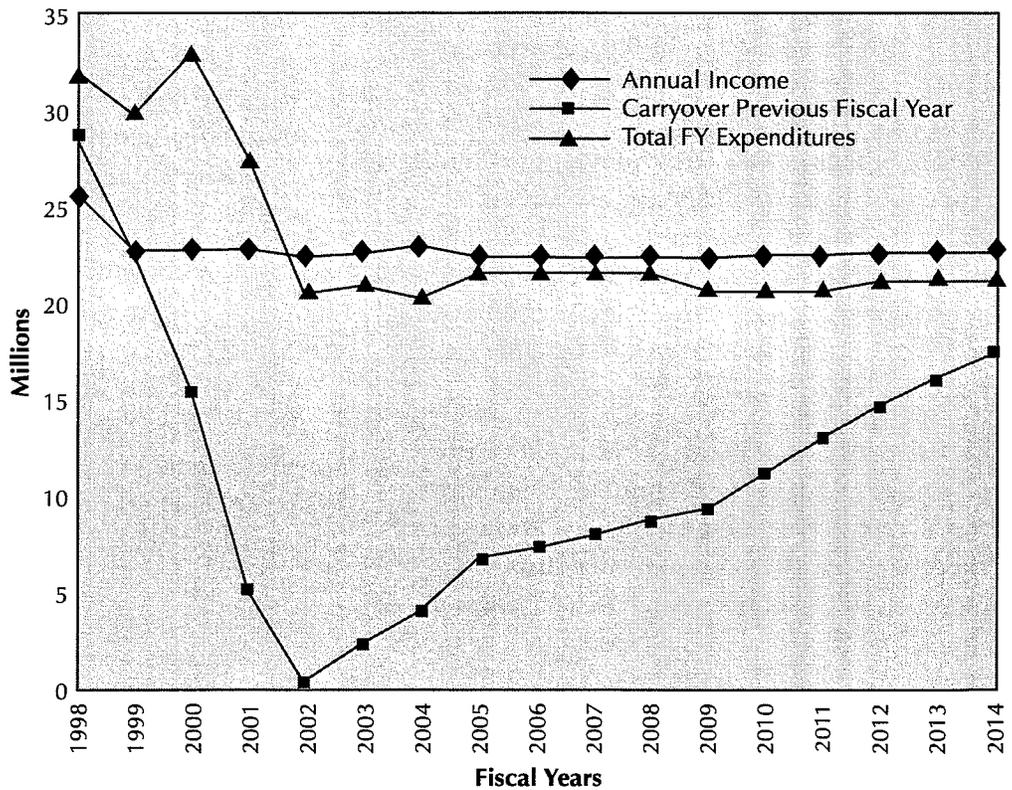
In the same way that the Minnesota Department of Natural Resources has no endpoint for when it will stop taking care of parks, the MPCA has no discernible endpoint for when it will stop taking care of all 106 landfills in the CLP.

While it can be said that initial construction costs will drop off, and some landfills will be decomposed enough to be returned to routine commercial uses, wilderness or park land, the MPCA has no way of predicting what this attrition rate will be. To date, MPCA forecasts show that expenses for the CLP are expected to peak in the year 2000 because of a pulse of cover construction and active gas system installations and then go into a long-term maintenance mode, (including corrective actions where necessary). Based on projected program expenses, the MPCA believes that on or about fiscal year 2003, total and annual program funds will appreciably exceed anticipated annual expenses on a long-term basis. The report calls this the “break-even point.” A fund surplus begins to develop in 2002. After 2002, projections show, the carryover balance exceeds \$1 million and increases annually. The MPCA staff will refine these estimates in coming years, as more information is developed about anticipated costs of the 106 landfills.

Figure 1, “Current Projections, Closed Landfill Program,” shows forecast annual revenues, annual expenses and carryover balances for the CLP through 2014.

The MPCA can use bond proceeds, to pay for active-gas collection systems at closed landfills in the program if they are located on public property. Depending on whether legislative changes are proposed to the CLP in the coming years that would tend to add expenses, the MPCA staff may ask the Legislature to renew the \$90 million bonding authorization created under the original CLP legislation. While the first 10 years of the CLP is not likely to use all this authorization, the state’s responsibility for these sites and the need for

Figure 1: Current-Dollar Projections, Landfill Cleanup Program



1. All figures are expressed in current, uninflated dollars
2. Projections do not reflect possible program changes through statutory amendments.
3. Projections do not reflect additional revenue from insurance industry settlements.



reconstruction will extend well beyond the date after which such bonding authorizations would normally expire.

This report considers the ability of the Solid Waste Fund surplus to cover perpetual-care costs at currently open MMSW landfills, as well as other uses for the money such as tax cuts and support of solid waste source-reduction activities. Some stakeholders will argue that extra revenues should bring a reduction in the fee or tax on solid waste when that date is reached; others will argue that the state should spend the money to encourage action "further up the hierarchy," on source reduction (avoiding waste generation in the first place) and on reuse of materials that would otherwise become waste.

Legislative actions that would enlarge the state's responsibility to provide permanent care for solid waste disposal facilities does have a cost to the public even when the state uses extra revenues under an existing program. The extra amount to be spent could have been retained by waste generators as a result of the state cutting the tax rate, or it could have been spent by the state on other pressing environmental efforts.

Issues and options relating to expansion of the CLP

Since inception of the CLP, stakeholders and members of the Legislature have proposed a variety of changes to the scope of the Program. Proposals include expanding the number of landfills in the program; taking nonlandfill disposal areas into the Program; sharing fee revenue now going to the Solid Waste Fund with owners of today's open landfills or creating exemptions from the fees that have been the primary funding source for the CLP. Following a legislative directive, the MPCA produced a paper for the Legislative Commission on Waste Management entitled "MPCA Comments on Proposals for Legislative Changes in Closed Landfill Program" (November 21, 1995), that discussed each legislative proposal known to the MPCA.

Minnesota's Closed Landfill Program comes with many precedents and conditions. The report discussion assumes that Minnesota would not accept open landfills on any more generous terms than it did in 1994, and might well set more rigorous entry conditions in keeping with the general historical trend in Minnesota that those landfills that remain open longer than others have more demanding environmental standards and therefore are more expensive to operate and close.

At this time, it is also important to note that the MPCA has opposed, and will continue to oppose, taking on major new landfill security-and-care duties unless it is assured that revenues are available to pay for them. The MPCA has also resisted cuts in revenue where all duties are left intact. This is because the continued economic vitality of the Closed Landfill Program is important to stakeholders involved in setting up the initiative in 1994, particularly the small business community. These companies and local governments did not want to sign liability releases (which were required from those entering the program and receiving reimbursement) and then later discover that the state could not financially support the program and was going to return cleanup obligations to the responsible parties. This action would leave them even worse off than they had been under Superfund if lawsuits began anew.

The MPCA's reticence to expand the CLP significantly will continue to be strong during the first 10 years of startup, when the pulse of initial construction and rebuilding occurs. The MPCA is finding that some remedial systems (chiefly covers and gas-control equipment) installed by landfill owner/operators and responsible parties need major rework or replacement, even though they are only a few years old. Further experience will narrow the uncertainty factor as to how many systems need replacement and on what schedule.

The MPCA staff will be available to refine cost estimates as legislative intentions become clearer. It is not possible for MPCA staff to know exactly



which landfills would take advantage of a Closed Landfill Program expansion that offered the choice to close or stay open, and this means that specific cost projections must wait until provisions are refined and landfill owner/operators are heard from as to their intentions. For example, some landfills have adjacent disposal areas and some do not, and because the cleanup costs of these areas are not included in financial assurance obligations, the state would be taking on this obligation immediately, but only if such landfills entered the program immediately.

Information sources

The information on CLP costs and policy issues comes from:

- MPCA files on these facilities;
- Unit-cost estimates developed by the Closed Landfill Program at sites already in the program;
- Information offered by the facility owner/operators in response to correspondence sent to all landfill operators in September and October 1997; and
- Information assembled for the report "MPCA Comments on Proposals for Legislative Changes in Closed Landfill Program" (November 21, 1995). The 1995 "MPCA comments" paper contains considerable detail on circumstances at the Greater Morrison, Fergus Falls and Northeast Otter Tail landfills, which is not reprinted in this report.

D. Old Municipal Dumps

Finally, MPCA staff is taking this opportunity to provide information on the status of old municipal dumps, to describe state and local programs already in place, and to lay out options on how to identify and handle those that are determined to be an environmental priority. This discussion is contained in Appendix B. Treatment in an appendix is

appropriate because these old dumps legally are not classified with permitted landfills that comprise the subject matter of the main body of the report. However, some common themes do emerge. Legislators and interested parties have called on MPCA staff intermittently to ask about bringing certain old dumps into the Closed Landfill Program or about other ways to receive assistance in cleanup through the Program. Such dumps operated from the 1800s through the late 1980s, when the last of them were phased out in deference to landfills with permits and to waste combustors. As will be discussed, merely ascertaining the number of dumps that need attention over and above current programs will take a significant effort.



Chapter III. Conventional Financial Assurance Costs and Compliance Status

This section reports on individual MMSW landfill compliance with financial assurance requirements under Minn. R. 7035.2665. This rule requires financial assurance for all MMSW and MSW combustor ash landfills remaining in operation after July 1, 1990. Although not required by rule, many industrial landfills, a couple of demolition landfills, and most recently a refuse derived fuel facility also provide financial assurance as part of permit conditions or enforcement documents. As previously mentioned, this chapter focuses on MMSW landfills and does not report on financial assurance compliance or other long-term liabilities associated with other facilities.

A. Overview of Rule Requirements

The rules require owners of MMSW landfills and MSW combustor ash landfills (waste to energy ash landfills) to estimate the costs of facility closure, postclosure care, and contingency action and to demonstrate how they will cover these costs. The rules allow facility owners to develop cash reserves by using trust funds, provide guarantees by banks and sureties (letters of credit or surety bonds), or to self insure with collateral. A provision under statute also allows municipalities to satisfy contingency-action costs by reserving a portion of their bond debt to cover expected contingency costs. This provision may not be applied to a new solid waste disposal facility or to expansion of an existing facility. Only one MMSW landfill is using this option to cover expected contingency-action costs.

The rules require facility owners to adopt the exact mechanism language provided in the rules. The purpose of this requirement is to minimize

administrative review and most importantly, to assure that the mechanism will satisfy its purpose, thus minimizing the potential for future litigation to recover money in the event of a poorly worded first or third party guarantee.

The facility owner must annually adjust financial assurance cost estimates for inflation during the facility's operating life. In addition, throughout the course of the year, a facility operator is required to revise cost estimate(s) whenever a change in site conditions increases those cost estimate(s). The facility operator has 60 days in which to adjust the payment rate into a trust fund or increase the amount of their guarantee to reflect an increase in their cost obligation. The rules also require facility owners and trustees to report annually on the status of their financial assurance mechanism.

A rule amendment in 1990 allows facility owners using trust funds to make payments based on the "present values" of closure and postclosure-care costs. The present value option allows facility owners to take into account the interest earnings on trust fund reserves, thus having the effect of reducing the amount of their trust fund payment. This option is used by most facility owners with trust funds and has reduced the financial burden of rule compliance.

Facility owners report on the status of their financial assurance mechanism (financial assurance value, increases, decreases) in the Annual Report. Financial institutions (Trustees) must submit to the MPCA and facility owner financial statements confirming the value of the trust fund at least 30 days prior to the anniversary date of the funds establishment. Public trustees using the dedicated trust must submit the following information within



90 days after the close of their fiscal year, which falls around March 31 since counties' fiscal years end December 31: 1) a copy of the public-owned landfill's financial statements for the latest completed fiscal year that clearly reports the status of the dedicated trust fund; and 2) a report from an independent certified public accountant (CPA) stating the status of the dedicated trust fund conforms to the rules. Historically, the MPCA has accepted state audit reports of counties to meet the CPA requirement. One problem with this arrangement is that most county-audited reports are not completed until fall. Since 1994, the MPCA staff has requested that municipally appointed trustees, usually the County Treasurer or County Auditor, submit unaudited reports by the March 31 deadline. This has been fairly successful; however, some counties have not complied regularly with this request.

B. Staff Responsibilities

The MPCA staff engineers, compliance staff, and financial assurance specialist form a team that is responsible for implementing the financial assurance requirements and for determining a facility owner's financial assurance compliance status. Staff engineers are responsible for reviewing and approving closure, postclosure-care, and contingency-action cost estimates and for approving decreases or disbursements from financial assurance mechanisms. If the facility owner plans to use a trust fund, the engineer will also review and approve the amount of their trust fund payment. Each year the engineer must review and approve inflation-adjusted cost estimates and any cost estimate increases or decreases that are reported by the facility owner throughout the year.

The financial assurance specialist and compliance staff are responsible for: 1) determining whether the facility owner is making adequate payments into their trust fund or assuring that their guarantee (letter of credit, surety bond) covers their financial assurance obligation, 2) reviewing and determining

acceptability of financial assurance documents (trust agreements, letters of credit, self-insurance, surety bonds), 4) reviewing amendments to the financial assurance mechanisms and 5) determining whether the facility owner and trustee is satisfying reporting requirements on the status of the financial assurance mechanism. In some cases, staff engineers will also assume some of these responsibilities.

To provide more efficient, comprehensive, and consistent compliance determination, the MPCA staff has developed a means of automating compliance checks of facility cost estimates and trust fund payment rates. The compliance method relies upon a spreadsheet which contains formulas that derive facility inflation-adjusted cost estimates and which calculates current- and present-value trust fund payment rates based on remaining facility operating life. A facility's reported cost estimates and payment rate are compared to the automated information to determine their adequacy.

In fall 1997, the MPCA staff sent inflation- and interest-adjusted cost estimates to facility owners as a means of speeding up the compliance determination process for 1998 and ensuring more consistent treatment of facilities. The MPCA hopes that this effort has the added benefit of reducing costs for facility owners in providing this information and allowing the program to run more smoothly. This effort should address some of the compliance implementation shortfalls noted in the 1995 Economic Status and Outlook Report.

C. Compliance Determination

This section evaluates financial assurance compliance for 29 MMSW landfills; three of which only accept MMSW combustor ash and two that are closed. Each facility is evaluated based on the following three compliance measures:

1. Are the financial assurance cost estimates adequate to cover closure, postclosure care, and contingency-action costs at the landfill?



2. Was the annual change to their financial assurance mechanism adequate?
3. Did they satisfy their financial assurance reporting requirements?

1. Adequacy of cost estimates

As mentioned, the MPCA staff engineers are responsible for determining whether a facility has provided adequate cost estimates. In making an evaluation, the engineer must determine that the facility has annually adjusted their estimates for inflation and that their estimates are adequate to cover third-party costs for closure, postclosure care, and contingency-action. It is easy to determine if a facility has accurately adjusted their cost estimates for inflation. Determining whether a facility's cost estimates are adequate is much more difficult.

Historically, staff engineers have relied upon a list of cost items to be covered for each cost category (i.e. closure, postclosure care, contingency action) in order to minimize the potential for facility owners to underestimate their financial assurance costs. In addition, staff engineers have relied upon their experience in reviewing and approving financial assurance reimbursements as a check to whether cost items are realistic.

In the course of implementing the CLP, the MPCA has gained direct experience in carrying out long-term care responsibilities, including determining costs to conduct closure, routine operation and maintenance, and some corrective actions. Of the sites with financial assurance requirements that entered the CLP, the majority of facility owners vastly underestimated the costs for closing their facility. Under the CLP, the MPCA found that the average cost to provide landfill cover in accordance with rule requirements is \$30,000 to \$70,000 per acre, with the lower range representing a landfill which has all soils (sand, clay, top soil) available on site, and the upper range representing sites where soils are not on site and where the waste needs recontouring to final grades. In applying this experience to today's open MMSW landfills, the

MPCA expects average facility closure costs to be about \$50,000 per acre, because sites open today would not need a great deal of recontouring and would not have all soils available on site.

Recent experience in the CLP of landfill closure costs and review of some facility owners' financial assurance reimbursement requests have shown instances where cost estimates which were initially approved by technical staff were later determined to be inadequate. These instances primarily occurred because of the state's and facility owners' inexperience with financial assurance-related costs. While the MPCA is aware of the fact that there is an incentive to underestimate financial assurance costs in order to reduce a facility owner's immediate financial burden, the MPCA is not aware of any facility owner deliberately underestimating their costs.

Some cost estimates in Table 1, on page 21, may be deemed inadequate in light of new information from the CLP regarding financial assurance-related costs. Increased experience gained through the MPCA's administration of the CLP and review of financial assurance reimbursements will further reduce the future likelihood of staff approving inadequate financial assurance cost estimates.

2. Adequacy of mechanism

The determination of whether the annual change to a mechanism is adequate establishes whether the facility owner is providing adequate coverage of financial assurance costs. This evaluation is made by the financial assurance specialist who evaluates whether the amount of a letter of credit was equal to the sum of the facility's financial assurance costs and whether trust fund payments were in accordance with facility owner commitments made the prior year in their Annual Report, and based on rates approved by staff engineers.

3. Adequacy of reporting

The determination of whether a facility owner satisfies the financial assurance reporting requirements is critical to determining whether the



facility owner will be able to guarantee coverage of conventional financial assurance costs. Compliance determination is based on: 1) whether the facility provided the financial assurance cost and mechanism information required as part of the Annual Report, and 2) a third-party confirmation of the value of the financial assurance mechanism. An independent report on the value of a financial assurance mechanism is a safeguard against any false or erroneous reporting by a facility owner in the annual report.

Table 1 provides a snapshot of financial assurance information at the end of 1996, unless noted otherwise after the facility name. The column titled "Obligation" is the current value of each facility's closure, postclosure care, and contingency action cost estimates. This amount provides the basis for setting up third-party guarantees (letters of credit and surety bonds) and for trust funds in which interest earnings are not applied to the fund. The majority of facility owners using trust funds apply all interest earnings to the balance of their fund, so they base their monthly payments on the present value of their closure and postclosure-care costs, which has the effect of reducing the amount of their financial assurance obligation for the purpose of making trust fund payments. Please note that the table below does not reflect present-value cost estimates. The column titled "Annual Change" is the difference between the value of their mechanism on December 31, 1995 and December 31, 1996. For example, this measure would be the sum of annual payments into a trust fund, plus interest earnings on the fund, minus any disbursements from the fund.

D. Compliance Evaluation

The discussions below summarize the compliance status for each category of Table 1.

Financial assurance mechanisms

In 1996, the majority of MMSW landfill owners set aside cash into trust funds and dedicated trust funds

to meet their financial assurance obligation, while two used a standby letter of credit and one a surety bond.

In August 1997, the MPCA approved the first use of a surety bond for meeting a facility owner's financial assurance obligation. The facility, which was recently purchased by a large out-of-state corporation, substituted the surety bond for a trust fund which had built up over \$1.6 million in cash reserves over the past seven years. This substitution is allowed under the rules and did not initially give MPCA staff cause for concern. However, most recently, MPCA staff received requests from three additional private landfills recently purchased by USA Waste, a large corporation based in Houston, to substitute existing trust funds with over \$7.84 million in fund reserves with standby letters of credit. Although allowed under the rules, the MPCA has some discomfort in a facility moving from a trust fund to a third-party guarantee because the MPCA believes that trust funds provide the best guarantee that a facility owner will be able to cover financial assurance costs.

The MPCA's discomfort stems from a concern that the facility owner may be investing existing trust fund reserves in other aspects of the business and plans to fund financial assurance costs from future revenues earned by other business investments. This financing approach relies upon continued profitability of other business investments and is not a prudent or reliable method for funding conventional financial assurance costs because the health of the other business investments may change over time and some of the other investments may be landfills which will have their own long-term care needs.

A trend to this possible method of funding has important implications for the long-term future of waste management in Minnesota. Historically, the key to profitability for national solid-waste firms has been vertical integration that ties the company's waste-hauling operations to large, regional landfills



Table 1. 1996 MMSW Landfill Financial Assurance Compliance Status

| Facility Name | Mechanism Type | Total Obligation | Mechanism Value (12/31/96) | Annual Change | Are Cost Estimates Adequate?① | Was Annual Increase Adequate? | Was Reporting Adequate? |
|--|----------------|---------------------|----------------------------|--------------------|-------------------------------|-------------------------------|-------------------------|
| Brown Co. SLF | DTF | \$1,185,836 | \$1,016,205 | (\$59,940) | No | Yes | Yes |
| Burnsville SLF | TF | \$5,737,711 | \$3,085,998 | \$274,702 | Yes | Yes | Yes |
| Clay Co. SLF | DTF | \$3,825,606 | \$1,027,112 | \$341,564 | Yes | No | No |
| Cook Co. SLF | DTF | \$1,296,326 | \$334,865 | \$92,819 | Yes | Yes | No |
| Cottonwood Co. SLF | DTF | \$1,338,388 | \$689,345 | \$52,967 | Yes | Yes | Yes |
| Crow Wing SLF (new) | DTF | \$4,507,846 | \$1,411,040 | \$291,263 | Yes | Yes | Yes |
| Crow Wing SLF (old) | DTF | \$1,354,023 | \$680,226 | \$56,826 | Yes | Yes | Yes |
| East Central SLF (12/97) | TF | \$4,049,153 | \$1,128,943 | \$175,323 | Yes | Yes | Yes |
| Elk River SLF | TF | \$4,306,129 | \$2,559,808 | \$846,214 | Yes | Yes | Yes |
| Fergus Falls SLF | DTF | \$1,858,055 | \$1,042,659 | \$167,438 | Yes | Yes | No |
| Superior FCR LF (Yonak) 8/97 | SB | \$2,657,820 | \$2,657,820 | \$1,314,700 | Yes | Yes | Yes |
| Greater Morrison SLF | DTF | \$3,284,344 | \$1,930,339 | \$191,635 | Yes | Yes | Yes |
| Goodhue Co. SLF (Red Wing SLF) | LC | \$2,628,070 | \$2,200,000 | 0 | Yes | No | No |
| Kandiyohi Co. SLF | DTF | \$3,392,607 | \$2,306,323 | \$427,194 | Yes | Yes | No |
| Lyon Co. SLF | DTF | \$3,184,005 | \$1,664,211 | \$240,122 | Yes | Yes | Yes |
| Mar-Kit SLF | TF | \$1,942,961 | \$609,921 | \$33,561 | Yes | Yes | Yes |
| Northeast Otter Tail Sanitary Landfill | DTF | \$1,766,419 | \$710,635 | \$211,362 | Yes | Yes | Yes |
| Spruce Ridge (McLeod Co) SLF | TF | \$5,515,636 | \$2,195,472 | \$184,584 | Yes | Yes | Yes |
| Nobles Co. SLF | TF | \$1,117,442 | \$493,619 | \$93,488 | Yes | Yes | Yes |
| -Nobles (County) | DTF | | \$75,581 | \$33,362 | | | |
| Olmsted Co. - Kalmar SLF | DTF | \$3,774,893 | \$2,137,355 | \$260,323 | Yes | Yes | Yes |
| Pine Bend SLF | LC | \$11,055,996 | \$9,656,945 | \$1,036,185 | Yes | Yes | Yes |
| Polk Co. SLF | DTF | \$1,858,148 | \$504,524 | \$99,539 | Yes | Yes | No |
| Ponderosa of Blue Earth Co. SLF | TF | \$2,076,957 | \$820,751 | \$55,712 | Yes | Yes | Yes |
| Renville Co. SLF | DTF | \$1,663,798 | \$1,446,393 | \$131,332 | Yes | Yes | No |
| Rice Co. SLF | DTF | \$2,038,483 | \$704,159 | \$100,709 | Yes | Yes | No |
| St. Louis County Regional LF | DTF | \$3,101,776 | \$870,217 | \$282,614 | Yes | Yes | No |
| Steele Co. SLF | DTF | \$2,373,318 | \$956,062 | \$172,360 | Yes | Yes | Yes |
| Winona SLF | DTF | \$2,862,317 | \$2,846,345 | \$279,557 | Yes | Yes | No |
| (Winona - Cont.) | BA | \$2,373,971 | \$656,501 | \$116,189 | Yes | Yes | No |
| WLSSD SLF (old MSW [SW-232] included) | DTF | \$6,306,457 | \$3,125,839 | \$789,813 | Yes | Yes | No |
| MSW Landfill Totals | | \$94,434,491 | \$51,542,214 | \$8,293,518 | | | |

DTF - Dedicated long-term Care Trust Fund
TF - Trust Fund
LC - Letter of Credit

BA - Bonding Authority (includes a 5% payment into a DTF)
SB - Surety Bond Guaranteeing Payment

① Note: as to "Are Cost Estimates Adequate?" criteria, the evaluations listed are tentative, pending evaluation of whether the cost estimates have been made on the basis of third-party vendors rather than the owner/operator's own crews and to assure that closure estimates are not understated based upon direct experience by the MPCA under the Closed Landfill Program.



Table 2. 1996 MMSW Landfill Financial Assurance Mechanism Summary by Ownership Category

| Mechanism Type | No. of Mechanism Types | Total Obligation | Mechanism Value (12/31/96) | Annual Change |
|-------------------|------------------------|---------------------|----------------------------|--------------------|
| BA (public only) | 1 | \$2,373,971 | \$656,501 | \$116,189 |
| DTF (public only) | 20 | \$50,972,645 | \$25,479,435 | \$4,162,861 |
| LC | 2 | \$13,684,066 | \$11,856,945 | \$1,036,185 |
| Public | 1 | \$2,628,070 | \$2,200,000 | 0 |
| Private | 1 | \$11,055,996 | \$9,656,945 | \$1,036,185 |
| TF | 7 | \$24,745,989 | \$10,894,512 | \$1,663,584 |
| Public | 2 | \$5,992,114 | \$1,738,864 | \$208,884 |
| Private | 5 | \$18,753,875 | \$9,155,648 | \$1,454,700 |
| SB | 1 | \$2,657,820 | \$2,657,820 | \$1,314,700 |
| Total | 31^① | \$94,434,491 | \$51,545,214 | \$8,293,518 |

DTF - Dedicated Long-term Care Trust Fund
TF - Trust Fund
LC - Letter of Credit

BA - Bonding Authority (includes a 5% payment into a DTF)
SB - Surety Bond Guaranteeing Payment
① 2 facilities use more than one mechanism type.

owned by the same company. (The most profitable of all landfills, if large amounts of waste are available, are the so-called "megafills" that achieve low unit costs through economies of scale. Harnessing sufficient waste to gain those economies of scale is one reason why hauling companies buy up other haulers.) In that respect, the end of trust-fund usage for financial assurance means that to the extent state and local governments want landfill firms to maintain their old landfills in good order, those governments will be dependent upon the continued health of a waste industry that is built on profitable landfilling at facilities that are still open.

The MPCA staff, would not be so concerned if MMSW landfills were operated by broad-based companies whose chief revenue was from business activities in some sector of the economy other than waste disposal. But the trend among today's large waste companies is to concentrate even more upon waste hauling and landfilling than they have in the past, by divesting other operations such as

incineration, recycling and hazardous-waste disposal, which are not showing the same profits or have been losing money. In short, the move away from trust funds has the effect of tying the state financially to the continued success of MMSW landfilling.

In addition to the concerns noted above, another lesson that the MPCA has learned in implementing the CLP is that facility owners who used standby letter of credit to guarantee coverage of their financial assurance obligations were not able

to provide the full amount of money to cover postclosure-care and contingency-action costs following closure work. Their plan appears to have been to fund postclosure-care and contingency-action costs out of operating revenues from other business operations. This approach only works when the business is diversified enough to have alternative sources of income to draw upon 30 years down the road. This lack of funding should not occur for facility owners using surety bonds because state rules require that the facility owner fully fund the standby trust in an amount equal to the sum of the bond before beginning closure actions at the facility. However, the MPCA staff is concerned that this requirement may result in a continuous delay in the final closure date in order to avoid having to fund the trust fully. Again, if facility owners using the bond option do not dedicate funds for financial assurance costs, they may not be able to guarantee coverage of conventional financial assurance costs. In response to the trend of private facility owners to replace existing trust funds with letters of credit and



as a result of the CLP experience with facility owners who used letters of credit, the MPCA plans to contact facility owners with third-party guarantees and ask for information on how they plan to pay for financial assurance costs after their facility closes.

Financial assurance obligation and annual change

At the end of 1996, MMSW landfill owners had satisfied 55 percent of their total financial assurance obligations of \$94.4 million. Full coverage of financial assurance costs would not be expected because the majority of facility owners are using trust funds, which are not fully funded until facility closure. During 1996, financial assurance contributions for these facilities increased by \$8.3 million. Facility owners using trust funds and dedicated long-term care trust funds contributed \$5.8 million toward meeting their financial assurance obligation, of which \$1.7 million was interest earnings. Trust fund owners also reported reimbursement of \$1.3 million in trust fund reserves.

Are cost estimates adequate?

In 1996 all but one facility was determined to have approved cost estimates based upon historical staff review of cost information. However, in reviewing some facilities' cost information, the MPCA staff has found some closure-cost estimates considerably less than the lower-end, \$30,000 per acre cost estimate experienced by a facility with all existing soils available on site. In some instances, the difference may be explained by the fact that the facility-closure estimate is based on first-party, rather than third-party costs, which do not reflect the true cost of performing site work. For example, a first-party closure-cost estimate may assume no cost for cover materials since all soils are available on site, or they may not include equipment costs because they are using the county transportation department's bulldozer. In light of direct cost information gained through the CLP, the MPCA staff intends to re-evaluate 1997 closure cost

estimates which are lower than \$50,000 per acre to assure that the estimates are not underestimated or based upon first-party costs.

With respect to the future, the MPCA would like to note that the federal government's recent agreement to limit greenhouse gas emissions may have a significant impact on the number of facilities required to install active-gas collection systems. A requirement of this nature would involve upfront capital costs as well as long-term monitoring and maintenance costs for up to 40 years after the postclosure-care period based upon MPCA staff assumptions.

Are mechanism values adequate?

With two noted exceptions, MMSW landfills were determined to have either paid an adequate amount into their trust fund or to have increased the value of their third-party guarantee to cover inflationary and other increases in cost estimates. The Clay County facility was noted as non-compliant because they used the present-value cost estimate to calculate their trust fund payment, but did not apply interest earnings to their fund. Once this error was brought to the facility's attention, they quickly remedied the situation ensuring that all future interest earnings will be applied to the principal of their fund. The MPCA just discovered that although the Red Wing Sanitary Landfill owners reported in their Annual Report that they had increased their letter of credit, they did not officially increase the value of the letter of credit with the bank. In addition, the County never established a standby trust fund in accordance with rule requirements. The MPCA is working with Goodhue County to resolve this oversight immediately.

Was reporting adequate?

In 1996, all MMSW landfill owners met the Annual Report information requirement, which is the main financial assurance reporting requirement. In addition, facility owners using letters of credit and trust funds through an independent bank provided mechanism value information. The only



compliance problem was that roughly half of municipally owned facilities using the dedicated long-term care trust fund option failed to provide a letter from the trustee confirming the account balance at the end of the year with attached financial statements showing account transactions by March 31, 1997. As stated earlier in this chapter, this condition was implemented about four years ago as a solution to the fact that state-audited reports for a county are not available until much later than the March 31 date required in the rules. The MPCA has since discovered that many of the municipal trustees were unaware of this interim solution and is working with facility owners to clarify this condition so that future compliance discrepancies may be avoided.

In closing, the MPCA staff does wish to note that since the effective date of EPA Subtitle D financial assurance requirements in April 1997, the MPCA has received renewed pressure from facility owners to allow additional means of financial assurance that are acceptable under Subtitle D rules but that are not currently considered adequate under MPCA rules. The MPCA is concerned that facility owners will pressure the Legislature to amend laws or require amendment of state rules to allow less protective financial assurance mechanisms. **It is the MPCA's belief that the Subtitle D financial assurance mechanisms will not adequately guarantee coverage of financial assurance responsibilities.** A number of the mechanisms do not amount to much more than a promise on the part of the facility owner to pay the costs when they come due. The MPCA staff believes that those who benefit from the cost of waste disposal service should be the ones who pay the "full costs" for that service. The MPCA staff has expressed these concerns to the EPA in comments on the federal regulations, without visible effect. Nonetheless, the MPCA believes its concerns are justified and will work with other states to explore this subject.



Chapter IV. Estimating Perpetual-Care Costs

A. Assumptions Used in Calculating Costs for Perpetual-Care Period

The MPCA staff expects the following categories of activities to be ongoing after the 30-year postclosure-care period: a) routine monitoring and maintenance costs, b) operation and maintenance costs, c) gas monitoring and maintenance costs, d) leachate management costs at portions of landfills that are lined and have leachate-collection systems, and e) contingency-action costs.

Of necessity, the cost estimates are based upon many interlocking predictions about costs and performance of landfill systems. Some factors, such as cover and liner performance over very long time periods, will have a profound effect on what the costs actually turn out to be. Readers may regard some of the following assumptions as overly optimistic and others as overly pessimistic, and this will bear on the credence they give these projections.

Ground-water monitoring and maintenance costs

It was assumed that the ground-water monitoring system at each type of landfill would be reduced to a sampling network of six monitoring wells during the perpetual-care period. The six monitoring wells would be sampled once per year into perpetuity. The ground-water monitoring wells were assumed to need maintenance or redevelopment once every 10 years at each type of landfill.

The Minnesota Department of Health's annual fee to maintain licensing of ground-water monitoring wells was included in the cost estimates, but only for privately owned facilities because this is how the fee is administered today.

Operation and maintenance costs

The operation and maintenance activities for each type of landfill were assumed to include mowing and minor erosion repair of the final cover systems. General site maintenance costs were also considered and include maintenance of on-site structures, fencing, and roads, as well as maintaining control of weeds and brush. These operation and maintenance costs were considered to continue into perpetuity. One facility owner pointed out that while the average facility may perform these activities once per year, others may only need to perform them once every two to five years.

Gas monitoring and maintenance

Both unlined and lined portions of MMSW landfills can have either an active gas-extraction system or a passive gas-extraction system. The monitoring costs for a passive-gas extraction system were considered in the routine monitoring and maintenance section of the MMSW landfill matrix.

The gas monitoring and maintenance section of the lined MMSW matrix includes the cost items for operation and maintenance of an active-gas extraction system. It was assumed that active-gas extraction systems would be operating at all unlined and lined MMSW landfills that have a design capacity greater than or equal to 2.5 million megagrams as regulated under Minn. R. pt. 7011.3500 through Minn. R. 7011.3505. The cost estimates also take into account the fact that some landfills have active-gas extraction even though their ultimate capacity is below 2.5 million megagrams, because of site specific conditions such as the use of gas systems to prevent ground-water contamination.

After lengthy discussion on this topic, MPCA staff chose to assume that where landfills have an active gas-extraction system running during the years that



the site is accepting waste, there is a 50 percent chance that the active system will run 10 years into the perpetual-care period, which would mean 40 years following closure. This also means that for landfills with active-gas systems there is an equal chance that the active-gas system will have been shut down before the start of the perpetual-care period, because gas production would have dropped too low. MPCA staff regard this assumption as a compromise between those who believe that no active-gas systems will be running 30 years after closure, and those who believe that they will be operating 50 years after closure, principally as a cleanup measure.

This report has not assumed changes to existing laws and rules, however, the environmental field is subject to rapid regulatory shifts. If changes to state or federal law would require additional open landfills to install active-gas collection systems as a means of reducing air pollution and greenhouse-gas effects, once this new threshold is set, cost estimates in this report will need to be updated. While much of the costs of active-gas collection would be incurred prior to the perpetual-care period, it would create changes that would ripple through several cost categories for perpetual care.

Leachate management

The MPCA staff believes that today's landfills will collect water on the liner into the indefinite future, because liners tend to be less permeable than covers and this results in a percentage of all precipitation that falls in the area accumulating on the liner. The MPCA estimates that on average, even a well-maintained landfill cover allows 10,000 gallons per acre per year through the barrier. This is because covers are more exposed to climatic stresses than are liners, and being built on top of waste that undergoes some settlement (due to weight compaction over time, and degradation of a portion of the organic fraction), they do not have as solid a foundation as do the liners.

Originally MPCA staff had projected 7,000 gallons per acre per year, but upon inspecting landfill leachate management reports and factoring in the tendency of settlement to increase the permeability of the cover, staff revised the number upward. It was assumed that leachate treatment (either by on-site management or at a water treatment plant) continues for 80 years following closure, and at that point it is assumed that the leachate is clean enough to pump out and handle like any other water coming off an artificial structure and a considerably lower cost per gallon (eight cents per gallon for treatment, one-half cent for pumpout and discharge). This assumption may be overly optimistic, because some staff believe that it will always be necessary to provide some form of leachate treatment under existing water-quality rules. Pumpout needs to continue because good engineering practice would not allow the caretaker of the closed landfill to shut off the leachate collection system and permit the lower reaches of the landfill to flood, so therefore water must continue to be removed off the liner indefinitely into the future. The MPCA staff will develop more information in the future as to the costs of leachate treatment and the most likely disposal methods for "clean leachate."

The costs to maintain leachate equipment and to sample and analyze leachate were also included in the matrices.

Contingency action

Contingency-action costs include costs to address events that are above and beyond routine operation and maintenance which could possibly endanger human health and the environment during the operating life and throughout the postclosure or perpetual-care period. The nature of contingency-action events is that their probability of occurrence is not well known and the amount of money needed to address a given contingency is usually fairly substantial. When faced with this circumstance in the financial assurance rules, the decision was to



provide for the normal probability of occurrence for most of the contingency events. This translates into providing between 50 and 60 percent coverage of the costs to address all possible contingency events for a facility. Contingency-action costs include measures such as ground-water pump-and-treat systems, the installation of active-gas extraction systems at landfills that do not have them now, and repair of major erosion damage.

The contingency-action estimates assume no change in the current approach to landfilling, which calls for "dry-tombing" of waste. This method contrasts with strong interest in the landfilling industry to use wet-cell technology, which intends to keep the waste mass moist at the outset and thereby accelerate degradation, methane production and also settlement of the waste mass. While the MPCA does not allow this as a routine approach, the MPCA does allow it on a limited, test basis. If the MPCA were to accept this as routine practice, a number of costs would need revision at landfills using this design.

All MPCA estimates assume that future rules and statutes will impose no stricter environmental standards than today. Throughout this discussion, MPCA staff and the Workgroup agreed that information would improve in the coming years and that the estimated costs and probabilities should be adjusted accordingly.

The matrices include a list of possible contingency occurrences that the technical team and Workgroup discussed as foreseeable. Upon further discussion of the time duration and probability of occurrence of each contingency event, the Workgroup determined that some events would not occur at all during the perpetual-care period, thus the Workgroup assigned these events an occurrence of "none." The Workgroup decided that these events should be left in the matrices, labeled as such, for the purpose of indicating that they were considered in the discussions.

MPCA staff decided to provide for the normal probability of occurrence for most of the contingency events. This translates into providing between 50 and 60 percent coverage of the costs to address all possible contingency events for a facility. Since the perpetual-care situation is similar, the technical team suggested providing assurance for 50% of most of a facility's contingency-action cost items. Some Workgroup members felt that a reduced level of probability such as 15% would be more reasonable. One member suggested that the probability of occurrence of an event should be based upon the technical design and in situ characteristics of each facility. It was decided that normal probability would be used for all contingency-action events except for one: detection of ground water contamination.

MPCA staff assumed that for the most expensive low-site-confidence contingent events, they would have less than 100% probability of occurring at any given landfill, with the estimated probability depending on facility type; if it happened at all it would occur only during the first 20 years of perpetual care and would never happen again after that.

The MPCA did not assume the need to replace the entire cover at any point, but did factor in the possibility of a three-acre cover augmentation (removal of old cover material and installation of a replacement cover). Three acres at each landfill is a small percentage of the total acreage, and the MPCA staff realizes that the assumption that most cover acreage will never need replacement may need more discussion.

MPCA staff decided that for the contingency-action event "detection of ground water contamination" (along with hazardous migration of landfill gas, the most expensive of any landfill contingency encountered to date), it was appropriate to consider all possible remedial action events, and to assign those actions to the facility types most likely to need that action. For example, a landfill that has no



active-gas collection system during its operating life, and later experiences a ground-water contamination problem due to volatile organic chemicals, is a candidate for a retrofitted active-gas collection system, but a landfill that has had active gas collection running for decades is unlikely to be a good prospect for reactivating the active gas system after it has been shifted to passive status, because of the cleansing effect the original active-gas system had upon the waste.

When making cost estimates for old unlined landfills in the Closed Landfill Program, MPCA staff project pursuing an escalating series of remedies to prevent or remedy ground-water contamination, namely high-quality cover first, followed by active-gas extraction and then ground-water pumpout if necessary.

MPCA staff did not include the costs of augmenting old covers on unlined landfill areas that are included within the permitted area of the open landfills. Such costs can range from \$30,000 per acre to \$70,000.

Estimating the costs of remedying ground-water contamination was one item for which MPCA staff regarded the Workgroup discussion as incomplete and proceeded to add more factors and variations, and also used some cost figures based on recent findings in the Closed Landfill Program. The numbers used by MPCA staff for ground-water contamination contingency costs are as follows:

a. **Landfill having some unlined acreage, and with no active-gas collection during the operating life:**

20% probability of having to install ground-water pumpout system, at a total installation and operation cost of \$3,000,000.

60% probability of having to augment the cover, at a cost of \$200,000.

30% probability of having to install an active-gas system, at a cost of \$1.5 million.*

b. **Landfill having some unlined acreage, and with active-gas collection:**

60% probability of having to augment the cover, at a cost of \$200,000.

c. **Landfill with all-lined acreage, without active-gas collection during the operating life:**

50% probability of having to augment the cover, at a cost of \$200,000.

20% probability of having to install an active-gas system, at a cost of \$1.5 million.*

d. **Landfill with all-lined acreage, and having active-gas collection in place during the operating life:**

50% probability of having to augment the cover at a cost of \$200,000.

***Note:** This cost assumes an operating life for the active-gas collection system of less than 20 years and does not incorporate related contingency expenses connected to active-gas collection, such as the greater risk of subsurface fires.

After comments from a stakeholder during review of cost estimates following the Workgroup meeting schedule, MPCA staff also factored in a lower probability of the ground-water-contamination event at landfills that offer extra protection (deep in-situ clay under the liner, and liners with extra barrier thickness or an extra liner). Each of these has the effect of lowering the probability by half at such a landfill. MPCA staff and the Workgroup discussed that at any specific landfill, cost estimates should be based on applying unit costs and best-estimate probabilities against actual site-specific conditions.

These estimates do not take into account all possible interactions between remedies, which can make cost projections difficult. For example, the decision to put a state-of-the-art, impermeable cover over an old, unlined cell will prevent methane from diffusing through the old cover. Instead methane will emerge out of vents atop the landfill, or out the



sides by traveling through porous soil, gravel or sand above the water table. If there are houses or occupied structures nearby, the improved cover may require extra precautions to protect human safety, such as active-gas extraction. Active-gas extraction brings a higher probability of a subsurface fire than a passive gas-management system (20% compared to 10%, in MPCA assumptions) and so can increase other contingency cost estimates.

B. High and Low Site Confidence Considerations

In identifying perpetual-care costs, the MPCA technical staff and the Workgroup characterized each cost based upon its timing or duration, probability of occurrence, and amount of money needed to address the cost. In discussing each cost, staff and the Workgroup decided to rate the level of site-specific confidence they had with respect to a cost item so as to identify where better information is needed. In addition, MPCA staff felt that this would be a worthwhile distinction because a different funding option might be appropriate based on the cost type.

Therefore, perpetual-care costs are subdivided into two categories; 1) costs the MPCA and Workgroup felt had a high degree of confidence as to the duration, timing, and amounts attributable to a specific facility and 2) costs which had a medium or low degree of confidence as to either their duration, timing or amount at a specific landfill site. The MPCA has placed any costs that did not rank high in each of the categories in the low site confidence category. Please see Appendix D for cost item confidence ratings in matrix format. "Low site confidence" does not mean that the MPCA believes the cost is unlikely to occur, rather that it is difficult to assign such a specific cost to any given facility with certainty because of unpredictable, site-specific factors. A low site confidence cost will probably not occur at every landfill.

Facility-specific high site confidence perpetual-care cost estimates

The following table shows the results of estimates for high site confidence costs, for each Minnesota MMSW landfill. It does not list low site confidence costs, which are mostly the costs of corrective action and the costs of active-gas collection, which can be estimated across a large population but are difficult to assign to specific sites. Instead, the low site confidence costs are summed separately, for all landfills. The first columns summarize certain key information used by the MPCA staff (acreage of expected landfill that is lined and unlined, acreage expected to have active-gas collection at year 30, and years of remaining operating life. As discussed above, these projected acreages may be different than current permitted acreages.



Table 3. Facility Specific Perpetual Care High Site-Confidence Cost Estimates

| Facility | Facility Acres lined at closure | Facility Acres unlined at closure | No. of acres with active gas, yr 30 | Years of operating life from 12/97 | Annual High Confidence Costs, 30 - 49 | Annual High Confidence Costs, 50 - 79 | Annual High Confidence Costs, 80 - perp. |
|---------------------------------|---------------------------------|-----------------------------------|-------------------------------------|------------------------------------|---------------------------------------|---------------------------------------|--|
| Brown Co. SLF | 27 | 17 | 0 | 40 | \$37,874 | \$37,874 | \$10,624 |
| Burnsville SLF | 65.1 | 78.8 | 80 | 15 | \$82,280 | \$82,080 | \$26,095 |
| Clay Co. SLF | 15 | 40 | 0 | 7.33 | \$29,715 | \$29,715 | \$11,465 |
| Cook Co. SLF | 9 | 0 | 0 | 12.9 | \$18,889 | \$18,889 | \$5,139 |
| Cottonwood Co. SLF | 18 | 16.4 | 0 | 20 | \$29,416 | \$29,416 | \$8,916 |
| Crow Wing (new) | 15 | 0 | 15 | 8 | \$24,475 | \$24,475 | \$6,225 |
| Crow Wing SLF (old) | 0 | 26 | 26 | 0 | \$13,916 | \$13,916 | \$6,916 |
| East Central SLF | 23.1 | 13 | 36 | 10.3 | \$33,719 | \$33,719 | \$9,394 |
| Elk River SLF | 65.5 | 22.5 | 80 | 6 | \$75,038 | \$74,838 | \$18,553 |
| Fergus Falls | 0 | 21 | 0 | 0 | \$13,261 | \$13,261 | \$6,261 |
| Forest City Road (Yonak) | 56.5 | 28 | 81 | 11 | \$67,380 | \$67,180 | \$17,645 |
| Goodhue/Red Wing | 0 | 29.1 | 0 | 0 | \$14,322 | \$14,322 | \$7,322 |
| Greater Morrison SLF | 14.1 | 28 | 0 | 22 | \$27,305 | \$27,305 | \$9,730 |
| Kandiyohi Co. SLF | 9 | 28 | 0 | 21 | \$22,557 | \$22,557 | \$8,807 |
| Lyon Co. SLF | 18.3 | 18.9 | 0 | 11.25 | \$30,023 | \$30,023 | \$9,298 |
| Mar-Kit SLF | 25 | 17 | 0 | 15 | \$36,012 | \$36,012 | \$10,262 |
| Nobles Co. SLF | 6 | 32 | 0 | 4 | \$20,888 | \$20,688 | \$9,028 |
| Northeast Otter Tail | 0 | 8 | 0 | 10 | \$11,558 | \$11,558 | \$4,558 |
| Olmsted Co. - Kalmar SLF | 22 | 0 | 0 | 68.92 | \$30,992 | \$30,992 | \$7,492 |
| Pine Bend SLF | 65 | 111 | 176 | 15.83 | \$86,726 | \$86,526 | \$30,616 |
| Polk Co. SLF | 12 | 49 | 0 | 31 | \$28,101 | \$28,101 | \$12,101 |
| Ponderosa of Blue Earth Co. SLF | 12 | 27 | 0 | 27.17 | \$25,219 | \$25,219 | \$9,219 |
| Renville Co. SLF | 15 | 25 | 0 | 33 | \$27,750 | \$27,750 | \$9,500 |
| Rice Co. SLF | 25.9 | 48 | 100 | 31.67 | \$40,911 | \$40,911 | \$14,486 |
| Spruce Ridge SLF (McLeod) | 40 | 55 | 60 | 20.58 | \$55,555 | \$55,355 | \$18,195 |
| St. Louis County Regional LF | 29 | 0 | 29 | 15.42 | \$37,509 | \$37,509 | \$8,759 |
| Steele Co. SLF | 16.5 | 34 | 0 | 5 | \$30,326 | \$30,326 | \$10,951 |
| Winona SLF | 4.8 | 30.2 | 0 | 3.58 | \$18,935 | \$18,935 | \$8,335 |
| WLSSD SLF | 0 | 65 | 0 | 0 | \$19,025 | \$19,025 | \$12,025 |
| TOTALS | 609 | 868 | 683 | | \$989,677 | \$988,477 | \$327,917 |

Facility Specific low-site-confidence costs

The MPCA staff estimated low-site-confidence costs per year. The first 20 years of perpetual care are estimated to be a total of \$1.367 million per year for all facilities. The annual estimate for total costs drops to \$6,960 per year in the following years of perpetual care. This significant drop is due to the

prediction by the MPCA staff and Workgroup members that expensive contingent events such as leachate-system plugging or subsurface fires, if they occur, will occur during the first two decades of perpetual care. The report sets out the low-site-confidence estimates as an aggregate figure because it is not possible to know which facilities of the total population will incur these costs.



Table 4. Total Perpetual Care Summary

| Total Perpetual Care Costs | | | | |
|--|--------------|--------------|--------------------|---------------------|
| MSW Landfill | Years 30-49 | Years 50-79 | Year 80 - infinity | Total Costs |
| Current Cost 1 and 2 | \$47,146,780 | \$29,863,110 | | \$77,009,890 |
| Annual Inflated Cost | \$6,129,081 | \$3,922,022 | \$2,461,346 | \$12,512,449 |
| Future Value Cost | \$92,545,849 | \$78,484,304 | \$86,667,111 | \$257,697,264 |
| Present Value Cost | \$9,813,982 | \$3,135,609 | \$801,064 | \$13,750,655 |
| Amount Needed at Closure (in 16 years) | \$21,422,650 | \$6,842,572 | \$1,748,731 | \$30,013,953 |

1. Note: Total Current Cost estimate does not include a value for costs after year 80 because assumption is based on using interest earnings and there is currently no interest earnings.
2. Note: Current Value Estimates do not include inflationary component.

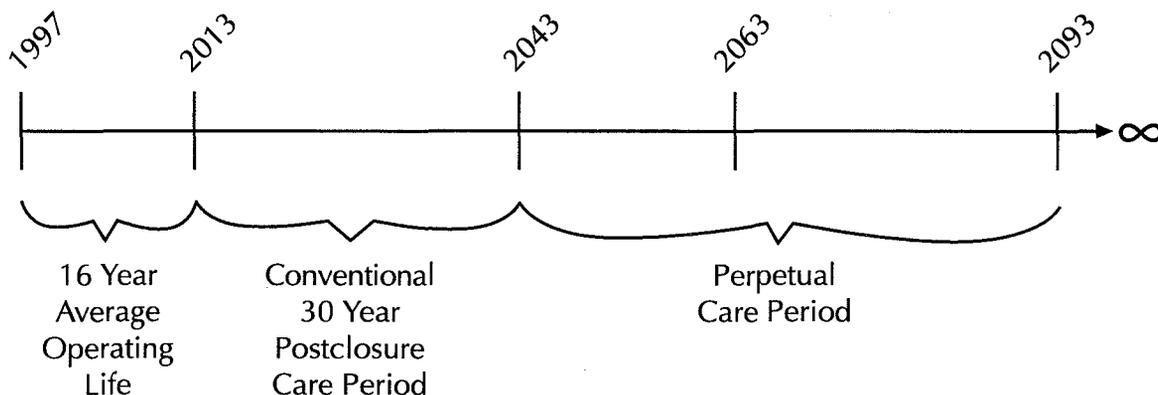
C. Evaluation of perpetual-care costs

Costs listed in Table 3 are in current dollars, unadjusted for inflation. See Appendix E for formulas used to calculate perpetual-care costs. Principal lessons to be drawn from this exercise include:

- Beginning in year 2043, estimated perpetual-care costs would be \$6.13 million. This amount was estimated to increase by a 2.10 percent inflationary rate over the next 20 years of perpetual care. The MPCA staff and the Workgroup agreed that operation and maintenance costs will step down in time. The most pronounced drop in costs

comes from shutting off active-gas collection systems, which are assumed to have only a 50 percent probability of running 10 years beyond the end of the conventional postclosure-care period. Therefore, beginning in year 2063, estimated perpetual-care costs would be \$3.92 million. This amount is also estimated to increase at a 2.10 percent inflation rate over the next 30 years of perpetual care. After 2093, leachate handling is assumed to shift from treatment to simple disposal, so there is another drop in the estimated annual perpetual-care costs to \$2.46 million. This amount is assumed to occur indefinitely;

Figure 2. Timeline of Landfill Care Periods





- When examining annual costs during the early years of postclosure care, a ground-water pumpout system is the most expensive single item at MMSW landfills outside of certain contingent events;
- When considered in aggregate over long periods, however, the highest-cost item at lined MMSW landfills is leachate management. MPCA staff is of the opinion that given today's technology, even a well-maintained closed landfill will see infiltration of 10,000 gallons per acre per year during the perpetual-care period. (If the cover is not maintained, the infiltration rate can go up significantly.) This means that landfills will continue to incur leachate-pumping costs as long as the landfill remains in place and the liner is able to hold water;
- There are points at which, for any given landfill, perpetual-care costs will step down significantly: active-gas collection will be shut off, and leachate will no longer need to be treated but rather only pumped out of the bottom of the landfill.
- For lined landfills, the bulk of costs go for maintenance of the containment systems, trapping leachate for management and directing gas out of waste and either into the air or to a combustion system. For landfills with unlined acreage, the bulk of annual expenses goes into a fund to pay for contingency events. Unlined landfill cells tend to have low annual costs until (if and when) a significant problem is detected, when the only options might be expensive ones. The only routine annual cost that is higher for unlined landfill areas than lined landfill areas is extra monitoring.



Chapter V. Criteria for Evaluating Funding Options

To evaluate the funding proposals in an objective manner, MPCA staff and the Workgroup borrowed from EPA Subtitle D financial assurance mechanism performance criteria and MPCA financial assurance mechanism standards to create a list of criteria critical in determining whether a funding option would be viable for addressing perpetual-care costs. The list of funding proposal evaluation criteria are:

Adequacy

The funding option must ensure that adequate funds will be available to cover perpetual-care costs when needed.

Timeliness

The funding option must ensure that funds will be available in a timely fashion when needed.

Security

The funding option must guarantee the availability of coverage to pay for perpetual care. The following items must be satisfied to meet the "security" criteria:

1. The funding option must be protected from improper expenditures, bankruptcies declared by either the permittee or a financial intermediary, and poor financial management;
2. This standard does not require the elimination of risks. Risk is present throughout the solid waste management system and industry in general. There is a minimum risk level that public policy changes cannot eliminate. Application of the security criterion must take into account acceptable levels of risk. Evaluators should

bear in mind that incentive structures can add to security if they encourage prudent risk management;

3. There must be periodic reporting of the amount of funds either reserved or guaranteed. Further, intermediaries or trustees must be required to notify the agency if a guarantee is about to lapse or a trust fund payment is not made. Security is compromised if coverage lapses;
4. The funding option must be legally valid, binding and enforceable under State and Federal law;
5. There must be a demonstration that any chosen intermediaries are qualified to perform the required services. These qualifications must be verified on a regular basis. Current procedures achieve this by:
 - a) relying on other regulatory agencies to review the performance of potential intermediaries and
 - b) relying on independent accountants to assess the value of financial reports;
6. There must be explicit statements of all the rights and responsibilities of all parties involved in financial agreements; and
7. Authority for decisions must be clear and limited to single parties. Sharing of authority invites conflict and delay, which will only add to costs without solving problems.

Affordability

The viability of a funding option is also a function of whether the source paying for perpetual care can afford to pay these costs. To some extent affordability is a relative term. What may be affordable to one source, may not be affordable to



another source. This criteria does not consider whether a source is willing to pay for the financial option. There is a great degree of difference between these two circumstances; however, in the past, some facility owners used the argument regarding ability to pay in situations where they were unwilling to pay for financial assurance costs.

Fairness

Most people have subjective feelings with respect to fairness. However, subjective feelings will not aid the evaluation of perpetual-care funding proposals. For the purpose of this report, "fairness" is a function of the correlation between who pays and who benefits from perpetual care. The closer the correlation between who pays for perpetual care and who benefits from perpetual care, the more "fair" the proposal. In this case, the proposal that imposes perpetual-care costs on waste generators that use landfills as their waste-management method would be considered more fair than an option that imposes costs for perpetual care on all waste generators without regard to how much they use landfilling for their primary means of disposal.

This criteria recognizes that it is more equitable, and better for society in the long run, to have the price for landfilling reflect its "true" costs. Some facility owners expressed a different notion of fairness. In their opinion, because everyone generates waste and all waste management methods rely on some level of landfilling, everyone should pay for perpetual care. If you embrace facility owners' notion of fairness, the apparent price of landfilling would be understated. In this event, the tendency is for people to over-utilize this option relative to other options for which prices reflect true costs; this is an inherent disadvantage to subsidies, though not always a fatal flaw where some valid social purpose is served. For example, libraries are subsidized to the extent that the actual users do not pay for the amount of service they use, but this is considered generally as a valid subsidy because it contributes to

an educated citizenry.

The MPCA staff has noted that sometimes the fairness issue is raised when the real issue is one of economic disadvantage, which is included within the affordability criteria. As an example, some landfill owners have stated that it would not be fair to impose the perpetual-care costs on Minnesota landfill owners because that will create an uneven playing field with other states. This issue is not really questioning the fairness of imposing the costs on the facility owner, but one of economic disadvantage that may be created by imposing an additional requirement on state landfills. The MPCA staff recognize that the issue of affordability is important and would address these types of concerns under that criteria.

As previously mentioned, in estimating perpetual-care costs, the MPCA staff and the Workgroup identified two different cost types: costs which participants felt had a high degree of confidence in their probability of occurrence, duration and cost to address, and those that had a medium or low degree of confidence in the above cost characteristics. In evaluating the various funding proposals, the MPCA and Workgroup members came to the conclusion that the nature of these two cost categories, "high site-confidence" and "low site-confidence" costs, may require different funding proposals in order to best satisfy fairness considerations. MPCA staff believe that costs with a high degree of confidence should be addressed in a manner that correlates the cost as close to the source as possible. Workgroup members from the landfill industry were concerned that this decision would increase their costs to the point that they may not be able to operate economically, particularly given low-cost competition from landfills in states with minimal requirements. MPCA staff regards the extension of high site-confidence costs to each landfill as a natural extension of their current responsibilities; discussion of the details of these costs can and should continue.



Both MPCA staff and Workgroup members were in agreement that, if policy is pursued in this area, payment of costs having a low degree of site-specific confidence would be administered best with the use of a statewide risk pool. This avoids the difficulty inherent in conventional financial assurance, which isolates each facility's funds from all others. In today's system, with the passage of time, some facilities will end up with surpluses and others with deficits, even though the total amount available might match the total need precisely. A risk pool can spread uncertainties across a large body of landfills, in the same way that automobile insurance prevents each car owner from having to save up enough money to pay for the total amount of accidental death liability that each driver could undergo. The money each car owner pays into the risk pool is based on the estimated accident risk based on such factors as the background of the driver, the car type and the miles to be driven.



Chapter VI. Perpetual Care Funding Options

As part of a brainstorming session, the Workgroup initially identified 19 funding proposals to cover perpetual-care costs. See Appendix C for a listing of all funding proposals from the Workgroup. Upon further discussion, the Workgroup merged some of the proposals and set aside others as not viable, leaving MPCA staff with six proposals for more detailed evaluation in this report. One of those proposals included addressing perpetual-care costs through expansion of the Closed Landfill Program, which anticipated the legislative report request on this subject. In the course of evaluating the CLP option, the MPCA staff identified three likely scenarios, or sub-options, under which that program could be changed to fund perpetual-care costs at open MMSW landfills. For the purpose of clarity and because the CLP option includes additional legislative report discussions not required of the other funding proposals, this chapter evaluates the first five funding proposals below.

- Flat State Tax
- Extend MLCATF
- Extending the Financial Assurance Obligation
- Status Quo
- One-time General Fund Payment into Dedicated Account
- Expansion of the CLP: Three possible options

The three CLP sub-options are addressed in the following chapter.

Option 1. Flat state tax

This option would require adding a line on state tax forms that would levy a standard amount per year per person living in Minnesota households to cover

perpetual-care costs. Based upon interest earnings of 5 percent per year, an average amount of \$1,268,097 would be needed in order to achieve a fund of \$30 million in 16 years. Since the number of residents in the state is roughly 4.5 million, the per capita costs to implement this option would be less than \$0.28 annually over the next 16 years. This estimate does not take into consideration population growth expected over the next 16 years, which would further reduce the per capita costs.

Option evaluation

Strengths: This proposal brings in taxpayers that waste-based fees and taxes don't, because those people who dispose on-site by burning or burying their waste would pay also. If passed, it would build up a fund to meet perpetual-care costs. To the extent that policymakers feel that waste costs are a broad social responsibility, this option would achieve broad payment from society.

Weaknesses: The largest stumbling block to implementing this option is the political feasibility of a new tax and the administrative cost of a new tax. The Governor has firmly stated that taxes will not be increased, or created, without broad support by the taxpayers. Therefore, discussing this option appears more academic.

Although this option could be criticized as insensitive to waste generation or the waste disposal method used by the person, and therefore not rewarding those who produce little waste or recycle what they generate, the amount is so negligible that it would not affect waste-disposal behavior.

² Formula used is $A = F[i/(1+i)^n - 1]$; where $F = \$30$ million, $i = 5\%$, and $n = 16$ years. See formula in Appendix E for more detail.



Option 2. Extend MLCATF

The Metropolitan Landfill Contingency Action Trust Fund (MLCATF) established in 1984 diverts \$.50 for each cubic yard of solid waste landfilled in the Metro area to cover perpetual-care costs at metropolitan landfills. In exchange, the state is responsible for conducting monitoring and cleanup activities at metro facilities after the 30-year postclosure-care period, to the extent of funds available in the MLCATF. Like MLCATF, this option would divert \$.50 from the \$2.00 per cubic yard Greater Minnesota Landfill Cleanup Fee (GMLCF) and place it in the state pool to pay for perpetual-care costs at Greater Minnesota landfills.

The amount of the fee may be based upon the estimated costs for covering all perpetual-care costs or only high site-confidence or low site-confidence costs. Regardless, it would be reasonable to have a uniform charge for facilities located in the Metro area and Greater Minnesota. Given estimated waste capacity to dispose of 70.4 million cubic yards of MMSW (as delivered by waste haulers), the charge would have to be \$.43 per cubic yard to cover all estimated perpetual-care costs.

Option evaluation

Strengths: The current \$0.50 payment per cubic yard under MLCAFT appears adequate to cover estimated perpetual-care costs. With respect to affordability concerns, this option should not affect costs at metro landfills since they are already paying \$0.50 per cubic yard into a state pool to be used for perpetual care of metro landfills. However, it may increase costs for Greater Minnesota landfills because they would have to divert 25 percent of their GMLCF revenues from the host county to the state.

With respect to fairness considerations, revenues from the GMLCF and MLCATF are directly correlated to landfills, so at an aggregate level this method places costs of the program on the facilities that benefit from the program.

Currently, the MLCATF is already established as a dedicated account, so security issues are addressed to the extent that the statutory language remains intact.

This options encourages owner/operators to design systems for longevity and environmental protection because they know they will be paying the first 30 years of care; allows "pool approach" to paying for scattered contingency-action events that may not occur at most landfills, but rather lead to high costs at relatively few landfills.

Weaknesses: Affordability concerns have been expressed by public landfill owners and counties that receive GMLCF revenues from private facility owners that a loss of GMLCF revenues would place increased financial burdens upon them and perhaps require that they increase their facility costs or require that they reduce other solid-waste services. Even so, the MPCA believes that the amount of \$0.50 per cubic yard makes this a reasonable option for funding perpetual-care costs. More detailed economic evaluation may be needed in order to determine the financial impact of this option on the economy and facility owners.

At an individual facility level the flat rates do not correlate directly to facility benefits. For example, a facility that pays in a total of \$50,000 over its operating life may require \$200,000 in perpetual-care costs or vice versa may only require \$30,000 in perpetual-care benefit. Some facility owners are net gainers, while others are losers. However, by pooling perpetual-care costs, total overall facility contributions should be less.

Option 3. Extend financial assurance obligations

This option would extend landfill owners' current 30-year postclosure-care financial assurance funding responsibility into perpetuity or to some agreed longer time period. Postclosure-care and contingency-action cost estimates would increase to account for the new time period. While in many



respects this option does not change current landfill owners' legal liabilities, it establishes state oversight of a funding requirement for which (to the MPCA staff's knowledge) facility owners have yet to establish a funding arrangement. In fact, as discussed earlier, landfill owners have stated to MPCA staff that if problems arise after 30 years, they believe it is the public's responsibility to address them because "it is the public's waste." The attitude reflected in these statements makes it all the more critical that the state establish some arrangement in a timely fashion to meet the anticipated future costs. This option would draw on the existing framework of financial assurance and extend funding estimates into perpetuity.

The estimated total costs of this option are the same as the total costs under the above option since both options relate cost recovery directly to waste managed at MMSW landfills. However, the exception to note is that with this option, the costs would be more closely related to each individual facility and not averaged among all facilities. Given an average operating life of 16 years and current estimated remaining waste capacity of 70.4 million cubic yards as delivered by waste haulers, the average charge would be \$0.43 per cubic yard to cover all estimated perpetual-care costs. The financial impact on an individual facility can be significantly more or less, depending on the conditions at their site and their remaining capacity.

Option evaluation

Strengths: This option best satisfies fairness criteria because it directly correlates perpetual-care costs to each individual facility. By allowing landfills to charge according to the risks and costs associated with perpetual-care at that particular landfill, this option avoids the shift of money from low risk to higher risk landfills which tends to occur in a pool or flat rate option. It also avoids disagreements that could occur between operators as to the allocation of money spent from a pool, where landfill operators retain the ultimate legal responsibility.

Weaknesses: This option brings into question affordability concerns because of the "uneven playing field problem," given that landfills in other states do not have to put aside money for perpetual care. In addition, competitive pressures since the 1994 Supreme Court decision that ruled designation illegal when it restricts the interstate movement of waste has caused many municipal facilities to reduce their tip fees and to subsidize costs through other means in order to maintain waste flows to their landfills. Given the highly competitive market, many landfill owners argue that any further cost increases may jeopardize their ability to run their landfill economically. Given market pressures, the MPCA staff believes that this option may not satisfy affordability criteria.

It is difficult to estimate an individual facility's perpetual-care costs accurately because of the lack of experience or information on costs expected to occur during the perpetual-care period. In addition, because the probability of some costs varies per site, it can be expected that some sites will be under-funded and others over-funded. Because there may not be adequate reserves to address an individual facility's perpetual-care costs, this option does not appear to satisfy adequacy criteria. If the adequacy criteria is not addressed, security and timeliness criteria are also not satisfied.

Option 4. Status quo, with possibility of later legislative appropriations to fill gaps

The Status Quo option continues today's system, meaning that cash or credit is set aside at landfills for the first 30 years of expenses but nothing for costs falling thereafter. Remaining financial assurance, if any, may be available to fund costs after the postclosure-care period. Because there is no time limit on the financial liability of the owner/operator for costs at a landfill following closure, if and when additional costs are incurred the owner/operator is "first in line" to pay those costs, with other legal actions under Minnesota or federal Superfund laws as a possible outcome.



Based on an average operating life of 16 years, landfill owners would have to spend a total of \$6.13 million beginning in 2043, assuming all facilities closed in 2013. This amount is estimated to continue for 20 years and increase by an inflationary amount of 2.10 percent each year. Beginning in year 2063, the annual costs are estimated to drop down to \$3.92 million because active-gas systems are no longer expected to be in operation. This amount is also estimated to continue for 30 years and increase by a similar inflationary amount each year. Beginning in year 2093, the amount is estimated to drop to \$2.46 million and continue at an inflationary adjusted rate into perpetuity.

Option evaluation

Strengths: With respect to affordability criteria this option has the lowest financial impact on current facility owners and does not have the risk of setting aside too much money. This option is well-understood by stakeholders today. This option does not require any new legislative or MPCA effort. This option defers actions until either the state has a better understanding of perpetual-care costs or systems begin failing and a crisis develops.

Weaknesses: Facility owners, particularly those from the private sector, may not be financially viable during the time periods involved in perpetual care. Stakeholders may have incentives to use Superfund or other liability-shifting methods to raise money at this point with its attendant high legal costs. Because of these concerns, this option does not appear to satisfy conditions of adequacy, timeliness, and security. In the event perpetual-care costs are addressed through Superfund, this option may prove to be the most expensive and least affordable option. Last, because this option has the greatest possibility to place today's costs for perpetual care onto future taxpayers, this option does not satisfy fairness criteria.

Option 5. One-time general fund payment into dedicated account

After seeing the MPCA staff's estimate of funds that would be needed for perpetual care if set aside promptly and allowed to draw interest, the Perpetual Care Workgroup added this option as an alternative to new taxes or shifts in current waste fees. It assumes that the Legislature would appropriate a single lump sum into a dedicated account, \$13.8 million if appropriated in 1999, with the reasoning that the total needed would be comparatively low if the money is set aside today and allowed to gather interest for the long time spans involved before perpetual care begins (on average, 46 years from today). Some members of the Workgroup felt that this would be a legitimate purpose for a portion of the state surplus projected to occur in the next biennium.

Option evaluation

Strengths: Takes advantage of early action, which can keep out-of-pocket costs low by setting money aside to gather interest for a long period. Does not have the administrative overhead cost involved in a new fee or tax.

Because it would not require a hike in waste fees or taxes, it would not hurt the competitive position of Minnesota landfills, which are higher priced than landfills in neighboring states.

Weaknesses: The general trend in legislation has been that where an identifiable sector is imposing social or environmental costs on the general society, and if legislators feel that the costs need to be paid, the members of the sector should pay this cost if they have an income available and if administration of a tax or fee is workable. For example, if coal-fired power plants are causing acid rain, the cost to remove acid gases should be paid by those who are using power from the plant, rather than society as a whole. Drawing money from a general fund goes against this trend.



The following concern applies to this option, as well as to all other options that depend on setting aside money into an interest-bearing account for long periods. It is open to question whether a dedicated account with spending that is delayed for decades will be able to withstand other, urgent but unrelated public needs that arise before perpetual-care expenses need paying. If legislators feel that such a fund will probably not be left untouched by future Legislatures, but rather will be diverted to other purposes before perpetual-care spending begins, one obvious solution would be to take action now to minimize long-term landfill costs, rather than to attempt to set aside enough money to pay higher costs later.



Chapter VII. Expansion of the CLP

A. Options to Expand the Closed Landfill Program

There are a number of scenarios under which the Legislature could amend the Closed Landfill Program (CLP) to allow some or all Minnesota MMSW landfills that are now open to qualify for the program or otherwise share in some of its benefits. The three principal CLP expansion options evaluated in this chapter are:

- Entry at time of closure
- Delayed entry, after passage of the 30-year postclosure-care period, and
- One-time window to qualify additional Landfills

This chapter also includes discussion of additional changes to the CLP for the Legislature's consideration that do not involve adding additional landfills.

CLP Option 6(A): Entry at time of closure

This would allow Minnesota MMSW landfills that are now open to have an opportunity to enter an expanded Closed Landfill Program as soon as they cease to accept waste and meet the conditions of acceptance, as set by the Legislature. They also would have the choice of declining the opportunity and retaining the liability to pay for perpetual care and for under-estimating in conventional financial assurance.

For landfills that chose to enter the program, this would have many policy implications, one of which is that the MPCA (rather than the owner/operator) would be covering the risks if conventional financial assurance is underestimated; if it proves to be

overestimated, the MPCA would use that surplus to reduce the money needed to pay for perpetual care at those facilities.

Generally, conditions of entry would become more expensive as time goes on, with the conditions becoming more stringent under a timetable that would be set out in legislation. MPCA staff assumes that basic conditions of entry would include prohibitions on continuation of land disposal close enough to a closed area that the area cannot be monitored and remediated separately from the areas with continuing disposal. The state would require owner/operators to complete the final cover, and would not allow the movement of financial assurance funds between accounts. The state would require that adequate, daily oversight is provided at the site to assure that sites are closed in accordance with rule requirements. This may take the form of hiring an engineering firm to carry out daily inspections of the closure work. An MPCA engineer's presence at a site would not substitute for QA/QC by the owner/operator or extend any liability to the state for work that does not satisfy rule requirements.

After the initial entry date, landfill owner/operators wanting to enter the program would find more rigorous design standards to ensure longevity of liners, slopes and leachate-collection systems. For example, the state might place a limit of 20 percent on new slopes. Owner/operators who stayed open would have to provide an extra margin of financial assurance, perhaps covering an additional share of the unfunded contingency-action costs.

Discussion of Implications and Costs: MPCA staff estimates that four facilities might take advantage of the initial entry deadline and assumes that the remaining facilities would continue operating on



their previous schedules, until they reach their final capacities. Under this option, entering landfills would be paying for the basic care of their site for 30 years with their financial assurance balance, and the only additional expenses to the CLP during the first 30 years of postclosure care would be for cleanup of adjacent disposal areas, unfunded contingencies and augmented cover on old unlined waste cells within the permitted area.

Given the decades that would pass before the bulk of unfunded expenses would be incurred, MPCA staff feels that given enough time the Solid Waste Fund could meet these extra expenses without needing additional revenues, if certain assumptions and conditions are accepted. That is, the earliest that significant reserves would be needed from the CLP would be more than 30 years from now (when the entering landfills' conventional financial assurance reserves are exhausted and the state has begun paying for perpetual care). When estimating the costs of this option, the MPCA staff assumes that today's open landfills have sufficient financial assurance to meet all costs of closure and 30 years of care, but do not have extra funds to pay the costs of cleaning up adjacent old disposal areas or the cost of adding extra cover on old cells closed before current requirements. Therefore, the state would begin paying these costs shortly after closure.

Option evaluation

Strengths: This option allows facilities to enter the program on a gradual basis when they are best (financially and physically) prepared to do so, rather than according to a time-critical deadline set by the state. Under this option facility owners who closed on their planned schedule would have financial assurance fully funded and have achieved desirable final elevations at the site to promote runoff and minimize erosion. Because the majority of sites are expected to enter an expanded Closed Landfill Program at a slow pace and given the requirement for them to provide adequate financial-assurance reserves to cover the first 30 years of postclosure

care, the MPCA staff believes that adequate reserves may be available under the current CLP to cover estimated perpetual-care costs, if waste taxes remain at their current level.

This option avoids the "pigeonhole" effect of today's financial assurance arrangements, which by averaging out expectations but isolating money within each landfill inevitably will result in over funding at some facilities and under funding at others. In today's system this money cannot be shifted from a surplus at one facility to a shortage at another.

The passage of the original CLP in 1994 resulted in expectations among some current facility owners that the state will step in and take on long-term care responsibilities at landfills eventually, with the typical explanation that "it is society's waste and they should pay for costs beyond conventional financial assurance requirements." Another rationalization supporting state care is that individuals and even corporations are not as well suited for perpetual duties as are governments. Individuals die, corporations reorganize and go bankrupt, but the state (and the cities, townships and counties that are its components) has a perpetual existence. Rather than delaying decisions on what some see as inevitable, this option takes a proactive approach and lays out procedures and conditions for how the transfer of responsibility may occur. Under this option, facility owners would know that there would be an increased amount of financial commitment that they would be responsible for if the facility remained open longer.

Under this option, facility owners may also choose not to enter the CLP, but continue to perform long-term care responsibilities for the conventional postclosure-care period and enter the program after that period.

The state obtains some economies of scale already in the existing Closed Landfill Program; the state has an administrative system set up for long-term care;



could address equity issue as to who pays for cleanup costs for pre-1994 waste buried in landfills that remained open after 1994 passage of the Landfill Cleanup Act; and it allows a pool approach to paying for contingency-action events.

Weaknesses: Institutionalizes a system in which public and private operators operate landfills during their net-revenue-generating period, and the state takes on landfills during the expense-generating period.

As to paying costs imposed by today's open landfills, users of processing plants would pay the same amount per capita as users of direct-to-landfill disposal. A user of an RDF processing plant may be sending less than 20 percent of its MMSW to landfills in the form of unprocessable residues and ash; an exclusive user of landfill space sends 100 percent of its MMSW generation to landfills, but under the state's current tax system both pay equally and in some cases the users of processing plants pay more because of the higher tip fees charged by processing plants — a cost that brings a higher tax when the taxes are levied on the basis of price, as will be the case under the new Solid Waste Management Tax beginning in January 1998.

Taking on open landfills' perpetual care and cleanup of their adjacent disposal areas would lessen the likelihood of the state doing other things with those funds or cutting the tax. MPCA staff labels this the "opportunity cost" issue, which runs across other options as well.

This option is different from the existing program, which sets a common deadline for all landfills to meet or fail the qualification test. One reason for the date certain in the Closed Landfill Program was a concern that deadlines set into the indefinite future may adversely influence the disposal practices of the landfill owners, who would come to depend on the state safety net and become less cautious about excluding toxic wastes. However, the MPCA believes that with regular inspections

this concern is less significant than at the unlined landfills that originally entered the CLP because (a) currently hazardous materials are separately managed from the general solid waste stream and because the long operating life gives landfill owners adequate incentive to not mismanage wastes to avoid impacts to the environment and ground water while they are still in operation. Today's landfills are lined, and this means that at a landfill with careless disposal this fact will become known through the leachate characteristics. It is likely that the MPCA would be requiring more frequent inspections by state or county staff if the state were to accept permanent care and cleanup actions at today's open landfills. This would represent an additional cost to the state and will be evaluated in more detailed cost estimates if this proposal moves forward.

This approach would require closer attention to whether today's landfills, which can follow the minimum permit requirements or a higher set of protection, at their discretion, should have the same latitude if they are anticipating entry to an expanded CLP. The state would be at significant financial risk if construction methods for new lined cells at open landfills did not lead to high-durability liners and leachate collection systems. One lesson of the last decade is that medium to large landfills cannot be excavated and relined under today's economics and technology, nor are they realistic candidates for a complete removal and reinstallation of a leachate-collection system. Both liners and leachate-collection systems are buried under dozens of feet of waste, and are as critical to long-term performance as a solid foundation is to a building.

MPCA staff is aware that a minor trend in today's industry involves reclaiming airspace and improving environmental protection by conveying old waste from several low, unlined areas to a lined area with a steeper profile. The reprofiling, along with screening out of dirt usable for cover in the new landfill, allows the operator to gain more airspace and pay for the work, at least in part. Today's shifting-onto-liner approach might evolve to



a technique that moves waste off a failed liner onto a new liner, and thus in effect might allow replacement of a buried liner, but it is not something to rely on at this point. New developments in this area over the next 20 years could justify another look at cost estimates. Inadequate financial assurance cost estimates could result in inadequate funds to perform the first 30 years of long-term care costs. Also, changes in Solid Waste Fund use or diversion of income to the fund may jeopardize the MPCA's ability to perform needed long-term care requirements. Facility owners with inadequate cost estimates may not provide adequate reserves to cover costs expected throughout the conventional financial assurance period. In addition, cost estimates are only based on performing routine operation and maintenance costs for a 20-year period, so this may also present a shortfall of revenues for conducting these activities. Policymakers should also be aware that whenever the state takes on care and cleanup responsibilities at a landfill, the state may find itself a defendant in litigation initiated by nearby landowners even though the legislation provides no indemnification by the state of the landfill operators, owners or waste generators. As the years go on and the state's actions become more influential at the site compared to actions taken by responsible parties before the state's arrival, the state's liability as a caretaker tends to increase. Discussion is needed as to whether this option would raise Commerce Clause issues, to the extent the option might use money from all Minnesota waste generators to affect the competitive position of in-state open landfills compared to out-of-state open landfills. To the extent that taking on open landfills imposes an added cost in the future that is paid for through the solid waste management tax, all waste generators in Minnesota who pay for garbage service would pay that extra cost regardless of where their own waste goes — in-state or out-of-state — to landfills or to other disposal methods such as incineration. The benefits of state care following closure would go to users of in-state landfills by greatly reducing the

financial liability risk posed by Superfund cleanups following closure. It would not offer protection to users of landfills located outside the state, because such landfills would not be eligible for management by the state of Minnesota under an expanded CLP. Although the original Closed Landfill Program affected only Minnesota landfills, it did not affect the relative competitive position of open landfills in the interstate market because it required immediate closure by landfills to qualify. Fees and revenues that are collected at landfill gates do not raise the same legal concern, because they are collected only from the users of those facilities.

CLP Option 6(B): Delay entry until completion of 30-year postclosure-care period

This option delays MMSW landfill entry into the Closed Landfill program until after the landfill has finished its 30-year postclosure-care obligation. It would require that the facility owner provide for all long-term care needs during the first 30 years. After 30 years, the MPCA would be responsible for conducting and paying for costs at the landfill. This would be an expansion of the scope of the Metropolitan Landfill Contingency Action Trust Fund (MLCATF) program in two significant ways: it would apply statewide rather than only in the Metro area, and the MPCA's financial exposure would not be limited to the balance in the MLCATF fund, as it is under current law. Under the Closed Landfill Program, the MPCA is obligated to do whatever is necessary to maintain and remediate landfills that have been accepted into the program, and to find the money to do it.

Under the MLCATF provisions, waste that is landfilled in the Metro area pays \$0.50 per cubic yard into a state pool to be used by the state for perpetual-care costs at metro landfills. Although it has been proposed before, there is no corresponding program for landfills in Greater Minnesota; instead, the Legislature established the mandatory Greater Minnesota Landfill Cleanup Fee for each county



that hosts a MMSW landfill. In the event this new option is adopted, the MLCATF would have to be repealed because the option would supersede the original program. Under this option, the Legislature should also consider requiring facility owners to turn over any remaining financial assurance to the state to cover perpetual-care costs. Because of the 30-year delay before a closed landfill becomes qualified for acceptance into the CLP, an offer of reimbursement to be paid at that time would not be a major motivation for owners and operators to enter the program. Therefore, this option may render reimbursement of past environmental costs a moot issue. Care for adjacent disposal areas would, however, be part of the MPCA's duties after landfills were accepted into the program.

Given an average operating life of 16 years and 30 years of long-term care provided by the landfill owner, reserves would not be needed from the Closed Landfill Program until year 2043, so the MPCA would have this much time to save for the expected costs, which would be chiefly for perpetual care of the permitted fill areas as well as adjacent disposal areas. At that time annual estimated perpetual-care expenses are expected to be \$7.37 million for years 30-49 of the perpetual-care period, \$5.84 million for years 50-79 and \$2.69 million from year 80 into perpetuity. The perpetual-care costs of providing this option are the same as the costs for option A, but would be less as to landfill costs that would be incurred between closure and the start of the perpetual-care period, because the state would not bear the risk of underestimation. Further, the MPCA's expenses for care of adjacent disposal areas would be delayed, compared to Option 6(A), which would have the state take responsibility following landfill closure.

Option evaluation

Strengths: This option has similar financial impacts and benefits as those listed under option 6(A) above, insofar as perpetual-care costs are concerned.

The noted exception is that under this option, the facility owner and not the state is responsible for performing long-term care costs during the conventional postclosure-care period. Because of the similarities, this option would also satisfy adequacy, timeliness, security and affordability conditions.

This option may discourage careless disposal behavior more effectively than Option 6(A), because a significant portion of the environmental consequences would occur during the first 30 years of postclosure care and the remediation would be paid for directly by the owner/operator.

Underestimated conventional financial assurance costs would place initial financial burdens upon the facility owner and not the state.

Weaknesses: Removes the current responsibility for perpetual care of Greater Minnesota landfills from facility owners. It may encourage some operators to defer action in the later stages of the 30 years of conventional postclosure care, on the expectation that the state will pay for all costs after 30 years have passed following closure.

CLP Option 6(C): One-time "window"

This option offers a limited, one-time additional window of opportunity by allowing permitted MMSW landfills to qualify and enter the Closed Landfill Program if they stop all disposal activities before a prompt deadline and meet conditions of qualification. There would be no allowance for later entry into the CLP. It would also allow entry for certain closed demolition landfills containing old MMSW. As with Option 6(A), the conditions of acceptance for MMSW landfills may include placing final cover on the landfill, providing a fully funded financial assurance trust fund, and signing a binding agreement. Fully funded financial assurance means providing adequate trust reserved to cover 30 years of postclosure-care and contingency-action costs. Under this scenario, landfill owners would not be able to dip into



postclosure or contingency-action reserves in the event they choose to cover the landfill themselves.

The MPCA staff speculate that as many as five MMSW facilities (Fergus Falls, Northeast Otter Tail, WLSSD's two permitted sanitary landfills and Crow Wing County's older sanitary landfill) and 17 closed permitted demolition facilities with a history of MMSW disposal prior to permitting would be interested in entering the program under a one-time window. The MPCA staff also estimates that four small landfills in Minnesota that are now accepting MMSW for disposal might be interested in closing to take advantage of a short-notice, limited-time offer to join the CLP. However, the MPCA staff does not know whether they all would decide to take the necessary steps to meet the conditions of entry, such as providing enough separation between open and closed areas to ensure that the closed areas would be hydrologically distinct from a nearby open disposal area. Rather than a firm projection, readers should regard this as a working figure of the incremental costs to the state if this many facilities took the necessary steps to qualify.

In fact, due to the interleaving of waste deposits at open and closed land disposal sites at the WLSSD disposal area, it is unlikely that the two closed sanitary landfills at the site (SW-65 and SW-232) could qualify for the Closed Landfill Program unless the open industrial landfill on site that is sidesloped onto the closed landfills is closed as well. These facilities are so near to each other that the MPCA is concerned about the prospects for expensive and protracted litigation in the future regarding which facility contributed the contamination. This concern is not directed at any one landfill owner/operator, but is rather a general concern on the part of the MPCA about being given responsibility for a closed landfill that is next to an open landfill under someone else's control.

Because the MPCA does not decide on the facility operator's behalf whether they should or should not take advantage of unusual legislative offers such as a

CLP expansion, the costing figures in this report assume that WLSSD would do whatever is necessary to qualify its landfills, up to and including closure of the open industrial landfill. It is possible, however, that even if such a provision were adopted by the Legislature, WLSSD might not elect to qualify its two closed landfills into the program because of difficulty in replacing the industrial landfill with new disposal capacity.

The qualification requirements in Minn. Stat. 115B.39 Subd. 2.(j) could be modified to allow old closed permitted demolition landfills that originally received mixed-municipal waste to enter the Program. The same criteria would be used that is currently in the legislation. Program funds could be used for these demolition landfills because the environmental impact is probably caused by old mixed-municipal waste rather than the demolition material. There are about 17 such old closed demolition landfills. These landfills took mixed-municipal waste before 1970 but ceased accepting MMSW before the state permitting era began and therefore never were permitted for mixed-municipal solid waste. Three demolition landfills that originally were permitted for mixed-municipal waste were able to qualify for the original CLP and have entered the program. The difference between the three qualifying and the 17 nonqualifying demolition landfills is largely a matter of chance, because the same materials were disposed of at all 20 landfills and only the permitting documentation distinguishes them. The same environmental considerations exist for all of them. The MPCA staff estimates the present-value cost of this option, reflecting the assumptions above, at \$16.3 million. Of this total:

- \$4.9 million represents the present value of perpetual-care costs of the MMSW landfills that the MPCA believes might pursue this option. This amount, set aside today and allowed to accrue interest, would be sufficient to meet the calculated costs at



these landfills after the conventional financial assurance period ends.

- \$4.5 million represents the costs of cleanup work to be done at adjacent disposal areas near the MMSW landfills.
- \$1 million represents possible reimbursement for past environmental response costs at the MMSW landfills or adjacent disposal areas.
- \$5.9 million represents the present-value cost of taking on the 17 closed demolition landfills believed to contain MMSW.

Option evaluation

Strengths: An evaluation of projected net revenues under the CLP show that there would be adequate surplus funds to cover perpetual-care costs of facilities estimated to take advantage of a one-time window to enter the CLP. This option would then satisfy adequacy, timeliness, and security criteria. MPCA staff expect that financial assurance reserves that would be turned over to the state would be available for long-term care at new facilities. Once again, many of the benefits noted under Option 6A would also apply under this option. (e.g. economies of scale, etc.) This option also has the benefit of closing facilities that cannot afford to operate in accordance with rule requirements, thus minimizing the impact of future liability that may result if these sites were to continue operating. Benefits primarily go to the facility owners and generators whose waste went to the facilities that choose to take advantage of the one-time window option. Addresses equity concerns some operators have raised beginning in 1994, regarding sites where they had closed to MMSW but were accepting other wastes nearby under the same permit. Addresses the issue of facilities that almost qualified for the CLP, but were set aside for later discussions when the 1994 legislation was drafted. Three of the old, closed demolition landfills discussed above are now eligible for funding under the Metropolitan Contingency Action Trust Fund. Arguably, because

the creation of the 1994 legislation with its funding provisions significantly cut the balance in the MLCATF, it is more appropriate to have these closed facilities handled under the CLP with its greater resources. While this option would remove the current responsibility for perpetual care of Greater Minnesota landfills from their facility owners, this condition would not appear to affect the qualifying facility owners' vigilance with respect to environmental and human health protection because of the short notice for entry. Currently state and federal laws do not allow landfill owner/operators to receive a "clean break" from their liability to pay cleanup costs at their closed landfills; passing permanent care duties to the state would for all practical purposes remove the overhanging liability that owners, operators, commercial generators and waste arrangers face.

Weaknesses: Again, much of the negative aspects of this option are the same as those noted for Option 6(A). However, the MPCA staff is chiefly concerned that this option may give facility owners the impression that there will be even more one-time windows of opportunity because of the history of repeated legislative actions to transfer long-term liabilities from facility owners to the state. Therefore, this option could have the unintended result of decreasing owner vigilance at other landfills not qualifying under this window, with respect to operating in a manner to minimize environmental and human health threats.

Facility owners with inadequate cost estimates may not provide adequate reserves to cover costs expected throughout the conventional financial assurance period. In addition, cost estimates are only based on performing routine operation and maintenance costs for a 20-year period, so this may also present a shortfall of revenues for conducting these activities.



B. Response to Legislative Inquiries

The following discussion relates to the possibility of incorporating currently open Minnesota MMSW landfills into the Closed Landfill Program. This discussion should be regarded as a separate option from Chapter VI, which is limited to estimating the amounts of money that would be needed to pay for perpetual care at MMSW landfills. There is an overlap between the two chapters to the extent that if MMSW landfills were brought into the Closed Landfill Program, they would bring along the known financial obligations to take care of them during the perpetual-care period, as well as an element of unquantifiable financial risk that spans all the years following closure.

Reimbursements of environmental response costs

Based on initial review of facility files and conversations with landfill owners, the MPCA estimates that the amount of reimbursement claims could total approximately \$10 - 11 million if the Legislature extended the same reimbursement provisions to incoming landfills as it did in 1994. About half of the payments would go to a single landfill, Pine Bend, for work that has been done there to comply with federal Superfund cleanup orders. Based on the MPCA's experience with reimbursement provisions for owner/operators under the Closed Landfill Program, however, the MPCA staff cautions that a firm estimate cannot be developed without significant work by both the owner/operator and the MPCA staff, and none of the involved parties are inclined to undertake the extensive file reviews necessary without legislation that lays out the specific terms of reimbursement. It is possible that an expanded CLP would not allow reimbursement for past costs at all, or that reimbursement terms might become increasingly stringent for landfills entering later.

Past settlements paid by public entities other than owner/operators

The only settlement by a public entity other than the owner/operator that has been reported to the MPCA was \$1.475 million paid by Benton County's local governments to Morrison County. Given that the MPCA has publicized this issue via letters and in speaking presentations, staff feels reasonably confident that there have been no other such settlements in Minnesota. The Legislature appropriated \$85,000 from the Solid Waste Fund to pay principal due on Benton County bonds in FY 1998. Pursuing a similar option for the remaining principal would direct the MPCA to use Solid Waste Fund money to pay Benton County the principal amount due on its bonds each year until the term of the bonds expires, for a total of \$737,500.

This is a unique situation where a public entity had once played a part in a landfill management board but later left that board, and had paid money to another public entity toward cleanup costs at the landfill as a result of a settlement; and by the time the CLP was created, had lost the legal standing to influence the closure and entry of that landfill into the CLP. Proponents say this payment will ease an excessive financial burden on Benton County residents. On the other hand, this payment would not produce a measurable environmental outcome because the money would go to reduce the tax burden at Benton County and its municipalities. Paying Benton County and its municipalities (and other local governments in such a situation, if they exist) also creates a precedent for reimbursement of environmental response costs on similar terms at other entering landfills, if done in conjunction with an expansion of the Closed Landfill Program. To the extent that a policy option selected by the Legislature would allow reimbursement to Morrison County for its cleanup costs not paid by Benton County, it probably would also allow reimbursement to Benton County.



Estimated environmental response costs, beyond conventional financial assurance

If additional Minnesota landfills were accepted into the Closed Landfill Program, the MPCA would incur environmental response costs over and above the financial assurance resources at the facilities. The landfills would bring perpetual-care costs (which are not covered by financial assurance), costs for augmented covers on old unlined MMSW cells that were closed when covers less than four-foot-equivalent were allowed, and expenses for the care and cleanup of adjacent disposal areas.

Perpetual care: In present value terms (that is, if the full amount was set aside today and began earning interest until expenses began occurring approximately 46 years from now), the perpetual-care costs of the 29 facilities permitted for MMSW disposal, that were not qualified for the Closed Landfill Program, is \$13.8 million.

Care and remediation of adjacent disposal areas: MPCA staff believes that at least three of the 29 open MMSW landfills have nearby dump sites that would be candidates for qualification as "adjacent disposal areas" that would become the responsibility of the MPCA if the Legislature retained the provisions that offer state cleanup and care of adjacent disposal areas. These are:

- The Old Smokey dump near Fergus Falls SLF, at an estimated cost of \$500,000;
- The Duluth No. 2 dump near WLSSD's old MMSW landfills (SW-232 and SW-65): 115 acres, of waste less than 15 feet deep. The MPCA staff estimated past costs of \$400,000, and additional costs to come of \$4 million; and
- The unpermitted papermill sludge dump near Crow Wing SLF (SW-111). The cost of remedial work at this site appears to be negligible. It appears that this site would need nothing more than a deed restriction annotating that the fill area not be

disturbed.

The MPCA staff estimate that up to 250 acres of old unlined MMSW cells at the 29 open landfills have less than four-foot equivalent covers and may be candidates for enhanced covers, at a cost of \$30,000 to \$70,000 per acre. The lower cost applies to simple cover construction; the higher cost applies to locations where the MPCA would need to move waste to improve the site profile. If the MPCA accepted these landfills into the program, and if it proceeded with the cover enhancement, this would add a cost of \$7.5 million to \$17.5 million to the existing CLP.

C. Other Possible Changes to the Closed Landfill Program

Old municipal dumps as cover material for CLP construction projects

Some counties and cities have expressed interest in moving material from excavated old dumps to landfills where cover construction is underway under the Closed Landfill Program. The Legislature should consider amendments to the Closed Landfill legislation that would allow municipalities or counties to relocate old municipal dumps on publicly owned land to facilities under the Closed Landfill Program that are undergoing cover construction and can use the additional material to achieve desirable slopes. This would be subject to the following conditions: 1) the added waste would improve final slopes and 2) the state would not have to pay for the material or any of the relocation expenses. See discussion in Appendix B for additional discussions on addressing other types of old dumps.

Pros: This option allows local governments to get rid of old dumps at a low cost to the governments, and minimal cost to the CLP, other than monitoring to ensure that hazardous waste is not being delivered to CLP sites. It expedites the return of publicly owned property into economic production, and promotes protection of human



health and the environment. Also, additional dump material would be beneficial in achieving better slopes for drainage of surface water at facilities being closed by the state.

Cons: The usefulness of the option is limited by the relatively small number of new cover-construction projects under the CLP in which additional fill material would be useful in reaching ideal contours. Once a CLP landfill is covered, there will be no more additional construction at that site for many years (e.g., replacement of a deteriorating cover decades from now). This option does not foresee stockpiling dump waste for indeterminate periods at a CLP construction site, pending future construction. Currently the MPCA staff expects that 20 landfills around the state will be undergoing cover construction in the coming years.

Concerns have been expressed by MMSW landfill operators that this material might otherwise have gone to their facilities, which are lined as opposed to most of the CLP sites, which are not. This concern is somewhat addressed by the impermeable covers to be installed over the waste at the CLP projects, which will keep most percolating moisture out of the material.

Old dump material may contain some contaminant that could increase the potential for response actions at the closed facility. This liability is present regardless, though currently not to the state. At least if the material is the MPCA's responsibility, there is a better chance for minimizing human health exposure and environmental contamination.

Revenue sharing with owner/operators of open landfills

As an alternative to MPCA care and cleanup of open landfills, this option would provide revenue-sharing that would allocate a share of the Solid Waste Management Tax proceeds to the owner/operator of the landfill, to be used for waste-related activities such as financial assurance payments. This would not qualify the landfill for MPCA care and

cleanup but instead would provide money that the owner/operator could use to augment financial assurance, to add protective measures on old unlined waste cells or for other solid-waste-related activities. The MPCA treated this subject in its paper on Closed Landfill Program Options, delivered to the LCWM in November 1995. This information was based on the bill language proposed up to that time, which was based on redirecting half of the Solid Waste Generator Assessment that is gathered from waste generators located in counties and cities with open MMSW landfills, as well as in Benton County. The revenue would have been sent to the county and city governments. Since the SWGA has now been altered in a fundamental way and incorporated into a new Solid Waste Management Tax that extends beyond the MPCA, MPCA staff will await new legislative language before attempting to update projections and commentary on "pros and cons."

Source reduction effort: this would involve the Legislature appropriating money from the Solid Waste Fund, probably as pass-through grants directly to business organizations, to encourage additional efforts to reduce waste volumes and toxicity at the source. The intention is twofold. First, to reduce the amount of waste generated that needs management and therefore eventually reduce the state's financial responsibility for land disposal acreage in the long term. The second is to provide a direct way of returning solid waste management tax funding to businesses in a way that doesn't preclude use of the funds in the future for unanticipated expenses from the Closed Landfill Program.



Chapter VIII. Summary of Funding Options

The discussion below ranks each funding proposal based on how it best satisfies the evaluation criteria. Workgroup members felt ranking the options was not a fair way of presenting the proposal summaries; however, the MPCA staff believes that it is helpful in identifying which option(s) appear to best satisfy evaluative criteria.

Adequacy

With the exception of the Status Quo option, the remaining options would provide adequate revenues to cover projected perpetual-care costs.

Timeliness

The following proposals would provide adequate cash for perpetual-care costs and therefore are deemed to satisfy the timeliness criteria as well: all CLP expansion options, Flat State Tax option, Expand Financial Assurance option and Extend MLCATF option and one-time General Fund Payment Option. Because the Status Quo option does not satisfy adequacy criteria, it cannot satisfy timeliness criteria.

Security

Most importantly, the MPCA staff believes that it is necessary to have funds dedicated for the sole purpose of providing perpetual care in order to satisfy security criteria. Currently, financial assurance trust funds already have this condition. The MPCA recommends that in the event an alternative proposal is adopted, the Legislature require that funds be placed into a dedicated account for perpetual-care activities at open MMSW landfills. With the exception of the status quo option, all other options dedicate, or could be drafted to dedicate, funds for perpetual-care costs, thus satisfy security criteria.

It is worth mentioning that all options have limited security concerns to the degree that the institution holding the cash has the possibility of going bankrupt. For this reason, the MPCA staff would recommend that the money be held at FDIC institutions and ideally that the amount of reserves be split so that any individual fund does not exceed the \$100,000 insurance guarantee. However, this condition may not be administratively possible. Certainly, fund investments may also present some security concerns; however a moderately aggressive investment approach may be acceptable when costs are not expected for more than a five-year time period. The approach for facilities that expect expenditures within five years should be more conservative. Of course, state fund investments would have to abide by statutory regulations.

Affordability

With respect to affordability, one might come to the quick conclusion that the Status Quo option is the most affordable proposal because there are no upfront expenses. The MPCA would agree with this conclusion if they believed that there would be no long-term care costs after the 30-year postclosure-care period. However, most people in the landfill business recognize that this assumption is not realistic. There will be costs after the conventional 30-year postclosure-care period, so now the issue with respect to "affordability" criteria becomes which proposal minimizes the financial burden on the party paying for perpetual care.

In comparing the eight funding options, the methods which would not result in an increase in current solid-waste management payments by feepayers and taxpayers is the one-time General Fund Option and the three CLP expansion options, which propose relying upon projected net revenues to fund perpetual-care costs at eligible landfills.



However, if projected surplus CLP revenues were to be returned to taxpayers, the CLP expansion option may not represent the most affordable option. For the purpose of this report, all CLP expansion options are considered to place the least financial burden on the economy since the CLP funding is already in place and is not proposed to be increased for any CLP expansion option. After the CLP expansion options, the MPCA ranks the remaining funding options in the following descending order of affordability: 3) Flat State Tax, 4) the Extend MLCATF option, 5) Extend Financial Assurance Obligation, and 6) Status Quo. The MPCA staff ranks the Status Quo proposal last, because unlike all the other proposals this option does not benefit

from compounded interest earnings over a significant time period to assist in generating enough revenue to fund estimated costs.

Fairness

The MPCA staff ranks the proposals in the following descending order based upon how closely the proposal correlates perpetual-care costs to landfill owners and waste generators that use landfills: 1) Extend Financial Assurance Obligation, 2) Extend MLCATF option, 3) CLP Expansion option 4) Flat State Tax, 5) One-time General Fund Payment, and 6) Status Quo.

Table 5 illustrates the above rankings in a matrix.

Table 5. Perpetual Care Funding Proposal Evaluation Matrix

| Rank | Adequacy to meet need | Timeliness | Security/verifiability | Affordable | Fair |
|------|---|---|--|---------------------------------------|---------------------------------------|
| 1 | CLP Expansion Options, Extend Financial Assurance, Flat State Tax and Extend MLCATF Option, One-time General Fund Payment | CLP Expansion Options, Extend Financial Assurance, Flat State Tax and Extend MLCATF Option, One-time General Fund Payment | Financial Assurance Extension | One-time General Fund Payment | Extend Financial Assurance Obligation |
| 2 | Status Quo | Status Quo | CLP Expansion Options, Flat State Tax, Extend MLCATF Option, One-time General Fund Payment | CLP Expansion Options | Extend MLCATF Option |
| 3 | | | Status Quo | Flat State Tax | CLP Expansion Options |
| 4 | | | | Extend MLCATF Option | Flat State Tax, |
| 5 | | | | Extend Financial Assurance Obligation | One- Time General Fund |
| 6 | | | | Status Quo | Status Quo |

In summary, the matrix shows that an extension of the Financial Assurance Obligations, the Extend MLCATF and the CLP Expansion options best satisfy the majority of evaluation criteria. One reason is that governments are better suited to handle perpetual duties than are private entities, which have no

inherent perpetual existence. The one-time General Fund Option also satisfies the majority of evaluation criteria, but does not appear to be realistic based upon political considerations.



IX. Report Findings

Following are comments and observations from MPCA on promising avenues for policy development, and issues needing further discussion and information gathering.

Conventional Financial Assurance at Open MMSW Landfills

- Outside of some confusion regarding reporting requirements for facility owners using the dedicated trust fund option, compliance status for MMSW landfills is very good. A review of 1996 financial assurance information shows current financial assurance costs of \$94.4 million of which 55 percent are covered with cash in a trust fund or a third party guarantee (i.e. letter of credit or surety bond).
- Some facility cost estimates may be low based upon MPCA first-hand experience conducting closure, postclosure care and contingency actions at facilities under the Closed Landfill Program. The MPCA staff plans to review adjusted cost estimates in the Annual Reports that will be submitted by February 1, 1998, in light of new cost information obtained by the CLP. The MPCA staff believes that increased experience in reviewing mechanism reimbursement requests and in conducting long-term care responsibilities at facilities in the CLP will improve the accuracy of approved cost estimates.
- The MPCA does have some concerns with respect to the ability of facility owners using, or moving toward using, letters of credit and surety bonds because these mechanisms do not show how the facility owner will fund costs after facility closure. Use of third party guarantees may also be a problem if the

Legislature decides to expand the CLP to arrange for immediate transfer of facilities with third party guarantees to the state following closure of MMSW landfills. The MPCA's experience in the CLP with facilities that had financial assurance requirements that were covered by a letter of credit was that the facilities found it difficult to produce a lump sum of cash as part of the binding agreement to enter the program.

- The MPCA staff is concerned that reliance on third-party guarantees to cover a significant portion of financial assurance costs may place the state in a position in which it is dependent on the continued financial health of the facility owner in order to ensure coverage of long-term costs. Because of the noted concerns, the MPCA will continue to work with the EPA and other states to exchange information on the effectiveness of financial assurance mechanisms.
- Current interest in limiting greenhouse gases may increase the number of MMSW landfills required to install active-gas collection systems. This step would increase the estimates for both conventional financial assurance and perpetual-care costs at some MMSW landfills.

Perpetual Care for MMSW Landfills

- In response to legislative inquiries about unfunded costs of land disposal, the MPCA finds that some costs will continue at MMSW landfill facilities beyond 30 years of postclosure care, and on into the indefinite future. In that respect today's financial assurance requirements do not cover the full time span over which some costs will occur.



Because no lined landfill has existed in Minnesota for 30 years, the long-term costs estimated in this report must be understood in the context of the assumptions on which they are based.

- The present value of perpetual care for the 29 open MMSW landfills is \$13.8 million, which assumes that this sum would be set aside today and allowed to gather interest over the next 46 years prior to any expenditures from the fund. If the state were to wait 16 years (the average remaining operating life that is estimated for open MMSW landfills) before setting up the fund, \$30 million would be needed to cover perpetual-care costs because of the loss of compounded interest earnings. The MPCA and the solid waste industry will be better able to estimate costs after further actual experience accumulates regarding the longevity of liners, covers, landfill gas-collection networks and leachate systems.
- During the discussions leading to this report, some MMSW landfill owners and operators in Minnesota stated that they felt it was either premature or simply unfounded for the MPCA to calculate the costs of perpetual care for landfills. They further stated that some methods of paying for these costs risked putting Minnesota landfills at a competitive disadvantage compared to landfills in neighboring states. A compilation of stakeholder themes and concerns is provided in the body of the report, and comment letters are attached as an appendix.
- This study also has implications for estimating the unfunded long-term costs at other types of regulated facilities, such as MSW combustor ash, industrial and demolition-debris landfills. The MPCA staff will be reporting in 1998 on the financial assurance status of these facilities.

Expanding the Closed Landfill Program to Accept Open MMSW Landfills

- In response to the 1997 legislative inquiry, this report considers three principal options that would arrange for the state to begin taking on some aspects of care at MMSW landfills that are now open, but will be closing eventually. Assumptions, estimated costs, advantages and disadvantages of each option are laid out in the body of the report. The MPCA believes that if the Legislature wants to pursue an expansion of the CLP, discussions should begin with Option 6(B), which would provide for state care only after facility owners have closed their landfills and have completed 30 years of postclosure care using their own financial assurance funds. The present value-cost of this option is \$14.8 million, which is composed of \$13.8 million in perpetual-care costs and \$1 million to remediate adjacent disposal areas.
- One option to expand the CLP, Option 6(C), sets out a "one-time window of opportunity" that would set a near-term deadline for a landfill to close and qualify into the CLP, assuming certain conditions were met (primarily, hydrogeologic separation from any ongoing land disposal activities). This option is chiefly for landfills that contained MMSW but were disposing of other wastes under the same permit in 1994, and therefore were not eligible for the original CLP. This option would also apply to 17 closed, old demolition-debris landfills that historically accepted MMSW. Based on anticipated closure of 9 MMSW landfills, and 17 closed demolition landfills the present value cost of this option is \$16.3 million.
- The Benton County request for state reimbursement of some of its settlement costs arising out of cleanup at the Greater Morrison Sanitary Landfill appears to be a



unique case. While the MPCA has concerns about the precedent this would set for reimbursement of other response costs, it is safe to say that if the Legislature follows the action it took in Fiscal Year 1998 and allows payment from the Solid Waste Fund to Benton County on a schedule matching the principal due on its bond payments (\$85,000 per year, up to a total of \$737,500), this would not cause a significant effect to the Solid Waste Fund. The greater effect would be through precedents this would set for other payments outside of the main structure of the Closed Landfill Program. There is no environmental gain to be achieved by making reimbursements for past costs to Benton County or to other responsible parties at currently open landfills.

- The MPCA staff projects that on or about fiscal year 2003 the CLP will achieve a "break-even" point in which revenues exceed expenses that are anticipated on a long-term basis. As this point approaches, the state will have decisions to make on how to spend the available funds that will accrue over time, or alternatively, whether to lower the waste-tax rate on consumers and businesses. Considering the needs of the current program and MPCA activities, and assuming that the tax rate is left at its current level, the state could pursue any of the three options listed in this report for expanding the Closed Landfill Program. The state could also pursue incentives for source reduction, discussed below.
- Up-front source reduction efforts that minimize the amount and toxicity of material landfilled are likely to be more cost-effective per ton than land disposal. The state should allocate a percentage of the Solid Waste Fund as direct incentive grants to the business community to support source reduction and reuse activities. Source

reduction and reuse are at the top of the state's waste management hierarchy. If the state decides to expand the current CLP to take on additional landfills that are now open, source reduction would offer the additional benefit of reducing the amount of landfill acreage for which the state may assume eventual responsibility.

Old Municipal Dumps

- At least 80 old municipal dumps in Minnesota have already undergone investigation and remediation or are in the process now. The report sets out current estimates and target dates for the MPCA to review and prioritize additional old dumps needing work. The state will continue to refine and improve cost and environmental information about old municipal dumps that need priority attention.
- The Legislature should consider statutory changes that would allow waste from old municipal dumps on publicly owned land to be relocated (under the condition that there be no out-of-pocket cost to the CLP) onto CLP landfills that are undergoing cover construction and that can use the excavated waste as material to achieve desired slopes. The CLP will be constructing covers at approximately 20 of its closed landfills in the future.

Appendix A. Statutory Report Requirements



Economic Status and Outlook Report

Subd. 3. Report. (a) The commissioner shall report to the senate and house of representatives environment and natural resource committees, the finance division of the senate committee on environment and natural resources, and the house of representatives committee on environment and natural resources finance by December 1 of each odd-numbered year on the economic status and outlook of the state's solid waste management sector including an estimate of the extent to which prices for solid waste management paid by consumers reflect costs related to environmental and public health protection, including a discussion of how prices are publicly and privately subsidized and how identified costs of waste management are not reflected in the prices.

(b) In preparing the report, the commissioner shall:

- (1) consult with the director; local government units; solid waste collectors, transporters, and processors; owners and operators of solid waste facilities; and other interested persons;
- (2) consider and analyze information received under subdivision 2 and information available under section 115A.929; and
- (3) analyze information gathered and comments received relating to the most recent solid waste management policy report prepared under section 115A.411.

The commissioner shall also recommend any legislation necessary to ensure adequate and reliable information needed for preparation of the report.

(c) The report must also include:

- (1) statewide and facility by facility estimates of the total potential costs and liabilities associated with solid waste disposal facilities for closure and postclosure care, response

costs under chapter 115B, and any other potential costs, liabilities, or financial responsibilities;

- (2) statewide and facility by facility requirements for proof of financial responsibility under section 116.07, subdivision 4h, and how each facility is meeting those requirements.

Minn. Stat. sec. 115A.981, subd. 3 (1996)

Eligibility Study for Expansion of Landfill Cleanup Program

Sec. 157. [LANDFILL CLEANUP PROGRAM ELIGIBILITY STUDY.]

By January 15, 1998, the commissioner of the pollution control agency shall report to the senate environment and agriculture budget division and the house environment and natural resources finance committee regarding the estimated impact of including permitted mixed-municipal solid waste landfills in this state that are open for the period between April 9, 1994, and January 15, 1998, in the landfill cleanup program after the landfills close.

The report must include:

- (1) information on past settlements by public entities that may be included with an expansion of the program;
- (2) an estimate of the environmental response costs at the permitted landfills that would become eligible to participate;
- (3) a discussion of the amount necessary to pay for reimbursement for persons who have paid for cleanup at these added sites; and
- (4) an analysis and recommendation of funding sources to pay for the additional costs due to expansion of the program.

Appendix B: Old Municipal Dumps in Minnesota



Introduction

The scope of Appendix B is as follows: "What is the situation in regard to the care and cleanup of old municipal dumps, and what options might Minnesota consider in the future?"

The purpose of this appendix is to set out a brief description of what is known about old municipal dumps, what actions the state is taking at this time, what additional information is needed prior to undertaking additional steps, and what options as to additional work could be considered after information improves. Because the MPCA has not received a legislative directive to report on this subject, and because such old municipal dumps are not part of the universe of disposal facilities treated in the main body of the report (landfills permitted by the state), the MPCA is treating this subject in an appendix.

Subject Background

While the Legislature has spelled out no specific policy on old municipal dumps, over the years the MPCA has received site-specific inquiries from elected officials and the private sector about special actions that might be taken on old municipal dumps. This action usually follows the site being named on the federal or state Superfund list, a proposed development project, or complaints by neighbors arising out of leachate seeps or well contamination. The traditional tools for action have been state and federal Superfund laws. Newer tools include the Voluntary Investigation and Cleanup Program and state and local cleanup grants. Over the years, the MPCA has "delisted" five old municipal dumps from the state's Permanent List of Priorities as satisfactory remedial investigation and cleanup actions were completed. Approximately 30 more old municipal dumps have entered the Voluntary Investigation and Cleanup Program.

In the context of environmental regulation, the term "dump" has come to mean a place where refuse and

municipal garbage has been indiscriminately disposed. Dumps are ubiquitous; they can be found anywhere in the state. See Map 1 at the end of this appendix for a statewide map of old municipal dumps mapped to date.

Dumps have been historically located on the outskirts of large and small cities and towns; in the suburbs, neighborhoods, or the vacant lot at the end of the street; behind the farmer's barn or at the bottom of a ravine or ditch; or back in the woods adjacent to a wetland.

The refuse disposed at a dump can vary widely in its origin and characteristics. Refuse can range from mixed-municipal solid waste (MMSW) that includes household garbage (cans, bottles, plastics, food wastes, paper, cardboard); to white goods (appliances like refrigerators, washing machines, dryers); grass clippings, leaves, and tree limbs; agricultural wastes (pesticide and fertilizer containers, manure, farm machinery, dead livestock); industrial waste; and miscellaneous debris (autos, building and demolition debris, ashes).

A majority of dumps were open for public use, and access for dumping was usually free or at a minimal charge. Dumping was unrestricted and unsupervised, resulting in very poor documentation of what was dumped, how much was dumped, and who was dumping. As a result, responsible parties at dumps with municipal waste are uniquely difficult to identify.

In some cases, commercial or industrial wastes were disposed at the dump. Due to the poor record keeping, the responsible parties for the contamination from commercial or industrial waste are difficult to distinguish from the users that disposed of ordinary MMSW. In this situation, the State must look to the owner or operator of the dump property if it is pursuing further investigation or cleanup. In most cases, the owner or operator is a local unit of government (either because the land was owned by the government, or arrived via tax forfeiture); or it can be an innocent land owner who



acquired the property long after the dump had been covered or buried.

In general, dumps can generate leachate and methane gas, and contaminate surface water, ground water, sediment, soil, and air. The degree of contamination varies widely, making the assessment of risk posed by a dump a complicated challenge for any regulatory agency or owner.

Past Government Activities

In 1980, the MPCA responded to the federal government's promulgated criteria for evaluating existing solid waste disposal facilities. The purpose of the criteria was to identify and inventory solid waste disposal facilities deemed to be "open dumps," and to publish the list, calling it the Open Dump Inventory (ODI).

The ODI effort by MPCA in 1980 evaluated 1,200 historical and presumed-closed municipal dump sites throughout the state. It also evaluated an additional 450 permitted and unpermitted sites and surface impoundments. The end result of the ODI effort identified the highest priority sites and established MPCA solid waste enforcement objectives for the closure or upgrading of municipal solid waste facilities statewide. Using money awarded by the Legislative Commission on Minnesota Resources, in 1985 the MPCA investigated 15 old dumps on the ODI for possible contamination problems, using existing water-supply wells and also monitoring wells installed for this purpose. The MPCA reported that "for each open dump site studied, some portion of the ground water has been degraded by addition of minerals or chemicals to the ground water which can be attributed to solid waste disposal." The study also concluded, however, that only a portion of the total dumps would need detailed evaluation or investigation.

Continuing through the 1990s, dump sites were addressed by the MPCA's Site Response Section (under Superfund), and the Solid Waste Section

based on complaints from the public, or if they were confirmed sources of contamination. The general rule of thumb for the assignment of sites was that dumps once permitted by the state were addressed by the Solid Waste Section; dumps that had no permit history with the MPCA were addressed by the Site Response Section. If the dump was reported to the MPCA and no complaint or contamination was confirmed, the dump was cross-checked with the ODI. If it was not listed on the ODI, it was added for future reference, and no further action was taken.

Sometimes a dump did have confirmed contamination, and investigatory action followed. Since 1983, MPCA has listed about 50 Minnesota dumps on the national list of potential and suspected hazardous waste sites. The addition of these dumps to the list authorized MPCA to spend federal funding for investigation and sampling activities.

About 20 of the 50 nationally listed dumps were initially screened out because the location and contents of the dump did not appear to pose a risk to human health or the environment. The remaining 30 dumps did undergo further investigation and sampling, resulting again in a majority being screened out due to a lack of risk posed by the site. A few dumps, however, did pose a threat, which resulted in removal of certain contaminants (such as at Brooklyn Park Dump) or continued monitoring (Pigs Eye Dump).

Current Assessment Activities At Old Dumps

The Site Response Section of the Ground Water and Solid Waste Division is currently engaged in the redesign of Superfund activities. One of the Superfund activities being redesigned is the initial assessment and prioritization of sites.

Using geographic information systems (GIS), an estimated 3,500 potential hazardous waste sites,



which includes the original 1,200 ODI sites, will be run through a computer screening model in the first step of the initial assessment and prioritization process.³ The screening model will compare site location relative to wells, surface water bodies, ecological areas, and population distribution and density.

While the location of a dump site near a well or water body does not measure risk, it is a good indicator that a potential for risk may be present. Accordingly, using GIS, the MPCA will evaluate all known dump sites for the potential to impact receptors according to information in available data bases, and rank them in priority order. It is estimated that approximately 10 percent of the 3,500 sites, or about 350 sites, will come forward as needing further investigation. The other 90 percent of the 3,500 sites will be deemed as a lower priority, and no further action will be taken at these sites unless new information surfaces and changes the priority ranking of the site. The effort to screen all 3,500 sites using geographic information systems is scheduled to begin in January 1998 with completion in six months. The next step of the process will be a site evaluation of the approximately 350 sites as they are reviewed in priority order with all other sites. The site evaluation is a systematic review of all site information in terms of risk posed to receptors by way of contaminant pathways. For example, contaminated ground water (the pathway) may pose a health risk to nearby residents (the receptors) who drink the ground water.

The outcome of the site evaluation will be the determination as to whether or not the site poses a risk to human health or the environment. If a site is evaluated as posing a risk, it moves on to assignment to a staff team. The staff team will be responsible

³ The 3,500 sites referenced in this document pertain to sites that have a known location in an existing data base or map. The MPCA staff has estimated that the total universe of sites, known and potential, could easily double this number to 7,000.

for planning a comprehensive investigation in order to characterize the site in terms of contamination extent and magnitude, and other cleanup considerations.

Of the 350 sites projected to come forward as needing further investigation, another 10 percent of those, or about 35 sites, are projected to need full cleanups. After a site is determined to need a cleanup, the same staff team that initiated the site investigation will continue with the remediation design and implementation. The goal is to screen out 35 of the 350 sites for remediation by the close of 1999, and complete remediation at the 35 sites by the close of 2003. Out of these 35 sites, the MPCA projects, 5 to 10 will be old municipal dumps.

State Agency Actions on Dumps, Beyond Investigation

At least four other state programs exist that have the some authority to investigate and remediate dumps. They are the Brownfield Investigation program (through MPCA), Voluntary Investigation and Cleanup (VIC) program (through MPCA), contamination cleanup grants (through DTED and the Metropolitan Council), and the "adjacent disposal area" provision of the Closed Landfill Program (through MPCA).

Brownfield investigation

MPCA has been authorized by the federal government to use a small amount of its site assessment funding for Brownfield Investigation. MPCA invites city governments to identify properties that are not being pursued by developers due to the genuine perception that liability for contamination may be inherited with the purchase of the property. MPCA conducts a Phase I and a limited Phase II investigation on the property at expense of federal funds, and provides the information at no charge to the city.



The city uses the information to define the extent of contamination, which translates into a cost of cleanup. The city can share this information with a developer, and overall development costs can be calculated, including the cost of the cleanup. In the event the developer decides the economics of the development are acceptable, the developer enters the VIC program to finalize a cleanup plan. After completing the VIC-approved cleanup, the developer is eligible for various assurance letters from MPCA, which are used to secure financial backing for the project.

Voluntary Investigation and Cleanup Program (VIC)

Dumps are routinely addressed by the VIC program. During real estate transactions, background reviews on property are usually conducted by the buyer through the use of an environmental consultant. The consultant is hired to check the historical record and available databases for information that may indicate a past land use that could present a contaminated situation. If a background review indicates a dump is located on the property, the consultant may pursue soil and ground-water samples in order to determine if contamination is present. If remediation is warranted, subsequent cleanup of the dump can result in the issuance of an assurance letter. Assurance letters are commonly used to secure financing from a lender.

Sometimes dumps are not discovered by background checks, and are literally dug up during construction excavations. In this case, the prudent responsible party can still enter the site in VIC, excavate and transport the fill material to a permitted landfill, and complete necessary soil and ground-water investigations for contaminants. Assuming a satisfactory cleanup is achieved, the responsible party is also eligible for MPCA assurance letters.

DTED's Contamination Cleanup Development Grant Program

The Minnesota Department of Trade and Economic Development (DTED) manages a grant program that provides funds to eligible development authorities for the investigation and implementation of a response action plan for contaminated property that has development potential. A dump located on developable land can qualify for this type of financial incentive. For qualification, applicants need to show a payback to the public through the creation of jobs and/or tax revenue.

To procure this type of funding, the development authority, or the responsible party working through a development authority, must first secure an approved response action plan (RAP) from the MPCA VIC program. The approved RAP and project cost estimates are submitted on a competitive basis to DTED, which selects the successful applicants on a six-month cycle.

Grant awards can fund up to 75 percent of the cost of cleanup, as long as this amount does not exceed 50 percent of the overall development cost of the project.

The Metropolitan Council operates a similar cost-matching cleanup program for developable waste sites within the seven-county metropolitan area.

"Adjacent Disposal Area" Provision under Minnesota's Landfill Cleanup Program

Existing language in the Landfill Cleanup Program legislation (Minn. Stat. 115B.39 — 115B.445) authorizes the state to address a small number of old dumps under the "adjacent disposal area" (ADA) provision in Minn. Stat. 115B.39, subd. 2(j). This



subdivision relates to the definition of a qualified facility, which is a key term because it defines the universe of sites that the MPCA takes responsibility for under this program.

The adjacent disposal areas provision allows the MPCA to expand its cleanup and care authority for waste located outside the permitted boundaries of a qualified landfill in the special case where there is a dump adjacent to the qualified landfill. It allows an adjacent dump to become part and parcel of the qualified facility. With this one exception, the current statute limits the Landfill Cleanup Program to addressing waste that lies within the permitted boundaries of qualified landfills. That is, the MPCA is not authorized to "reach out" from a qualified facility to an old dump a mile away and spend landfill cleanup money at that site.

Some of the adjacent dumps operated prior to the permitted life of the qualified landfill; others

apparently arose out of disposal activities at the same time that the landfill operated, by equipment operators who were not staying within the landfill's permit boundaries. When evaluating an adjacent dump, the MPCA looks both at proximity as well as the waste's characteristics and whether the dump is contributing to the same contamination problem as the main body of the qualified landfill (i.e., the direction of ground-water flow causes contamination from the adjacent disposal areas and the permitted landfill to mingle).

Following is a list of adjacent dumps that are or will be handled under the Landfill Cleanup Program's adjacent disposal areas provision. Some qualified landfills have not yet completed their binding agreements and been accepted into the program, and the MPCA may identify additional dumps as adjacent as it takes over responsibility at those locations.

Table B-1. Dumps Identified to Date Under the Original Closed Landfill Program as "Adjacent Disposal Areas"

| Name | Adjacent to this Qualified Landfill: | Response actions taken to date | Further response actions planned |
|--|---------------------------------------|--|---|
| North Engen and South Engen Dumps | St. Augusta SLF | North Engen excavated and placed on top of St. Augusta SLF and South Engen. Capping completed in 1997. | Monitor entire site. |
| Treloipe Township Dump | Cass County SLF (aka Longville-Remer) | Monitored site. | To be determined. |
| (Unnamed area outside permit boundaries) | Bueckers No. 1 SLF | Excavated and moved onto Bueckers No. 1; capped. | Continue monitoring. |
| Lehnen Dump | Paynesville SLF | Cap installed by operator is believed adequate - MPCA has acquired title to filled area. | Continue monitoring. |
| Fifty Lakes Dump | Fifty Lakes Modified LF | Monitored using wells in place; is closer to receptors than permitted landfill | Excavation and relocation to Fifty Lakes Modified LF in 1998 season |



County Programs

Sherburne County has used money from its "Greater Minnesota Landfill Cleanup Fee" (GMLCF) to assist landowners in remediation of OMDs over the last three years. Under Minn. Stat. 115B.923, the operators of MMSW landfills are required to remit \$2 per cubic yard of solid waste to the Department of Revenue, which generally speaking, pays the GMLCF money to the host county or sanitary district where the landfill is located.

Sherburne County's program, which has won recognition from the National Association of Counties, offers matching money to landowners wishing to remove dumps situated on their property. Twenty-one projects have been completed so far, the largest a dump containing 2,200 cubic yards of old waste. Sherburne County budgets \$100,000 per year on a cost-sharing basis, offering to pay between 75 and 95 percent of the total costs at eligible projects, with the lower percentage applying to the less-costly efforts. The average site has cost the county \$5,500 and the landowner \$1,000. Sherburne limits the program to waste disposed before June 15, 1993; waste dumped after that point is the responsibility of the landowner.

Dakota County has been carrying out site investigation and remediation for almost three years, funded mainly through a solid waste surcharge that is paid on waste disposed at the two private MMSW landfills located in the county. Dakota County's program seeks to develop a working relationship with responsible parties, municipalities, the MPCA, the Minnesota Department of Health, and USEPA Region V.

The county has developed a comprehensive site inventory that includes all known waste-disposal or contaminant-release sites in its borders, recorded in GIS format. Most of these are nonconforming dumps for residential, commercial, agricultural, or industrial waste or are hazardous waste sites. The

county has identified 450 sites that will require evaluation.

Conclusions and projections as to existing dump cleanup and investigation programs

- By July 1998, MPCA will have screened and ranked in priority order 3,500 potential hazardous waste sites, including all 1,200 dump sites now listed on the Open Dump Inventory, using a GIS screening model. The MPCA anticipates that a majority of the dumps (1,100 to 1,150 out of the total 1,200) will screen out as very low priority, meaning the dump location and contents have an insignificant impact on human health and the environment based on current land use.
- By December 31, 1999, MPCA will have conducted field investigations at 50 to 100 of the 1,200 dumps on the ODI that screen out of the GIS model as having possible effects on human health and the environment. The MPCA staff estimates that five to 10 of these dumps (which are not known at this time, and not yet on the Minnesota Permanent List of Priorities) will pose a risk to human health and the environment and will need to complete remediation by December 31, 2003.
- Development of property will continue to generate dump investigations and cleanup, which can be addressed by Brownfield Investigations, participation in the VIC process, or the DTED grant process.
- Dumps that suddenly and unexpectedly present risks to human health and the environment can still be addressed by current Superfund programs that can provide emergency water supplies and, if necessary, time-critical removal of contamination sources.



Further policy options

The following is a list, not necessarily exhaustive, of further steps that the government could take in this area. Because old municipal dumps vary so much in their circumstances and solutions, it may be that there never will be a single policy or program that covers the entire population of old municipal dumps in the same way that the Landfill Cleanup Program covered an entire population of state-permitted landfills used for MMSW that closed by the legislative deadline to enter that program. Therefore the following options should be regarded not as mutually exclusive programs but as measures that might be applied to different situations.

Buffering and isolation of priority sites

This would offer further assistance (through statutory aids or funding or both) to encourage owners to separate dumps from nearby receptors by the purchase of land for buffer zones, augmenting the cover, permanent sealing and abandonment of drinking-water wells, for extension of city water supplies, and other isolating measures. Pending a decision as to the proper remedial action, or pending money to pay for actual cleanup work, short-term actions like these can substantially reduce the long-term costs by keeping receptors away from the source of contamination. At this time, the MPCA has not estimated the costs to implement such a program.

The state might provide matching funds for this purpose and could assist in the planning and zoning technical issues.

Incorporate dump into main structure of Closed Landfill Program

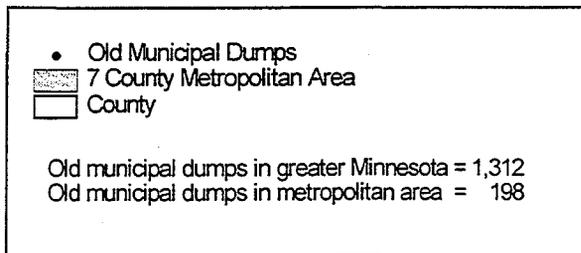
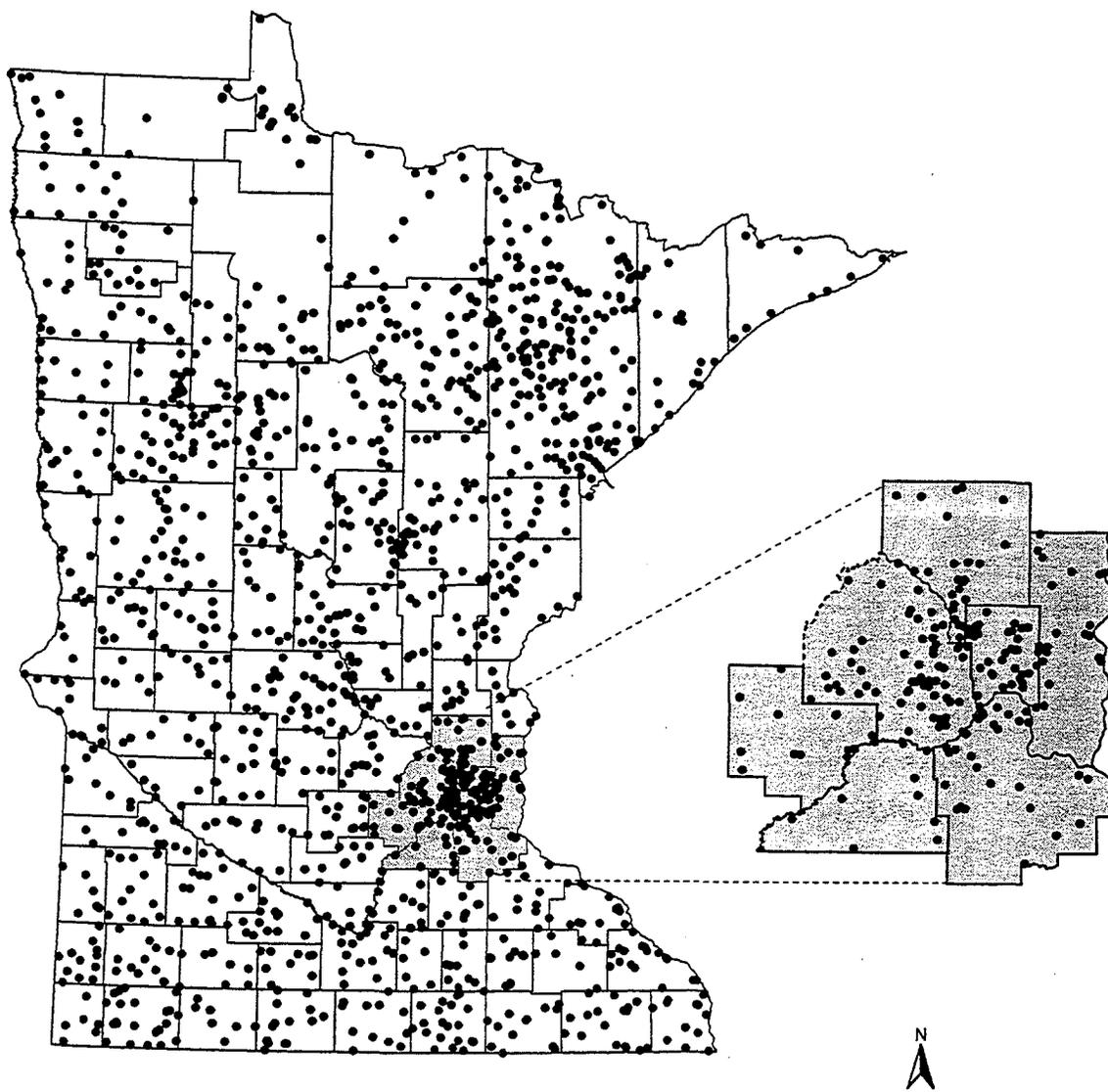
There could be two ways to incorporate old municipal dumps into a system of state care and cleanup. Either the Legislature would expand the program to directly absorb the site into MPCA responsibilities, or the Legislature could extend the Closed Landfill Program to include a permitted

MMSW landfill that is immediately adjacent to an OMD. That would bring the OMD into state care because it would satisfy the "adjacent disposal area" criterion in the law. The MPCA then would take on permanent operation and maintenance work at the site; or it might excavate the OMD and move it on to a larger landfill.

Identification and notice of OMD's on deeds

This could be accomplished by legislation requiring owners of land on which an OMD is located to notify any potential buyers of that land through the use of a deed notification or a deed restriction. This would aid in avoiding changes in land use that could change exposure pathways which could lead to greater risks to human health or the environment. There would be no significant staff cost for implementing this recommendation.

Old Municipal Dumps in Minnesota



This map of old municipal dumps was obtained from research initiated in the 1980's. Please note that this map only depicts dumpsites that the MPCA is aware of. As additional dump sites are discovered in the state of Minnesota they will be added to this list.

December 24, 1997

 Minnesota Pollution Control Agency



Appendix C. Funding Options Discussed by Perpetual Care Workgroup

| Description of Funding Option | Comments and Discussion Points |
|--|---|
| State tax of \$0.50 per person to raise lump sum to pay for perpetual care costs | New tax, not correlated to waste generation or purchase of collection services |
| One-time appropriation from General Fund into dedicated, interest-bearing account to pay for perpetual care at MMSW landfills | Added at the suggestion of the Perpetual Care Workgroup in November 1997; staff concerns about political feasibility and use of General Funds for a sector-specific cost. Some members said prospects of a state surplus next biennium would this possible. |
| Expand the Closed Landfill Program to provide perpetual care for MMSW landfills now open | Now addressed in Chapter VII of report |
| Divert county "host fees" authorized by statute under 115A.919 | Deleted from Perpetual Care Workgroup discussions on May 8, 1997. |
| Divert some or all of GreatMinn Landfill Cleanup Fee under 115A.923 for perpetual care. Structure similar to Metro Landfill Contingency Action Trust Fund (possibly 50 cents/cu yd. to perpetual care fund). | Sensitivity to local conditions; affordability concern; political feasibility. Concerns that this would induce counties to raise other host fees. |
| Divert city or township host fees authorized by statute under 115A. 921 | Deleted from discussions on May 8, 1997; see above. |
| Add-on fee, collected at landfill, to augment perpetual care (i.e., expand financial assurance to cover perpetual care period) | Affordability; sensitivity to local conditions; equity on a national level Other comments: could compensate for above problems by removing other fees on solid waste, or more waste will go out of state |
| Remain at Status Quo (i.e., owner/operator is liable for costs into indefinite future, with Superfund recourse against waste generators) | |
| Carry over excess financial assurance funds that haven't been used at the end of 30 years of postclosure care, into perpetual care fund. | Availability; adequacy. Other comments: consider ramifications where facility owners have no money left over to transfer but need money for perpetual care |
| Money from Environmental Trust Fund set aside in a state-pooled fund each year | Availability of money; dispute resolution; stable source of funding and duration of revenue stream uncertain; equity |
| Insurance options | Needs further discussion with insurance industry |

| Description of Funding Option | Comments and Discussion Points |
|---|---|
| Seek appropriations from Legislature on biennial budgeting schedule; seek "unspent SCORE tax surplus" | Concerns about funding delay; timeliness; equity |
| Insurance bonds | Was incorporated in discussion on insurance proceeds |
| Shift some of current SCORE appropriations into perpetual care | Concerns about political feasibility; security |
| Capture revenues from future use of landfill property | Deleted from discussions on May 8 |
| Impose an additional "sin tax" | Political feasibility concerns |
| Tax or service charge on haulers | Concerns that more fees and taxes would not be politically feasible |
| Pledge bonding authority for county owner/operators | |

Appendix D. Perpetual Care Cost Matrix

Appendix D. Perpetual Care Cost Matrix MMSW Landfills

| Cost Item | Time Period (years) | Frequency or Probability of Occurrence | Estimated Cost (\$/unit) | Degree of Site-specific Confidence (high or low) |
|---|---------------------|--|--|--|
| Routine Monitoring and Maintenance | | | | |
| Groundwater sampling and analysis of indicator parameters list | 30 - perpetuity | 1/year | \$235/well/year for six wells (sampling \$135/year, and VOC analysis \$100/year) (Source: Closed LF Program and PC Workgroup) | High |
| Monitoring well maintenance and replacement (see SF) | 30 - perpetuity | 1/10 years (well replacement is rare, maintenance is predictable) | \$250/well for six wells (Source: Closed LF Program and PC Workgroup) | High |
| Licensing of monitoring wells at private landfills (Fee paid to MDH) | 30 - perpetuity | 1 / year | \$100/well/year (Source: PC Workgroup) | High |
| Checking gas-monitoring probes for gas migration; gas sampling; site visits (for landfills without active gas collection) | 30 - perpetuity | 1/year | \$750/year for site (Source: PC Workgroup) | High |
| Operation and Maintenance | | | | |
| Mowing of final cover (prevents growth of deep-rooting vegetation, that would puncture liners) | 30 - perpetuity | 1/year | \$35/acre/year (Source: closed LF Program) | High |
| Minor erosion repair of final cover (following significant storm; may also follow | 30 - perpetuity | 1/2 years | \$35/acre/year (Source: Closed LF Program, PC Workgroup) | High |

| Cost Item | Time Period (years) | Frequency or Probability of Occurrence | Estimated Cost (\$/unit) | Degree of Site-specific Confidence (high or low) |
|--|---------------------|---|--|--|
| spring snowmelt) | | | | |
| General site maintenance (includes weeds and brush control, maintenance of building, fences and roads) | 30 - perpetuity | 1/year | \$1,200 per year per site, or \$10 / acre, whichever is greater (Source: Closed LF Program, PC Workgroup) | High |
| Gas Monitoring and Maintenance | | | | |
| Electricity | 30 - 40 | daily --- 50% probability that will be running at year 30, and that will run for 10 more years | \$200/acre/year (Source: PC Workgroup; 1994 MPCA Landfill Gas Study, by Barr Engineering, Nov. 1994) | Low |
| Remote Interrogation (meaning data is gathered electronically and transmitted to operator by phone lines, offsite. Eliminates need for some site visits) | 30 - 40 | 1/day --- 50% probability that will be running at year 30, and that will run for 10 more years | \$5,000 /year (Source: Closed LF Program; 1994 MPCA Landfill Gas Study, by Barr Engineering, Nov. 1994) | Low |
| Site visits (including gas flow adjustment and blower maintenance) | 30 - 40 | 1/week --- 50% probability that will be running at year 30, and that will run for 10 more years | \$10,000/year (Source: Closed LF Program) | Low |
| Condensate removal and disposal (note: lined just combines with | 30 - 40 | same frequency as leachate removal --- 50% probability that will be running at year 30, and | \$100/acre/year for lined (Source: Closed LF Program) | Low |

| Cost Item | Time Period (years) | Frequency or Probability of Occurrence | Estimated Cost (\$/unit) | Degree of Site-specific Confidence (high or low) |
|---|---------------------|--|---|--|
| leachate; unlined needs tank for this and must be tested. \$1000 per testing event for unlined) | | that will run for 10 more years | | |
| Flare pilot light gas (keeps pilot going when landfill gas mixture is not flammable) | 30 - 40 | 1/year --- 50% probability that will be running at year 30, and that will run for 10 more years | \$1,000/year (Source: Closed LF Program; 1994 MPCA Landfill Gas Study, by Barr Engineering, Nov. 1994) | Low |
| Gas sampling | 30 - 40 | 1/year --- 50% probability that will be running at year 30, and that will run for 10 more years | \$75/acre/year (Source: Closed LF Program; 1994 MPCA Landfill Gas Study, by Barr Engineering, Nov. 1994) | Low |
| Blower maintenance (every 3 -5 years, blowers need factory overhaul. Each overhaul event is \$3,000) | 30 - 40 | Checked quarterly, during site visits --- 50% probability that will be running at year 30, and that will run for 10 more years | \$1,000/year (Source: Closed LF Program) | Low |
| Operations Report | 30 - 40 | 1/year --- 50% probability that will be running at year 30, and that will run for 10 more years | \$3,400/year (Source: Closed LF Program; 1994 MPCA Landfill Gas Study, by Barr Engineering, Nov. 1994) | Low |
| Blower replacement (for pumping landfill gas from collection system; periodically must be replaced with brand-new units.) | 30 - 40 | 1/10 years --- 50% probability that will be running at year 30, and that will run for 10 more years | \$6,000/replacement (Source: Closed LF Program) | Low |

| Cost Item | Time Period (years) | Frequency or Probability of Occurrence | Estimated Cost (\$/unit) | Degree of Site-specific Confidence (high or low) |
|--|---------------------|---|---|--|
| Regrade pipelines (Following settlement. Requires mobilization of equipment, locating and unearthing of pipelines, replacing pipes and restoring cover system) | 30 - 40 | 1/5 years --- 50% probability that will be running at year 30, and that will run for 10 more years | \$150/acre/year (Note: Event typically runs \$20,000 - 40,000) (Source: Closed LF Program) | Low |
| Repair well heads | 30 - 40 | 1/10 years --- 50% probability that will be running at year 30, and that will run for 10 more years | \$35/acre (Source: Closed LF Program; 1994 MPCA Landfill Gas Study, by Barr Engineering, Nov. 1994) | Low |
| Repair instrumentation | 30 - 40 | 50% probability that will be running at year 30, and that will run for 10 more years | \$300/acre (Source: Closed LF Program; 1994 MPCA Landfill Gas Study, by Barr Engineering, Nov. 1994) | Low |

Leachate Management

| | | | | |
|--|---|-------------------------------------|---|------|
| Leachate hauling and treatment | 30 - 80, assuming by year 80 leachate reaches drinking-water or comparable standard | annually | 10,000 gal/acre/year x \$0.08/gal (Source: PC Workgroup) | High |
| Pump and discharge of leachate from the liner (leachate meets drinking water or comparable standard) | 80 - perpetuity | depends on leachate generation rate | 10,000 gal/acre/year x \$0.005/gallon | High |
| Maintenance of leachate equipment (can include storage equipment, piping, spray equipment) | 30 - 80 | 1/year | \$2,500/year (Source: PC Workgroup) | High |

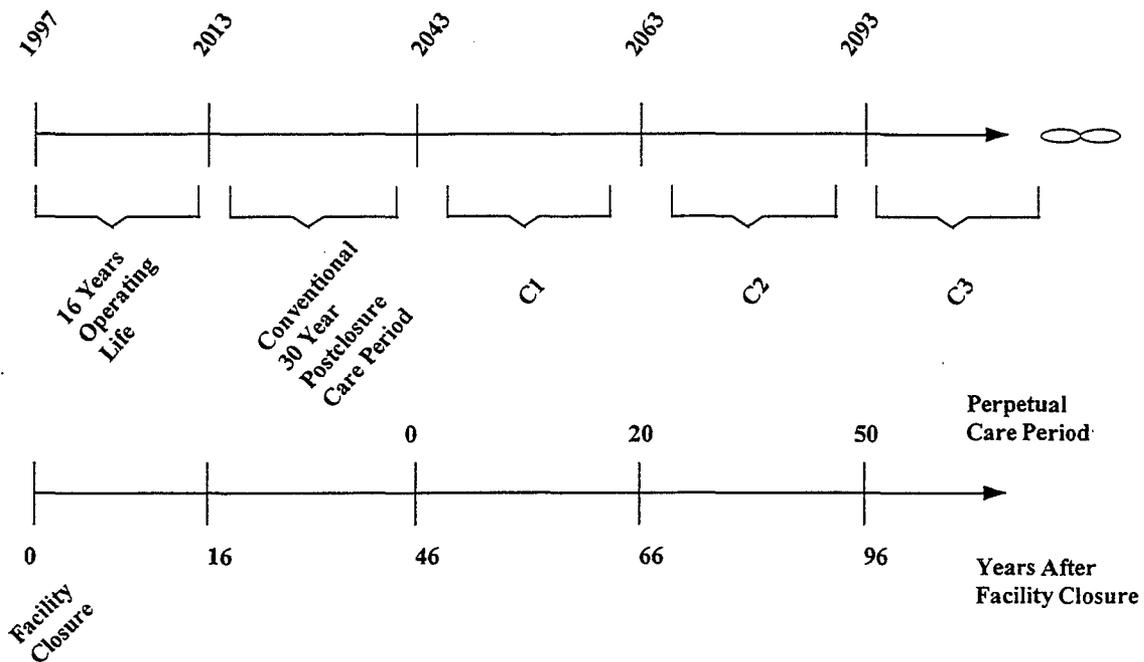
| Cost Item | Time Period (years) | Frequency or Probability of Occurrence | Estimated Cost (\$/unit) | Degree of Site-specific Confidence (high or low) |
|---|--|--|---|--|
| Sampling and analysis of leachate | 30 - 80 | 1/year | \$4,500/year (Source: PC Workgroup) | High |
| Contingency Action Events | | | | |
| Mechanical equipment damage requiring replacement in advance of routine replacement schedule (caused by vandalism, fire, explosion) | 30 - 80, not enough of a concern to include as a cost factor | None | None (Source: PC Workgroup) | NA |
| Damage to surface-water controls such as dikes (include berms on final cover, or chutes conveying surface water to toe of slope, sed. pond) | 30 - perpetuity | 1 / 25 yr. storm | \$61 / acre / year (Source: PC Workgroup) | High |
| Monitoring well failures (gas and groundwater) | 30 - perpetuity | None | None (Source: PC Workgroup) | NA |
| Monitoring probe failure | 30 - perpetuity | None | None (Source: PC Workgroup) | NA |
| Settlement of cover (filling in low places following waste degradation below cover) | 30 - perpetuity | 1 / 5 years | \$1,000 / site / event (Source: PC Workgroup; Closed LF Program) | Low |
| Erosion of cover | 30 - perpetuity | 1 / 25 year storm | \$1,000 / year / site (Source: PC Workgroup; Closed LF Program) | Low |
| Air quality violations and persistent odor complaints | 30 - perpetuity | None, if waste is kept dry | None (Source: PC Workgroup; Closed LF Program) | High |
| Explosive levels of gas near dwellings or occupied buildings | 30 - perpetuity | None, assumes gas migration will be minimized or controlled; waste will be digested or | None (Source: PC Workgroup; Closed LF Program) | NA |

| Cost Item | Time Period (years) | Frequency or Probability of Occurrence | Estimated Cost (\$/unit) | Degree of Site-specific Confidence (high or low) |
|---|---------------------|---|--|--|
| | | will be kept dry, LF gas actions more likely during operation or early in post-closure | | |
| Detection of ground water contamination, either before or after ground water quality violation occurs | 30 - perpetuity | lined, active: 50% probability for cover enhancement lined, passive: 50% probability for cover enhancement and 20% for active gas system mixed, active: 60% probability for cover enhancement mixed, passive: 60% probability for cover enhancement, 20% for pumpout system, 30% for active gas system | \$3,000,000 lump sum for pumpout running eight years (includes contamination analysis) -- \$200,000 per event to rework and replace cover to reduce infiltration (provides for 3-4 acres of replaced cover) --- \$1.5 million for active gas system to remove VOCs from groundwater -- (Source: Closed LF Program, current contingency action plans) | Low |
| Surface water quality violations (e.g., leachate seeps) | 30 - perpetuity | None, design should prevent this | None (Source: PC Workgroup; Closed LF Program) | NA |
| Exceedance of leachate parameters, making previous treatment methods unavailable | 30 - perpetuity | None, peaks occur during operation or soon after closure, so shouldn't occur beyond 30 years after closure | None (Source: PC Workgroup) | NA |
| Liner failure at bottom of landfill (see "GW Quality violations indicated by monitoring wells") | 30 - perpetuity | Will happen eventually at all sites, however not all liner failure situations will require gw remedial action | see "GW Quality violations indicated by monitoring wells" | |
| Plugging or other failure of leachate | 30 - perpetuity | 25% probability per perpetual care period | Low end: no additional cost because backup drainage system handles flow High end: \$22,500 lump sum | Low |

| Cost Item | Time Period (years) | Frequency or Probability of Occurrence | Estimated Cost (\$/unit) | Degree of Site-specific Confidence (high or low) |
|---|---------------------|--|--|--|
| collection system, requiring installation of pumpout wells or use of other alternative collection systems | | | (Assumes 3 extraction wells for 5 acres, @ \$7,500 each) (Source: PC Workgroup; current contingency action plans) | |
| Subsurface fire requiring excavation | 30 - perpetuity | 20% probability per perpetual care period at landfills with active gas collection; 10% if no active gas collection | Firefighting @ \$1,800 / day (assume 7 day fire) ---- Earthmoving and cover repair \$120,000/acre (assumes 2 - 3 acres affected) (Source: PC Workgroup; current contingency action plans) | Low |

Appendix E. Formulas used in Calculating Perpetual Care Costs

MMSW LANDFILL TIMELINE



Note: See attached text for more information on formulas.

All formulas use inflation and interest rates required by rule to be used in calculating financial assurance costs. These rates are conservative.

I. Cost Estimate C_1 : Estimated Costs Expected to Occur for Years 1-20 of the Perpetual Care Period.

Step 1: Inflate Current Annual Cost Estimate for 46 Years (2043)

$$F_{(2043)} = P_{1997} (1 + f)^n$$

where:

P_{1997} = current annual cost estimate for years 1-20 of the perpetual care period;
 f = inflation rate (Survey of Current Business, October 1997) = 2.10%; and
 n = the number of years until the first expense is incurred (46 years).

$$F_{(2043)} = \$2,357,339 (1 + 0.0210)^{46} = \$6,129,081$$

Step 2: Estimate Total Future Costs for Years 1-20 of Perpetual Care (2043-2063)

$$C_{(46-66)} = \sum_{(46-66)} \left[\frac{F_{(2043)} (1 + f)^n}{(1 + i)^n} \right]$$

where:

- $F_{(2043)}$ = inflated annual cost estimate;
- i = interest (discount) rate (Federal Reserve Bank, October 1997) = 5.00%;
- f = inflation rate = 2.10%; and
- n = the number of years until each annual expense is incurred (years 46 - 66 after facility closure or years 1-20 of the perpetual care period).

See attached Table for calculations.

Step 3: Discount Total Future Cost Estimate to Present Value (1997)

$$P_{1997} = \frac{C_{(46-66)}}{(1+i)^n}$$

where:

- P_{1997} = present value of total future costs for years 1-20 of the perpetual care period;
- $C_{(46-66)}$ = total future costs for years 1 - 20 of the perpetual care period;
- i = interest rate = 5.00%; and
- n = the number of years until the first expense is incurred (46 years).

$$C_1 = P_{1997} = \frac{\$92,545,879}{(1 + 0.0500)^{46}} = \boxed{\$9,813,982}$$

II. Cost Estimate C_2 : Estimated Costs Expected to Occurred for Years 21-50 of the Perpetual Care Period.

Step 1: Inflate Current Annual Cost Estimate for 66 Years (2063)

$$F_{(2063)} = P_{1997} (1 + f)^n$$

where:

- P_{1997} = current annual cost estimate for years 21-50 of the perpetual care period;
- f = 1997 inflation = 2.10%; and
- n = the number of years until the first expense is incurred (66 years).

$$F_{(2063)} = \$995,437 (1 + 0.0210)^{66} = \$3,922,022$$

Step 2: Estimate Total Future Costs for Years 21-50 of Perpetual Care (2063-2093)

$$C_{(66-96)} = \sum_{(66-96)} \left[\frac{F_{(2063)} (1 + f)^n}{(1 + i)^n} \right]$$

where:

- $F_{(2063)}$ = inflated annual cost estimate;
- i = interest (discount) rate (Federal Reserve Bank, October 1997) = 5.00%;

f = inflation rate = 2.10%; and
 n = the number of years after each annual expense is incurred (years 66 - 96 after facility closure or years 21-50 of the perpetual care period).

See attached Table for calculations

Step 3: Discount Total Future Cost Estimate to Present Value (1997)

$$P_{1997} = \frac{C_{(66-96)}}{(1+i)^n}$$

where:

P_{1997} = present value of total future costs for years 21-50 of the perpetual care period;
 $C_{(66-96)}$ = total future costs for years 21 - 50 of the perpetual care period;
 i = interest rate - 5.00%; and
 n = number of years until the first expense is incurred (n = 66 years).

$$C_2 = P_{1997} = \frac{\$78,484,304}{(1 + 0.0500)^{66}} = \$3,135,609$$

III. Cost Estimate C_3 : Estimated Costs After Year 50 of Perpetual Care Period.

Step 1: Inflate current annual cost estimate for 96 years (Year 2093).

$$F_{(2093)} = P_{1997} (1 + f)^n$$

where:

P_{1997} = current annual cost estimate after year 50 of the perpetual care period;
 f = inflation rate (Survey of Current Business, October 1997) = 2.10%; and
 n = number of years until the first expense is incurred (96 years).

$$F_{(2093)} = \$334,877 (1 + 0.0210)^{96} = \$2,461,346$$

Step 2: Calculate the amount of funds needed to cover annual costs after year 50 into perpetuity.

for n = infinity, $F_{(2093)} = rC_{96+}$

where:

$F_{(2093)}$ = future annual perpetual care cost estimate;
 C_{96+} = future perpetual care cost estimate for years 50 of perpetual care through infinity; and
 r = real interest rate = $\frac{(i - f)}{(1 + f)} = 2.84\%$

$$\$2,461,346 = (0.0284) C_{96+}$$

$$C_{96+} = \$86,667,111$$

Step 3: Discount Future Costs to Present Value (1997)

$$P_{1997} = \frac{C_{96+}}{(1+i)^n}$$

where:

- P_{1997} = present value of future costs for years 50 through infinity of the perpetual care period;
 C_{96+} = future perpetual care cost estimate for years 50 through infinity of the perpetual care period;
 i = interest rate = 5.00%; and
 n = number of years until the first expense is incurred (96 years).

$$C_3 = P_{1997} = \frac{\$86,667,111}{(1 + 0.0500)^{96}} = \boxed{\$801,064}$$

IV. Total Present Value Costs for Perpetual Care

$$P_{1997} = C_1 + C_2 + C_3 = \$9,813,982 + \$3,134,609 + \$801,064 = \boxed{\$13,750,655}$$

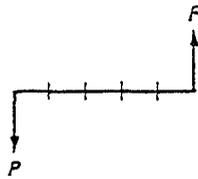
| Perpetual Care Period High Confidence Cost Estimates | | | | | |
|---|----|---------------------------------|--|-----------------------------|-------------|
| 2043 Annual Perpetual Care High Confidence Cost Estimate for Years 30-49: | | | | | \$2,573,160 |
| Inflation Factor = | | 2.10% | | | |
| Discount Rate = | | 5.00% | | | |
| Year | n | Inflated Annual | | Inflated and Discounted | |
| | | Cost | | Annual Cost | |
| 2044 | 1 | \$2,627,197 | | \$2,502,092 | |
| 2045 | 2 | \$2,682,368 | | \$2,432,987 | |
| 2046 | 3 | \$2,738,697 | | \$2,365,790 | |
| 2047 | 4 | \$2,796,210 | | \$2,300,449 | |
| 2048 | 5 | \$2,854,930 | | \$2,236,913 | |
| 2049 | 6 | \$2,914,884 | | \$2,175,131 | |
| 2050 | 7 | \$2,976,097 | | \$2,115,056 | |
| 2051 | 8 | \$3,038,595 | | \$2,056,640 | |
| 2052 | 9 | \$3,102,405 | | \$1,999,838 | |
| 2053 | 10 | \$3,167,556 | | \$1,944,604 | |
| 2054 | 11 | \$3,234,074 | | \$1,890,896 | |
| 2055 | 12 | \$3,301,990 | | \$1,838,671 | |
| 2056 | 13 | \$3,371,332 | | \$1,787,889 | |
| 2057 | 14 | \$3,442,130 | | \$1,738,509 | |
| 2058 | 15 | \$3,514,414 | | \$1,690,493 | |
| 2059 | 16 | \$3,588,217 | | \$1,643,804 | |
| 2060 | 17 | \$3,663,570 | | \$1,598,403 | |
| 2061 | 18 | \$3,740,505 | | \$1,554,257 | |
| 2062 | 19 | \$3,819,055 | | \$1,511,330 | |
| 2063 | 20 | \$3,899,255 | | \$1,469,588 | |
| Totals | | \$64,473,479 | | \$38,853,342 | |
| | | (Current Value -not discounted) | | (Present Value -discounted) | |
| 2063 Annual Perpetual Care High Confidence Cost Estimate for Years 50-79: | | | | | \$3,894,599 |
| Year | n | Inflated Annual | | Inflated and Discounted | |
| | | Cost | | Annual Cost | |
| 2064 | 1 | \$3,976,386 | | \$3,787,034 | |
| 2065 | 2 | \$4,059,890 | | \$3,682,440 | |
| 2066 | 3 | \$4,145,148 | | \$3,580,734 | |
| 2067 | 4 | \$4,232,196 | | \$3,481,838 | |
| 2068 | 5 | \$4,321,072 | | \$3,385,673 | |
| 2069 | 6 | \$4,411,814 | | \$3,292,164 | |
| 2070 | 7 | \$4,504,463 | | \$3,201,237 | |
| 2071 | 8 | \$4,599,056 | | \$3,112,822 | |
| 2072 | 9 | \$4,695,636 | | \$3,026,849 | |
| 2073 | 10 | \$4,794,245 | | \$2,943,250 | |
| 2074 | 11 | \$4,894,924 | | \$2,861,961 | |
| 2075 | 12 | \$4,997,717 | | \$2,782,916 | |
| 2076 | 13 | \$5,102,669 | | \$2,706,055 | |
| 2077 | 14 | \$5,209,826 | | \$2,631,316 | |

| | | | | | |
|--|----|---------------------------------|--|-----------------------------|----------------------|
| 2078 | 15 | \$5,319,232 | | \$2,558,641 | |
| 2079 | 16 | \$5,430,936 | | \$2,487,974 | |
| 2080 | 17 | \$5,544,985 | | \$2,419,259 | |
| 2081 | 18 | \$5,661,430 | | \$2,352,441 | |
| 2082 | 19 | \$5,780,320 | | \$2,287,469 | |
| 2083 | 20 | \$5,901,707 | | \$2,224,291 | |
| 2084 | 21 | \$6,025,643 | | \$2,162,858 | |
| 2085 | 22 | \$6,152,181 | | \$2,103,122 | |
| 2086 | 23 | \$6,281,377 | | \$2,045,036 | |
| 2087 | 24 | \$6,413,286 | | \$1,988,554 | |
| 2088 | 25 | \$6,547,965 | | \$1,933,632 | |
| 2089 | 26 | \$6,685,472 | | \$1,880,227 | |
| 2090 | 27 | \$6,825,867 | | \$1,828,297 | |
| 2091 | 28 | \$6,969,210 | | \$1,777,801 | |
| 2092 | 29 | \$7,115,564 | | \$1,728,700 | |
| 2093 | 30 | \$7,264,991 | | \$1,680,955 | |
| Totals | | \$163,865,208 | | \$77,935,550 | |
| | | (Current Value -not discounted) | | (Present Value -discounted) | |
| | | | | | |
| Perpetual Care High Confidence Cost Estimates | | | | Current Value * | Present Value |
| 1997 Perpetual Care Cost Estimate for Years 30-49: | | | | \$19,793,540 | \$4,120,185 |
| 1997 Perpetual Care Cost Estimate for Years 50-79: | | | | \$29,654,310 | \$3,113,686 |
| 1997 Perpetual Care Cost Estimate for Years 80 - infinity: | | | | NA | \$784,415 |
| TOTAL | | | | \$49,447,850 | \$8,018,285 |
| * Current Value Estimates do not include inflationary component. | | | | | |

| Perpetual Care Period Low Confidence Cost Estimates | | | | |
|--|----|---------------------------------|-------------------------------------|-------------|
| 2043 Annual Perpetual Care Low Confidence Cost Estimate for Years 30-49: | | | | \$3,555,921 |
| Inflation Factor = | | 2.10% | | |
| Discount Rate = | | 5.00% | | |
| Year | n | Inflated Annual Cost | Inflated and Discounted Annual Cost | |
| 2044 | 1 | \$3,630,596 | \$3,457,710 | |
| 2045 | 2 | \$3,706,838 | \$3,362,211 | |
| 2046 | 3 | \$3,784,682 | \$3,269,350 | |
| 2047 | 4 | \$3,864,160 | \$3,179,054 | |
| 2048 | 5 | \$3,945,307 | \$3,091,252 | |
| 2049 | 6 | \$4,028,159 | \$3,005,874 | |
| 2050 | 7 | \$4,112,750 | \$2,922,855 | |
| 2051 | 8 | \$4,199,118 | \$2,842,128 | |
| 2052 | 9 | \$4,287,299 | \$2,763,631 | |
| 2053 | 10 | \$4,377,333 | \$2,687,303 | |
| 2054 | 11 | \$4,469,257 | \$2,613,082 | |
| 2055 | 12 | \$4,563,111 | \$2,540,911 | |
| 2056 | 13 | \$4,658,936 | \$2,470,733 | |
| 2057 | 14 | \$4,756,774 | \$2,402,494 | |
| 2058 | 15 | \$4,856,666 | \$2,336,140 | |
| 2059 | 16 | \$4,958,656 | \$2,271,618 | |
| 2060 | 17 | \$5,062,788 | \$2,208,878 | |
| 2061 | 18 | \$5,169,107 | \$2,147,871 | |
| 2062 | 19 | \$5,277,658 | \$2,088,548 | |
| 2063 | 20 | \$5,388,489 | \$2,030,865 | |
| Totals | | \$89,097,683 | \$53,692,507 | |
| | | (Current Value -not discounted) | (Present Value -discounted) | |
| 2063 Annual Perpetual Care Low Confidence Cost Estimate for Years 50-79: | | | | \$27,422 |
| Year | n | Inflated Annual Cost | Inflated and Discounted Annual Cost | |
| 2064 | 1 | \$27,998 | \$26,665 | |
| 2065 | 2 | \$28,586 | \$25,929 | |
| 2066 | 3 | \$29,187 | \$25,212 | |
| 2067 | 4 | \$29,799 | \$24,516 | |
| 2068 | 5 | \$30,425 | \$23,839 | |
| 2069 | 6 | \$31,064 | \$23,181 | |
| 2070 | 7 | \$31,717 | \$22,540 | |
| 2071 | 8 | \$32,383 | \$21,918 | |
| 2072 | 9 | \$33,063 | \$21,312 | |
| 2073 | 10 | \$33,757 | \$20,724 | |
| 2074 | 11 | \$34,466 | \$20,151 | |
| 2075 | 12 | \$35,190 | \$19,595 | |
| 2076 | 13 | \$35,929 | \$19,054 | |
| 2077 | 14 | \$36,683 | \$18,527 | |

| | | | | | |
|--|----|---------------------------------|-----------------------------|------------------------|----------------------|
| 2078 | 15 | \$37,453 | | \$18,016 | |
| 2079 | 16 | \$38,240 | | \$17,518 | |
| 2080 | 17 | \$39,043 | | \$17,034 | |
| 2081 | 18 | \$39,863 | | \$16,564 | |
| 2082 | 19 | \$40,700 | | \$16,106 | |
| 2083 | 20 | \$41,555 | | \$15,662 | |
| 2084 | 21 | \$42,427 | | \$15,229 | |
| 2085 | 22 | \$43,318 | | \$14,808 | |
| 2086 | 23 | \$44,228 | | \$14,399 | |
| 2087 | 24 | \$45,157 | | \$14,002 | |
| 2088 | 25 | \$46,105 | | \$13,615 | |
| 2089 | 26 | \$47,073 | | \$13,239 | |
| 2090 | 27 | \$48,062 | | \$12,873 | |
| 2091 | 28 | \$49,071 | | \$12,518 | |
| 2092 | 29 | \$50,102 | | \$12,172 | |
| 2093 | 30 | \$51,154 | | \$11,836 | |
| Totals | | \$1,153,797 | | \$548,755 | |
| | | (Current Value -not discounted) | (Present Value -discounted) | | |
| | | | | | |
| | | | | | |
| Perpetual Care Low Confidence Cost Estimates | | | | Current Value * | Present Value |
| 1997 Perpetual Care Cost Estimate for Years 30-49: | | | | \$27,353,240 | \$5,693,797 |
| 1997 Perpetual Care Cost Estimate for Years 50-79: | | | | \$208,800 | \$21,924 |
| 1997 Perpetual Care Cost Estimate for Years 80 - infinity: | | | | NA | \$16,649 |
| TOTAL | | | | \$27,562,040 | \$5,732,370 |
| * Current Value Estimates do not include inflationary component. | | | | | |

| Perpetual Care High Confidence Costs | | | | |
|---|--------------|--------------|------------------|---------------|
| MSW Landfill | Years 30-49 | Years 50-79 | Year 80 - infini | Total Costs |
| Current Cost *1 and *2 | \$19,793,540 | \$29,654,310 | NA | \$49,447,850 |
| Annual Inflated Cost | \$2,573,160 | \$3,894,599 | \$2,410,190 | \$8,877,950 |
| Future Value Cost | \$38,853,342 | \$77,935,550 | \$84,865,843 | \$201,654,735 |
| Present Value Cost | \$4,120,185 | \$3,113,686 | \$784,415 | \$8,018,285 |
| Amount Needed at Closur | \$8,993,829 | \$6,794,730 | \$1,712,386 | \$17,500,945 |
| *1 - Note: Total Current Cost estimate does not include a value for costs after year 80 because assumption | | | | |
| *2 - Current Value Estimates do not include inflationary component. | | | | |
| Perpetual Care Low Confidence Cost Estimates | | | | |
| MSW Landfill | Years 30-49 | Years 50-79 | Year 80 - infini | Total Costs |
| Current Cost *1 and *2 | \$27,353,240 | \$208,800 | NA | \$27,562,040 |
| Annual Inflated Cost | \$3,555,921 | \$27,422 | \$51,156 | \$3,634,500 |
| Future Value Cost | \$53,692,507 | \$548,755 | \$1,801,268 | \$56,042,529 |
| Present Value Cost | \$5,693,797 | \$21,924 | \$16,649 | \$5,732,370 |
| Amount Needed at Closur | \$12,428,821 | \$47,843 | \$36,345 | \$12,513,009 |
| *1 - Note: Total Current Cost estimate does not include a value for costs after year 80 because assumption is based on using interest earnings and there is currently no interest earnings. | | | | |
| *2 - Current Value Estimates do not include inflationary component. | | | | |
| Total Perpetual Care Costs | | | | |
| MSW Landfill | Years 30-49 | Years 50-79 | Year 80 - infini | Total Costs |
| Current Cost *1 and *2 | \$47,146,780 | \$29,863,110 | | \$77,009,890 |
| Annual Inflated Cost | \$6,129,081 | \$3,922,022 | \$2,461,346 | \$12,512,449 |
| Future Value Cost | \$92,545,849 | \$78,484,304 | \$86,667,111 | \$257,697,264 |
| Present Value Cost | \$9,813,982 | \$3,135,609 | \$801,064 | \$13,750,655 |
| Amount Needed at Closur | \$21,422,650 | \$6,842,572 | \$1,748,731 | \$30,013,953 |
| *1 - Note: Total Current Cost estimate does not include a value for costs after year 80 because assumption is based on using interest earnings and there is currently no interest earnings. | | | | |
| *2 - Current Value Estimates do not include inflationary component. | | | | |

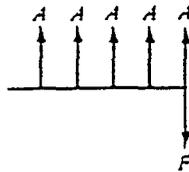


* To Find F ($F/P, i\%, n$)
 Given P
 $F = P(1 + i)^n$

COMPOUND AMOUNT

* To Find P ($P/F, i\%, n$)
 Given F
 $P = F(1 + i)^{-n}$

PRESENT WORTH

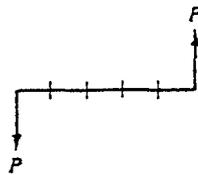


* To Find A ($A/F, i\%, n$)
 Given F
 $A = F \left[\frac{i}{(1 + i)^n - 1} \right]$

SINKING FUND

To Find F ($F/A, i\%, n$)
 Given A
 $F = A \left[\frac{(1 + i)^n - 1}{i} \right]$

SERIES COMPOUND AMOUNT

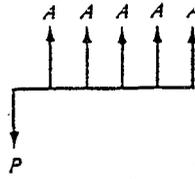


To Find F ($F/P, r\%, n$)
 Given P
 $F = Pe^{rn}$

CONTINUOUS COMPOUNDING
COMPOUND AMOUNT

To Find P ($P/F, r\%, n$)
 Given F
 $P = Fe^{-rn}$

PRESENT WORTH



To Find A
Given P ($A/P, i\%, n$)

$$A = P \left[\frac{i(1+i)^n}{(1+i)^n - 1} \right]$$

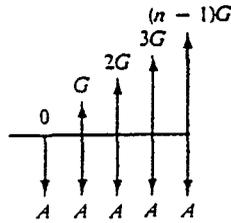
CAPITAL RECOVERY



To Find P
Given A ($P/A, i\%, n$)

$$P = A \left[\frac{(1+i)^n - 1}{i(1+i)^n} \right]$$

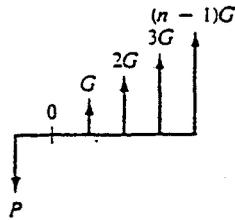
SERIES PRESENT WORTH



To Find A
Given G ($A/G, i\%, n$)

$$A = G \left[\frac{1}{i} - \frac{n}{(1+i)^n - 1} \right]$$

GRADIENT UNIFORM SERIES
(Arithmetic Gradient To Uniform Series)



To Find P
Given G ($P/G, i\%, n$)

$$P = \frac{G}{i} \left[\frac{(1+i)^n - 1}{i} - n \right] \left[\frac{1}{(1+i)^n} \right]$$

GRADIENT PRESENT WORTH
(Arithmetic Gradient To Present Worth)

multiple of the lives of the two alternatives seems reasonable in the revised Example 5-3. What would one do, however, if in another situation the alternatives had useful lives of 7 and 13 years, respectively? Here the least common multiple of lives is 91 years. An analysis period of 91 years hardly seems realistic. Instead, a suitable analysis period should be based on how long the equipment is likely to be needed. This may require that terminal values be estimated for the alternatives at some point prior to the end of their useful lives. Figure 5-1 graphically represents this concept. As Figure

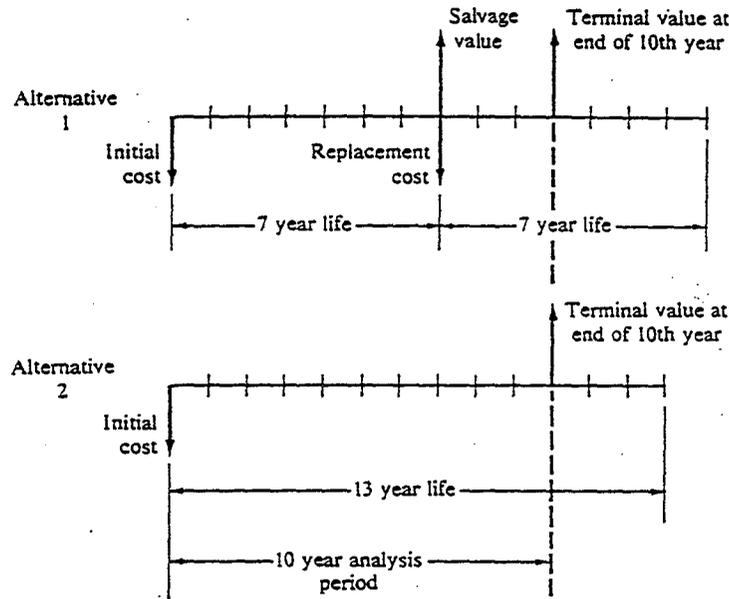


Figure 5-1. Superimposing an analysis period on 7 and 13 year alternatives.

5-1 indicates, it is not necessary for the analysis period to equal the useful life of an alternative or some multiple of the useful life. To properly reflect the situation at the end of the analysis period an estimate is required of the market value of the equipment at that time. The calculations might be easier if everything came out even, but it is not essential.

Infinite Analysis Period—Capitalized Cost

Another difficulty in present worth analysis arises when we encounter an infinite analysis period ($n = \infty$). In governmental analyses there are at times circumstances where a service or condition is to be maintained for an infinite period. The need for roads, dams, pipelines, or whatever are sometimes considered permanent. In these situations a present worth of cost

analysis would have an infinite analysis period. We call this particular analysis *capitalized cost*.

Capitalized cost is the present sum of money that would need to be set aside now at some interest rate to yield the funds required to provide the service or whatever indefinitely. To accomplish this, means that the money set aside for future expenditures must not decline. The interest received on the money set aside can be spent, but not the principal. When one stops to think about an infinite analysis period (as opposed to something relatively short like 100 years) we see that an undiminished principal sum is essential, otherwise one will of necessity run out of money prior to infinity.

In Chapter 4 we saw that:

$$\begin{array}{rcccc} \text{Principal sum} & + & \text{interest for the period} & = & \text{amount at end of period} \\ P & + & iP & = & P + iP \end{array}$$

If we spend iP , then in the next interest period the principal sum P will again increase to $P + iP$. Thus we can again spend iP . This concept may be illustrated by a numerical example. Suppose you deposited \$200 in a bank that paid 4% interest annually. How much money could be withdrawn each year without reducing the balance in the account below the initial \$200?

At the end of the first year the \$200 would earn 4%(\$200) = \$8 interest. If this interest were withdrawn, the \$200 would remain in the account. At the end of the second year the \$200 balance would again earn 4%(\$200) = \$8. This \$8 could also be withdrawn and the account would still have \$200. This procedure could be continued indefinitely and the bank account would always contain \$200. The year-by-year situation would be as follows:

$$\begin{array}{l} \$200 \text{ initial } \xrightarrow{\text{Year one}} 200 + 8 = 208 \\ \quad P \text{ withdrawal } iP = \frac{8}{200} \xrightarrow{\text{Year two}} 200 + 8 = 208 \\ \qquad \qquad \qquad \text{withdrawal } iP = \frac{8}{200} \xrightarrow{\text{Year three}} 200 + 8 = 208 \\ \qquad \qquad \qquad \qquad \qquad \qquad \text{withdrawal } iP = \frac{8}{200} \end{array}$$

and so on

Thus for an initial present sum P there can be an end-of-period withdrawal of A equal to iP each period, and these withdrawals may continue forever without diminishing the initial sum P . This gives us the basic relationship:

$$\text{for } n = \infty \quad A = iP$$

This relationship is the key to capitalized cost calculations. We previously

defined capitalized cost as the present sum of money that would need to be set aside at some interest rate to yield the funds to provide the desired task or service forever. Capitalized cost is therefore the P in the equation $A = iP$. If we can resolve the desired task or service into an equivalent A , the capitalized cost may be computed. The following examples illustrate the computations.

EXAMPLE 5-5

How much should one set aside to pay for \$50 per year maintenance on a gravesite if interest is assumed to be 4%? For perpetual maintenance the principal sum must remain undiminished after making the annual disbursement.

$$\text{Capitalized cost } P = \frac{\text{Annual disbursement } A}{\text{Interest rate } i}$$

$$P = \frac{50}{0.04} = \$1250$$

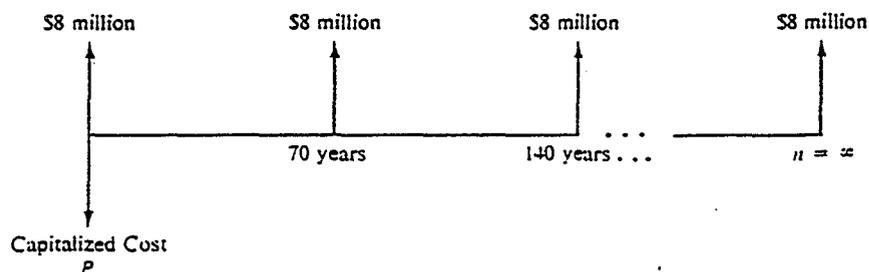
EXAMPLE 5-6

A city plans a pipeline to transport water from a distant watershed area to the city. The pipeline will cost \$8 million and have an expected life of 70 years. The city anticipates it will need to keep the water line in service indefinitely. Compute the capitalized cost assuming 7% interest.

We have the capitalized cost equation

$$P = \frac{A}{i}$$

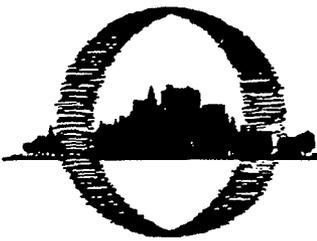
that is simple to apply when there are end-of-period disbursements A . Here we have renewals of the pipeline every 70 years. To compute the capitalized cost, it is necessary to first compute an end-of-period disbursement A that is equivalent to \$8 million every 70 years.



The \$8 million disbursement at the end of 70 years may be resolved into an equivalent A .



Appendix F. External Stakeholder Comment Letters



COUNTY OF
Olmsted

PUBLIC WORKS DEPARTMENT
2122 CAMPUS DR SE
ROCHESTER MN 55904-4744
507/285-8231

TO: PERPETUAL CARE WORKGROUP MEMBERS

FROM: DENNIS H. SIEMS *DHS*

DATE: APRIL 14, 1997

SUBJECT: FUNDING PERPETUAL CARE

I fully agree that landfill owners must provide funding for the 30 year post closure care period and any contingency actions required at their sites during that period. But we should not be required to fund for perpetual care and contingency actions beyond the 30 year post closure care period. The Environmental Protection Agency and other neighboring states do not presently require perpetual care funding. Requiring Minnesota landfills to fund a program like this would put us at a greater disadvantage than we already are. Current market forces and the fact that neighboring states are not presently required to fund for contingency actions during the 30 year post closure period are bad enough.

I feel that perpetual care of Minnesota's landfills is a societal problem, therefore, it should be paid for by all Minnesotans. I would propose that an environmental fund be created that is untouchable for any other purpose than the perpetual care of Minnesota's closed landfills. Once created the only thing the governor or the legislature could do with the fund is raise, lower, or eliminate the funding mechanism.

I propose that a line be added to the state income tax form, much like the wildlife line, although this would be mandatory. On this line each family would be required to pay \$1.00 per person in the household and each employer would pay \$1.00 per employee. This would be very fair because the larger the family or employer generally the more waste they generate.

Another interesting thing that could happen is that after 5 to 10 years the fund may be large enough that the present closed landfill program may be able to operate off of the interest. This is assuming that the closed program has completed most of their large capital projects and is in a maintenance mode. Therefore the fees presently being collected to fund the closed program could be eliminated.



AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

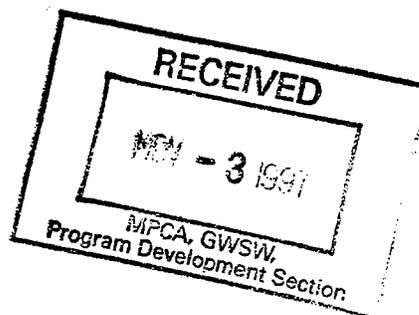
98



Pine Bend Landfill, Inc.

October 30, 1997

Ms. Cristine Leavitt
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155



RE: Comments on MMSW Landfill Perpetual Care Draft Report

Dear Ms. Leavitt:

Thank you for the opportunity to comment on the facility-specific numbers and draft perpetual care cost estimates provided by the Minnesota Pollution Control Agency.

Please consider the following recommendations when preparing the draft report:

- Funding Option 6 (with elements of 10 and 11, remaining with the status quo, with possibility of later legislative appropriations to fill the gaps), seems to be the appropriate action at this time. There has been no demonstrated need for perpetual care funding to date and no necessary dollar amount has been determined.
- Metropolitan area landfills are already participating in a perpetual care plan under the Metropolitan Landfill Contingency Action fund, Minnesota Statute 473.845, Subd.3.2. Therefore, there is no need to place additional fees for perpetual care on metro area landfills.
- The chart depicting specific costs at Pine Bend Landfill, SW-45, contains inaccuracies. The lined acreage expected at closure is estimated at 65 acres, not 94 acres. The unlined acreage expected at closure is 111 acres, not 109 acres. The acreage with active gas collection operating at year 30 is unknown. I cannot comment on the accuracy or the appropriateness of annual "high confidence" costs for years 30-49, 50-89 and 90-perpetuity, because I do not know what assumptions have been made in developing those numbers.

Thank you for the chance to make comments on this issue. I look forward to reviewing the forthcoming draft report. Please call me at 450-2157 with any questions or comments.

Sincerely,

BROWNING-FERRIS INDUSTRIES

Sabina K. Ylinen

Sabina K. Ylinen
Environmental, Safety & Health Manager

cc: Tim Goodman, BFI
Chuck Wegner, BFI

ROY A. LUUKKONEN AUDITOR
RICHARD D. ROTTSCHAFFER, M.D. CORONER
DICK ROSS SHERIFF
DONALD F. RYAN ATTORNEY
LAUREEN E. BORDEN TREASURER
KATHY LUDENIA RECORDER
MARTYN SCHMIDT ASSESSOR

DUANE A. BLANCK, P.E. HIGHWAY ENGINEER
VACANT SURVEYOR
THOMAS J. COWELL LAND COMMISSIONER
DARRELL PASKE COURT ADMINISTRATOR
CAROL CARLSON COMMUNITY HEALTH ADMINISTRATOR
TODD HOLMAN PLANNING AND ZONING
DOUGLAS R. MORRIS SOLID WASTE COORDINATOR

GARY M. ZGUTOWICZ COMMUNITY SOCIAL SERVICES DIRECTOR
DAVID R. SCHULDHEISZ VETERANS SERVICE & EMERGENCY MANAGEMENT

COUNTY COMMISSIONERS
JOHN R. FERRARI, CHAIRMAN GILBERT B. DEWES, VICE CHAIRMAN
JAMES "JIM" HILL PAUL M. THIEDE TERRY SLUSS

TELEPHONE (218) 828-2971
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October 30, 1997

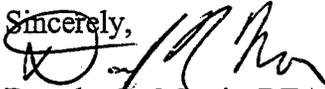
Minnesota Pollution Control Agency
Solid Waste Planning and Assistance Unit
Program Development Section
Attn: Cristine Leavitt and Jim Chiles
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Re: Comments on "Perpetual Care" Cost Estimates

I appreciate the opportunity to comment on subject matrix and cost estimates. Our County is greatly interested in this "Perpetual Care" for Landfills since we currently own a solid waste disposal facility and a closed unlined landfill that was not incorporated into the State's closed landfill program.

Overall my comments outlined in my July 10, 1997 Ltr, Subject Comments on "Perpetual Care Evaluation and Ranking Matrix", to your office still stand. I am unable to agree to the cost, based on non-available existing data. Currently, USEPA Subtitle D post closure care requirements and currently existing conditions and development plans that any care beyond 30 years will be minimal.

I feel this issue is being presented as a risk much greater than it should be. There are many other high risk activities that greatly affect the health and welfare of the citizens of the State that are not being addressed as in-depth. I will oppose any recommendations that is not based on objective research, not a notion that it is a good idea. I have not seen any objective research that shows that lined landfill are a potential risk to perpetuity, in addition many of the lined landfill operators are incorporating new state-of-the-art concepts (i.e. leachate recirculation) that has a potential of reducing the existing perceived risks even more. I feel that the recommendation the group came up with on their last meeting still hold true and should be the recommendation to the Legislation; **"Further investigation of lined landfill and the concept of perpetual care is required, and any final recommendations will be then based on substantiated information."**

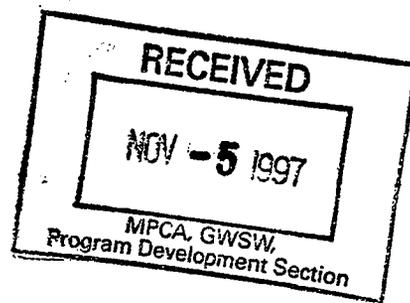
Sincerely,

Douglas R. Morris, REA & REP
Solid Waste Coordinator

Enclosure - Information on Gas System for SW-111



SOLID WASTE COORDINATOR
CROW WING COUNTY COMPLEX WEST
301 LAUREL STREET
BRainerd, MINNESOTA 56401-3522

CROW WING COUNTY
BRainerd, MINNESOTA 56401





COUNTY OF

*Olmsted*PUBLIC WORKS DEPARTMENT
2122 CAMPUS DR SE
ROCHESTER MN 55904-4744
507/285-8231

November 26, 1997

Christine Leavitt & Jim Chiles
Minnesota Pollution Control Agency
Program Development Section
Ground Water & Solid Waste Division

Dear Cristine & Jim:

I would like to make the following comments on the draft Landfill Liability Study, dated November 13, 1997.

It is too early to know if perpetual care is needed for today's modern landfills. First, they are designed much better than landfills of the past, utilizing composite liners and leachate collection systems. Secondly, the waste is screened much better now and that along with hazardous waste collection programs would have the effect of lowering the toxicity of the leachate.

The cost for landfill covers should be \$30,000 to \$70,000 because if you have onsite soils they can be built for \$30,000.

As per your direction, Lanny Peissig and I have agreed on 10,000 gallons per acre for leachate generation for closed sites.

I would like the opportunity to review with you how you arrived at the annual perpetual care cost for the Kalmar Landfill. I have not been able to duplicate your numbers when I due the calculations.

A sixth funding option should be listed in the report. The legislature puts \$16.5 million dollars from the general fund into a dedicated long term trust fund. This option would not raise the cost of operations at Minnesota landfills and force more waste out of the state. This option would also rank at the top in each category of your Perpetual Care Proposal Evaluation Matrix. In my mind, this is by far the best funding option identified to date.

Thank you for the opportunity to comment on the report. If you have any questions, feel free to contact me.

Sincerely,

Dennis H. Siems



AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

ROY A. LUUKKONEN AUDITOR
RICHARD D. ROTTSCHAFFER, M.D. CORONER
DICK ROSS SHERIFF
DONALD F. RYAN ATTORNEY
LAUREEN E. BORDEN TREASURER
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VACANT SURVEYOR
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GARY M. ZGUTOWICZ COMMUNITY SOCIAL SERVICES DIRECTOR
DAVID R. SCHULDHEISZ VETERANS SERVICE & EMERGENCY MANAGEMENT

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JOHN R. FERRARI, CHAIRMAN GILBERT B. DEWES, VICE CHAIRMAN
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TELEPHONE (218) 828-2971
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December 16, 1997

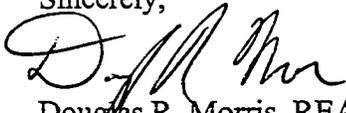
Minnesota Pollution Control Agency
Solid Waste Planning and Assistance Unit
Program Development Section
Attn: Cristine Leavitt and Jim Chiles
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Re: Comments on Landfill Liability Study, dated 12/08/97

I appreciate the opportunity to comment on subject Study. I am submitting some additional written comments. Most of my previous written comments were addressed per phone conversation between myself and Christine Leavitt on December 11, 1997. My schedule does not allow me to attend the scheduled public meeting on December 17, 1997. If you have any questions or need additional information, let me know.

Our County is greatly interested in this Study for it may impact (positively and/or negatively) the Greater Minnesota facilities and counties if the recommendations presented become law through future legislation initiatives or internal agency policy development and implementation.

Sincerely,


Douglas R. Morris, REA & REP
Solid Waste Coordinator

Enclosure



SOLID WASTE COORDINATOR
CROW WING COUNTY COMPLEX WEST
301 LAUREL STREET
BRAINERD, MINNESOTA 56401-3522

CROW WING COUNTY

BRAINERD, MINNESOTA 56401

RECEIVED

DEC 16 1997

MPCA, GWSW,
Development Section

CROW WING COUNTY
COMMENTS CONCERNING DRAFT (12/08/97)
LANDFILL LIABILITY REPORT
December 16, 1997

First, I would like to take this time to say that both Christine Leavitt and Jim Chiles have done an excellent job in the preparation of this study. The Study topic is very diverse and they have prepared a document that captures the basic issues and present the issues in a neutral light. Overall, Christine has addressed the majority of my concerns. The following is some additional issues:

Comments are in order as they appear in the report.

1. Pg 4., last Para.

A. "Up-front source reduction..."

ISSUE:

May also wish to point out that this reduces the long term liability in all the disposal options currently available for solid waste; composting and incineration also.

2. Chap II, Pg 5, Para A, 2nd paragraph

A. "..... Under current requirements"

ISSUE:

Maybe change to: "Under current **federal and state** requirements..." That way if requirements are different you can than expand to show these differences.

3. Chap II, Pg 9, Para B, 3rd paragraph

A. "... medium to large ..."

ISSUE:

Maybe clarify what is considered a "medium"and "large" landfill.

4. Chap III, Pg 17, Table

A. Obligation Column

ISSUE:

In reviewing the amounts each facility has, it appears that the FA for all facilities are not being held to a constant standard with MPCA. This issue was addressed in our phone conversation.

5. Chap III, Pg 34 & Chap IX, pg 47

A. Option 5 (A)

ISSUE:

Need much more explanation from MPCA and justification in this report for this concept. First, landfills are and will in the future play an import part of the overall states integrated solid waste management system. Why should landfills that remain open to fulfill this need be punished? If in-state landfills are forced to close, how is the state going to address our state's waste liability concerns in out of state facilities? Also, both OEA and MPCA future goals is addressing toxicity of waste, which in the long term should lower the liability of operating a landfill. Another point is, many of the landfills are on a phased development schedule. We just closed Cell #1, with more Cells to close in the future. When we do eventually close the entire site, these older cells will already had many years to reach a steady state condition. So of the entire site, only the most recently closed area will have the greatest concern for contingency action. This being the case, why the escalating-cost?

November 26, 1997



Mr. Jim Chiles and Ms. Christine Leavitt
 Minnesota Pollution Control Agency
 Groundwater and Solid Waste Division
 520 Lafayette Road N.
 St. Paul, MN 55155-4194

| | | | | | |
|-------------------------------|-------------------|---------|------------|------------|----|
| Post-it [®] Fax Note | 7671 | Date | 11/26/97 | # of pages | 10 |
| To | Jim Chiles or | From | Fred Doran | | |
| Co./Dept. | Christine Leavitt | Co. | | | |
| Phone # | | Phone # | | | |
| Fax # | | Fax # | | | |

Dear Jim and Christine:

Subject: Comments on Landfill Liability Study - 11/13/97 Draft

R. W. Beck appreciates the opportunity to provide comments to the referenced draft report. I apologize for not making the November 20 meeting; my car was not running too well that day.

My comments are provided in the order that they appear in the study. The location of the issue is provided in **BOLD**, followed by our comment.

1. **Page 5, B. Perpetual care for landfills**

Somewhere in this background section, as a stand alone point, the MPCA should discuss that contingency actions relative to leachate contamination from today's Subtitle D will be minimal. The reasons:

- Landfill liners, leachate collection, and leak detection systems.
- Permits require industrial waste management plan.
- Many items previously disposed in landfills (batteries, white goods, oil/free liquids) are now banned.
- Community HI:W programs.

The risks of groundwater contamination from toxics contained in waste has been minimized.

2. **Page 5, paragraph 4, Discussion of Minnesota generated waste flow to out-of-state landfills**

Make sure that the audience of this report is aware of the current magnitude of Minnesota solid waste disposed in out-of-state landfills. There is considerable flow of waste, including MSW combustor ash, to Wisconsin, Iowa, and North Dakota. Minnesota is one of the top ten states in waste export. This generation liability for perpetual care and expenses beyond financial assurance is then placed on the taxpayers of these other states.

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Mr. Chiles/Ms. Leavitt
November 26, 1997
Page 2

3. Page 6, first bullet, "A preliminary MPCA..."

Although some costs (e.g., mowing) for perpetual care at the CLCP landfills and the current open Subtitle D landfills are comparable, a majority are not. The costs for the CLCP landfills have focused on enhancement of final cover, waste relocation, and contingency action activities (groundwater quality and LFG). These costs are irrelevant for a Subtitle D landfill. The latter landfill will have major expenses during perpetual care, if at all, for LFG and leachate management.

4. Page 10, paragraph 3, line 4, "revenue sharing..."

I cannot see this idea as being too popular, particularly with the private companies.

5. Page 13, Table ____.

What is the source of these numbers and have they been verified? The FA obligation, based on 1996 Annual Report, is \$2.9 million for Crow Wing (SW-376) and \$917,725 for Crow Wing (SW-111). Also, why would the FA obligation for large metro landfills (Elk River, Superior FCR) be comparable or less than several smaller out-state landfills?

6. Page 14, "Financial Assurance Outlook, Costs too Low:..."

The sites which entered into CLCP had less experience in developing cost estimates and, also, less time to build the trust fund to the FA obligation requirement. The latter reason is the main reason for underfunding. I personally developed the financial assurance estimate for the Tellijohn Landfill in the early 1990's. Up until 1992, the estimate was based on a long site life. Then, estimates were based on closure in 1993 to meet Subtitle D closure requirements. Closure and post-closure estimates were made as low as practical to lessen the impact that FA on the tipping fee. The change in site life resulted in tripling the annual financial assurance payment. This increase could not be reflected on a competitive tipping fee.

As for the estimates being low, the MPCA reviews and approves the financial assurance calculation for each facility owner. The Agency should take an equal share of responsibility.

7. Page 18, paragraph 2, d) Leachate management

Leachate generation of 20,000 gallons per acre per year is about 2 to 4 % of the annual rainfall depending on the site location in Minnesota. Regulations require

Mr. Chiles/Ms. Leavitt

November 26, 1997

Page 3

cover efficiency at 90% (i.e., 10% of rainfall becomes leachate) and a total liner/cover efficiency of 98.5% (i.e., 1.5% of rainfall becomes leachate). Most HELP model results estimate a combined efficiency exceeding 99%. I'd be curious to see data from the CLCP sites that are covered and have leachate collection as well as any open landfills which have totally closed cells. My experience would put this number closer to 10,000 gallons/acre/year.

Also, I question the 80 year timeframe for leachate treatment. There are several references available which provide historical leachate trends (from memory WDNR, Illinois Water Survey, EPA). From what I recall, the data tend to stabilize in a timeframe similar to the length of the post-closure period. Adding 50 years to this is very conservative.

8. Page 23, paragraph 1

I do not know if a leachate system in a Subtitle D landfill can be termed passive. There will likely be pumping required to lift the leachate to a discharge point. That is unless the owner is allowed to let leachate, albeit at low concentrations, fill a cell to ground elevation where it can flow freely into a surface water system.

9. Page 25, Bullets of ADA's

The unpermitted paper-mill sludge dump near Crow Wing SW-111 should not lead to any MPCA expense. Currently, groundwater monitoring indicates no impacts from this area. There is no access to the area and cover growth is very vigorous. More harm would likely be created by doing any additional cover or grading work on this ADA. The only cost associated with this area is monitoring and based on the results to date, this expense will cease prior to the end of the SW-111 post-closure period.

10. Page 28, last paragraph

You state that the MPCA is opposed to taking on new landfill security and care duties unless the revenue is there. This was important to the stakeholders involved in setting up the CLCP. Would the word "obligated" be better than "opposed"? The section deals with background on the CLCP. The word "opposed" sounds more like requiring adequate revenue is an Agency position or opinion rather than a fiscal or business requirement.

Mr. Chiles/Ms. Leavitt
November 26, 1997
Page 4

11. Page 31, paragraph 3 under Option (a)

You state that if landfills could enter the CLCP at time of closure, that the state would hire engineering services to complete inspection. Why would this be necessary? The owner and their engineer should be responsible for closure documentation and certification, as is currently done. I understand the MPCA's desire to have landfills entering the program meet their closure criteria. However, the MPCA will receive a good product under the current method of closure certification. The current method relies on the professional ethics and reputation of the engineer and a high level of review by the MPCA. The MPCA permits the closure design, reviews and comments on the construction plans and specifications, completes site visits during construction, and reviews and approves the documentation/certification report. The owner's engineer would be familiar with the design and how it ties into the surrounding design elements (e.g., surface water, anchor trenches, previous closures, etc.). An engineer hired by the MPCA would have a learning curve and wouldn't be familiar with other elements of the site design.

12. Page 31, paragraph 4 under Option (a)

Why would the MPCA place higher restrictions on sites if they enter the program after the initial entry date? Particularly, the thought of requiring these facilities to carry an extra margin of financial assurance is concerning. Would the contingency action risk or maintenance functions during post-closure and perpetual care be greater for landfills that close in the future. With technology advances I would believe the opposite would be true. There should be incentives for landfills (since some level of landfilling will be necessary) to provide disposal capacity for Minnesota's waste into the future. These restrictions would be disincentives and would also create an uneven playing field with our landfill neighbors.

One thought is for the owner, if he chooses to incorporate slopes greater than 20%, is to negotiate an agreement that the owner is responsible for any contingency action related to slope failure. The owner would maintain a trust fund for that event through the post-closure period. The MPCA would be responsible for other post-closure and perpetual care activities. If slope failure doesn't happen in post-closure, it likely will not happen.

Mr. Chiles/Ms. Leavitt

November 26, 1997

Page 5

13. Page 34, paragraph 2

Again, why does the MPCA believe there will be inadequate financial assurance funds. All but 2 of the facilities listed in the Table on page 13 that are still open were determined by the MPCA to have adequate funding. Most of the facilities that entered the CLCP in 1994 were under the gun to meet a FA obligation in a very short timeframe. Sites entering in the future should not have this problem. Also, the MPCA reviews the FA for all of these facilities during the annual reporting process. Funding should not be an issue.

14. Page 38, paragraph 1

The closed Crow Wing County Landfill (SW-111) has 9 years of monitoring data with distinct VOC characteristics and plume definition. Any impacts from the adjacent Potlatch Monofill should be differentiable. Otherwise, the two facilities stand alone.

15. Page 38, Cons for Option 1 (d)

Crow Wing SW-111 does have adequate financial assurance funding for the remaining post-closure period of 16 years.

Are any of these sites a piggyback design? These sites would be the most difficult for differentiating contamination.

16. Page 41, Option 4, Explanation of option

Unless neighboring states address perpetual care, this option is unacceptable. The average charge of \$1.70/cy is equivalent to a tipping fee increase of \$3/ton (Assuming 1100 lb/cy in-place density). This is an increase of 5-10% for most sites in Minnesota.

17. Page 41, Cons for Option 4

I believe that other facilities like composters and incinerators are the facilities that have opted to subsidize their tipping fees with the loss of flow control, not landfills.

17. Page 52, Appendix D, 2.

Again, why the additional restrictions for landfills that enter the CLCP at later dates. I do not believe that the risks will increase to justify the higher FA.

Mr. Chiles/Ms. Leavitt
November 26, 1997
Page 6

That concludes my comments on the November 13, 1997 draft study. I look forward to your next draft. Please call me if you have any questions.

Sincerely,

R. W. BECK, INC.



Fred J. Doran, P.E.
Senior Environmental Engineer



Ms. Christine Leavitt and Mr. Jim Chiles

Page 2

December 19, 1997

If the state learned that an operator had "cut corners" in violation of law, the state would, of course, have recourse. Operating a landfill, however, entails myriad decisions not defined by law yet potentially affecting long-term liability. Waste Management, for example, requires its industrial waste customers to provide analytic testing proving their wastes are not hazardous. Our testing requirement is not required by law, but is designed solely to reduce long-term liability. Similarly, what about a decision to use a less qualified, but cheaper, engineering consultant? Or to double-check quality control measures during landfill construction?

Landfill operators make decisions every day affecting the long-term environmental security of their facilities. Minnesota cannot possibly legislate -- let alone enforce -- standards for prudent decision-making in every instance. The state's only means of protection is to maintain a financial incentive for landfill operators to avoid the future costs associated with poor short-term decisions.

Removing that incentive would both increase the state's potential landfill care costs and reduce the level of environmental protection now in place.

The draft report mentions this risk but greatly understates it. For example, the draft report states that "most facility owners in Greater Minnesota appear to be operating under the assumption that the public will be taking over perpetual care responsibilities after year 30 anyway, if there are any such costs, because 'it is the society's waste and their responsibility'" (page 39; see also pages 32). Since that is not current Minnesota law, we hope MPCA staff will undertake education efforts to disabuse the landfill operator quoted of that misconception. Certainly, that misconception should not be used to justify a massive transfer of landfill liabilities to the state.

We recommend that MPCA adopt a fifth criterion for evaluating funding options: incentives for prudent facility operation. That criteria should be used to evaluate each of various funding options. Such an evaluation, we suspect, would render several of the policy options offered far less attractive.

Second, one option for meeting a portion of perpetual care costs would be to require facility owners to provide proof of financial responsibility for a 40-year post-closure care period, rather than the 30 years now required. Wisconsin, for example, requires a 40-year post-closure care period. While extension of the post-closure care period does not address perpetual care, it would provide additional assurance that all expenses will be met during the most critical post-closure time frames. We hope that Option 3 will be expanded to include a discussion of this possibility.



Ms. Christine Leavitt and Mr. Jim Chiles

Page 3

December 19, 1997

Please call if you have any questions or we can be of assistance.

Yours Sincerely,

Lynn Morgan

Manager of Legislative & Regulatory Affairs

cc: Dick Ancelet
Gerard Hamblin
Chris Johnson
Veronica Lynch
Don Otter
Mike Robertson



Highway Engineer
Public Works Director
STEVEN C. BACKOWSKI

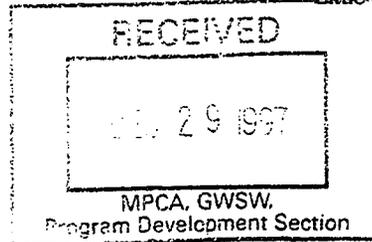
"HOME OF LINDBERGH"

December 23, 1997

Highway Department
Little Falls, Minnesota 56345-3196

320/632-0121

Mr. Jim Chiles
MPCA Policy Development
Program Development Section
Ground Water & Solid Waste Division
520 Lafayette Road
St Paul MN 55155



Dear Mr. Chiles:

This letter is in regard to the MPCA "Draft" Landfill Liability Study and its proposed future directions for Minnesota's mixed municipal solid waste landfills. The scope of this report is only focused on the liabilities of the 29 open mixed municipal solid waste landfills. Consideration should be given to expand the scope of this report to include the operating permitted demolition and industrial landfill sites. Its ironic that the 29 mixed municipal solid waste landfills that have financial assurance for thirty years of post closure care are under review for additional monies beyond the post closure care period while operating permitted demo and industrial landfills lack any post closure financial assurance requirement.

With the legislative enactment of the closed landfill cleanup program in 1993, the state assumed the post closure care for 106 closed mixed municipal solid waste landfills and excluded the remaining 29 open landfill sites of any program benefit. In the case of publicly owned mixed municipal solid waste landfills it has left them in a position to not only pay for their own landfills unlined cells closure maintenance and cleanup but, as in the case of Morrison County, to pay \$75,000 per year in state landfill cleanup taxes not including their share of 90 million dollars in state issued landfill cleanup bonds. The report needs to be modified to delineate the liability of the 29 open landfill cells from the old unlined MPCA certified closed areas that are part of the open landfill permits. With this updated study, an equitable distribution of state collected funds could be made to assist excluded landfills with their old cell post closure care. A landfill distribution program has been attempted by the split fee legislation of Steve Wenzel and Leroy Kopenhayer in the past legislative session and consideration should be given to facilitate this concept.

If the State of Minnesota wants to continue the concept of the remaining open 29 mixed municipal solid waste landfills need for additional monies after the post closure period, serious consideration must be given to have it come from the current closed landfill funding program and not from newly created landfill fees which will simply drive waste out of state and expose the generators to Federal Super Fund action.

Sincerely yours,

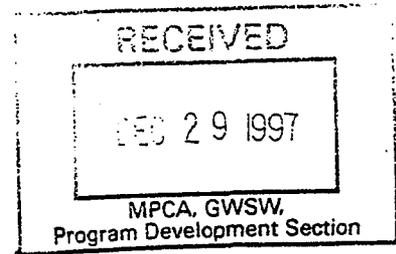
Steven C. Backowski
SCB/jb

COUNTY ENVIRONMENTAL DEPARTMENT

LYON COUNTY, MINNESOTA
Lyon County Courthouse
MARSHALL, MINNESOTA 56258
PHONE: (507) 537-6733

December 23, 1997

Christine Leavitt
Ground Water & Solid Waste Division
MPCA
520 Lafayette Road
St. Paul, MN 55155



Dear Christine:

I have reviewed your draft landfill liability study and have the following questions and comments.

Section on conventional financial assurance:

1) The table in page 1F states that the Lyon County SLF FA obligation is \$3,184,005. Where did this number come from? Based on correspondence with Kathy Holland-Hanson, the landfill's financial obligation for 1996 is \$2,337,448. This would be the amount needed if the landfill was closed on December 31, 1996. Please clarify how this number was derived.

Section on Perpetual Care:

A) Address the need for additional study of concept.

- 1) Why doesn't the MPCA evaluate new technologies being considered for landfills such as recirculation, landfill mining or toxicity reduction requirements since landfilling/waste disposal is not remaining stable but is evolving an evaluation of where landfilling/waste disposal may be in 20 years may change the need or length of post closure care requirements. While this may complicate your task, you could recommend to the legislature that the idea needs additional study for several more years to fully evaluate the need and length of perpetual care needed.
- 2) The report should address site locations and the cost benefit ratio of developing large trust funds vs. future environment hazards. Some sites, based on remote location, may be better served with total abandonment vs. the scarce resources necessary to institute perpetual care. By addressing the above issues, I feel that state can do a better job of addressing/developing true costs for perpetual care as well as developing recommendations on landfill operations and siting.

A) Funding of perpetual care/fairness and availability

- 1) Currently residents and businesses in Lyon County are paying for the post closure

care (and probably perpetual care) of 106 closed landfills. They are paying this under the assumption that it is a societal problem. Because Lyon County chose to remain open and invested large sums of money, prior to the establishment of the closed landfill program, the wastes placed prior to this act are considered Lyon County's problem and not societal problems. Lyon County residents are required to pay twice the cost for the post closure care of their landfill. The money that the county currently puts away for post closure care and the money which the county residents and businesses pay into the closed landfill program are more than enough to pay for post closure and proposed perpetual care costs.

If Lyon County is allowed to keep funds, from this county, currently going into the closure landfill program and place in the currently existing financial assurance fund until the landfill closed more than enough money will be available for post closure and perpetual care costs. This would meet all the tests of adequacy, timeliness and security. But above all, would meet the fairness test since Lyon County residents are currently paying in enough funds (with solid waste assessment) to cover all required and speculated post closure costs.

The county currently pays in approximately \$100,000/year to the closed landfill program and @ 5% interest the county would have a fund of \$2.4 million 16 years from now. Based on revised plans the county will have 17 - 20 years of available capacity at current fill rates. This is more than 1/26 of the MPCA current estimated perpetual care need of \$36,000,000, 16 years from now.

Perpetual Care Cost Matrix

- 1) Monitoring of ground water could be reduced to once every 2 to 5 years based on type and age of site, etc. Even the closed landfill program is looking at less than yearly monitoring events.
- 2) Gas Monitoring could also follow the scenario of well monitoring, could also be done at the same time as well testing at greatly reduced costs.
- 3) Yearly leachate testing appears high. We pay less than that during the year.

Sincerely,



Paul Henriksen
Lyon County Environmental Administrator



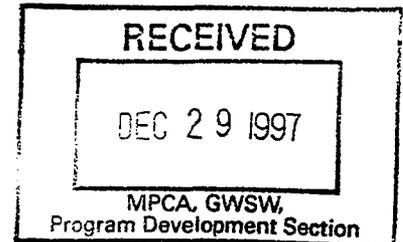
Cottonwood County

Michael J. Kirchmeier
Solid Waste Administrator

1355 Th Avenue, P.O. Box 247 • Windom, MN 56101-0247 • (507) 831-2441 • Fax: (507) 831-2367

December 23, 1997

Ms. Christine Leavitt
MN Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194



Dear Christine:

Please accept this letter as official comment on the MPCA's Landfill Liability Study / Draft 12/8/97.

I regret that I was on able to stay longer at your official public comment meeting, but when you have to travel 4 hours to attend a meeting and then 4 hours home again it makes for a long day. According to your agenda it didn't appear that you were going to allow adequate time for comment so we decided to make use of the time to travel home.

I am glad that we did get to hear your presentation because it reaffirmed what was rumored that this study will result in doing nothing more than to drive up the cost of landfilling to make other forms of disposal competitive and a perpetual funding mechanism for the MPCA.

Some of my concerns are::

1. The need for perpetual care hasn't been established. The EPA is not proposing it and according to the material you presented only one other state (Michigan) may be doing something about it. You didn't appear to have any information on what they were doing for sure.
2. There appears to be a some concern that the cost estimates for perpetual care are high and are not even based on proposed practices of the MPCA closed landfill section.
3. I would be the first to agree with that if there was a need for perpetual care established it is only fair that landfills that are open should pay for the perpetual care of their facilities. I do want to ask where the fairness issue was when the State Closed Landfill program was funded. Why the Cottonwood County residents are asked to pay approximately \$35,000 a year into that fund and yet will not benefit from it at all. In addition we have to pay for the financial assurance on our old landfill and our new landfill. The \$35,000 dollars per year. that Cottonwood County residents gives to the closed landfill program could be put to

good use locally in protecting the Cottonwood County landfill against liability for environment risk in the future as part of its financial assurance account. This money collected for the 20 year remaining life of the Cottonwood County facility and the accumulating interest for the 20 year life of the facility plus the 30 year post closure care period would generate a sizeable amount of money (In excess of \$6 million). Probably more than enough to take care of perpetual care when and if needed.

Your choice of funding attacks landfills once again by attempting to take the greater Minnesota landfill cleanup fund. County owned facilities have become depended on having this fund and most our using it for financial assurance. (Many others finance much of their solid waste management programs on this revenue) If Cottonwood County loses this fee it would have to raise its tipping fee \$6.00 per ton . This 12 % increase would serve as a incentive for haulers s to take our waste out of State. Higher cost of waste disposal also serves to encourage improper disposal of waste in out-state areas because of easy access to friends and relatives who live in rural areas.

Cottonwood County is trying to be responsible for the landfill that we chose to keep open in 1991, but are getting very tired of the constant harassment from the State in the form of policy changes and increased fees. It is really frustrating to have a greater fear of the State on waste issues than from any other source .

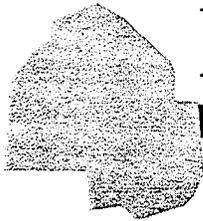
I believe that local government and the State should be partners not foes, but obviously the feeling isn't mutual.

Sincerely,



Michael J. Kirchmeier
Solid Waste Administrator

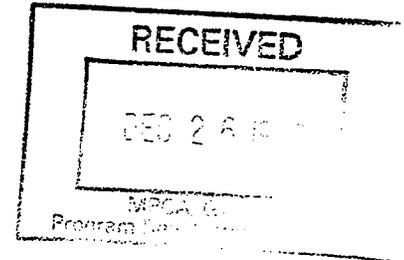
MJK:cqp
Enclosure
mpca/leavitt



Hennepin County

An Equal Opportunity Employer

December 23, 1997



Mr. Jim Chiles and Ms. Christine Leavitt
Minnesota Pollution Agency
520 Lafayette Road
St. Paul, Minnesota 55155-4194

FAXED
12-24-97

Re: Landfill Liability

Dear Mr. Chiles and Ms. Leavitt:

The purpose of this letter is to provide you with our comments on the Landfill Liability Report. First of all, we strongly encourage the state to promote the principal of "user pays", whereby the funding for the perpetual care period would be assessed on each unit of waste landfilled. A statewide revenue source or a "Flat Tax" to pay the long term costs associated with landfilling is unacceptable because it would be inequitable for those who choose to dispose of their waste higher on the solid waste hierarchy.

The "Status Quo" option is unacceptable. While it is difficult to assess the costs of care beyond the 30 year period, this should not be an excuse for failure to account for the costs that can be reasonably anticipated. Should the funding subsequently prove inadequate, the funding formulas can be adjusted. Failure to take action today will only make the funding dilemmas more acute as the perpetual care period approaches. Funding contingency actions can effectively be addressed through some pooled risk arrangement for all landfills.

Finally, we believe there is justification for a one time "window" for open landfills to opt into the Closed Landfill Program. However, entry in the Program after this "window" should not be allowed. This is justified because it was difficult to see the consequences of the recent regulatory and market changes in advance. We believe that after the "window", no subsequent reopening should be allowed and the perpetual care proposal should be the means to handle the liability after the 30 year post closure period.

Department of Public Works
417 North Fifth Street
Minneapolis, Minnesota 55401-1397
(612) 348-6509 FAX:(612) 348-8532
Environmental Info Line:(612) 348-6500

Recycled Paper

Minnesota Pollution Agency
Landfill Liability
Page 2

Thank you for providing us with the opportunity to comment on the draft report. We would like to compliment you on preparing a report that is easy to read and clearly lays out the alternative policy choices.

Sincerely,



Carl Michaud
Solid Waste Program Manager
Environmental Management Division

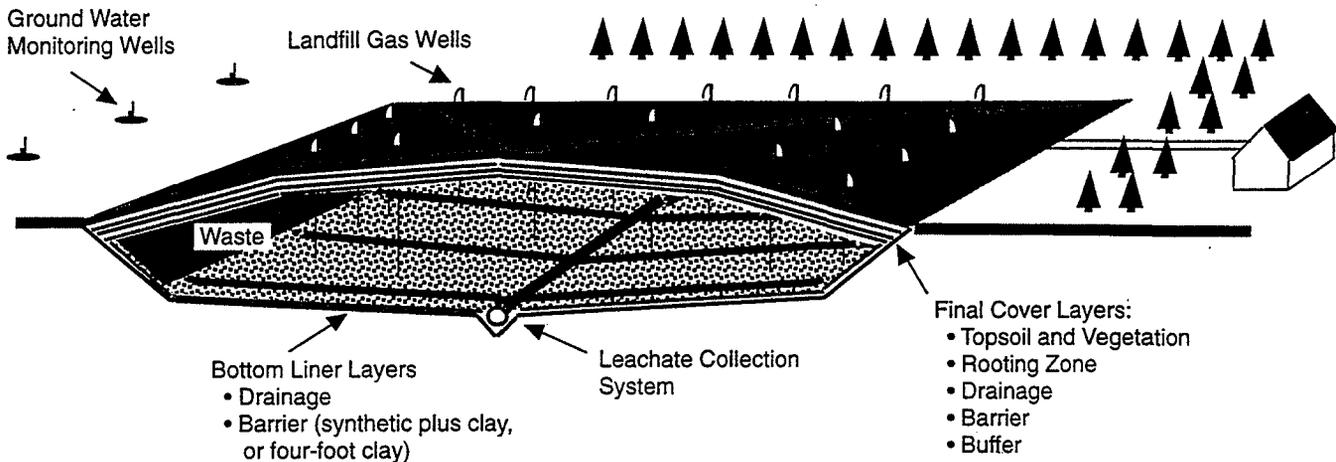
TH/

c: Janet Leick

Appendix G. Landfill Terminology

Landfill Terminology

Diagram of Typical Subtitle D Landfill



Adjacent Disposal Areas: Dumps that are next to MMSW landfills and contribute to the same ground water contamination problems.

Contingency-action costs: The costs to address events that are above and beyond routine operation and maintenance, where the events could endanger human health and the environment. Contingency-action events can occur during the operating life and throughout the conventional postclosure period and perpetual-care period.

Flares: Equipment used to burn landfill gas that is not being captured for energy recovery.

Landfill Closure and Cover: Each landfill cell is typically designed to reach capacity in two to three years, and must receive a phase or cell final cover at that time. Final facility closure is required once the entire site is filled to capacity. Upon reaching final refuse grades within a cell or at the entire site, proper final cover must be placed. Final cover may consist of all soil layers or a

combination of synthetic materials and soil layers. Final cover is constructed in layers of different materials to achieve all functions desired, since no one material will fulfill all the functions required of the final cover system. Minnesota Rules for MMSW landfills require that the final cover system consist of at least three layers: the barrier layer, the drainage layer, and the top layer. MMSW landfill final cover systems must be capable of containing or rejecting at least 90 percent of the precipitation falling on it. Together with the underlying liner, final site efficiency must be at least 98.5 percent.

Landfill Gas: Gases are produced from organic matter as it decomposes. In solid waste, the decomposition of organic matter begins soon after the refuse is buried in a landfill. Most of the organic matter breakdown is caused by bacteria. Landfill gas is explosive when mixed with air at concentrations between 5 percent and 15 percent by volume. Typical landfill gas is a mixture of

several gases, including water vapor. Gas concentrations are approximately 50 to 55 percent for methane and 45 to 50 percent for carbon dioxide. The remainder consists of small amounts of nitrogen, hydrogen sulfide, carbon monoxide, hydrogen, ammonia, and volatile organic compounds. Mercury has also been found in landfill gas. After landfill closure, the rate of waste decomposition reaches a peak within the first few years, maintains a steady state, and then slowly declines. A closed landfill will continue to generate gas in significant quantities for many years. In landfills without adequate gas control, escaping landfill gas may manifest itself by stressing or killing vegetation on the cover.

Landfill Gas – Active Gas Collection: Larger landfill facilities must often install an active gas-extraction system because the volume of gas that is generated is too great for passive vents to control. This is required for landfills having an ultimate capacity over 2.5 million metric tons, and may also be desirable at smaller landfills as a means of reducing ground water contamination or preventing off-site migration of gas to nearby structures. With an active gas-extraction system, vertical gas vents are interconnected by a series of pipes (often above ground). Pumps are then used to actively “pull” landfill gases from the waste. The collected gas is sent to a flare or, at larger landfills, may be used as a source of fuel to generate electricity that can be used on-site or sold to an electric company. Many facilities find it necessary to remove condensed liquid from the gas mixture prior to flaring the gas or using it as a source of fuel. This creates an aqueous liquid called “condensate,” which must be disposed of independently of the gas. Landfills which collect leachate can simply add the gas condensate to their leachate tank or storage pond and dispose of both in the same manner.

Landfill Gas – Passive Gas Venting: This type of venting is called “passive” because landfill gas is allowed to vent naturally to the atmosphere, without combustion or other treatment. The vent merely provides an easy pathway for the gas to follow through the waste and then exit the landfill through the final cover system. Effective passive venting consists of vertical bore holes (about one hole per acre of filled ground), drilled into the waste.

Landfill Liners: A system to contain leachate at the base of a landfill so it can be collected and removed before reaching the ground water. Liner systems are generally composite liners consisting of compacted clay soils overlain by a synthetic membrane. The MPCA may also approve the use of an all-clay liner. Liner systems include leachate collection and detection provisions. The use of clay materials requires special handling during construction to assure that the proper compaction and thickness are achieved to maintain the soil’s permeability at or above the minimum regulatory standards. The type of synthetic liner materials selected must be compatible with the conditions inside a landfill and not be subject to failure. The superior containment properties of synthetic membrane liners are partially offset by the vulnerability of these materials to damage during construction, because the task of constructing synthetic liners without such tiny imperfections is almost impossible. Some damage to liners during construction must be anticipated. This is why a composite liner system is used. A composite liner system employs a clay liner overlain by a synthetic membrane liner. As of July 1995, all MMSW sent to a landfill in Minnesota is being disposed in a lined area.

Leachate: Liquid produced by water seeping through a landfill that picks up particles and absorbs contaminants from waste. Any vegetation that comes in direct contact with leachate will likely die because of the high concentration of salts and toxic chemicals in the leachate. Leachate contains high concentrations of inorganic parameters, such as sulfate, chloride, and can include a variety of metals (arsenic, cadmium, chromium, lead, etc.). Precipitation is used to estimate leachate production because it is the greatest source of moisture in a landfill. In Minnesota 20 to 30 inches of precipitation fall every year, which is equal to 540,000 to 810,000 gallons of water per acre annually.

MMSW: Mixed municipal solid waste, meaning household and commercial wastes that are aggregated for collection and disposal. Minnesota bans certain materials from disposal with MMSW, such as lead acid batteries and auto hulks.

Old Fill Areas: Cells located at MMSW landfills that the operator closed before current rules and regulations took effect. Old fill areas are not lined at the bottom and do not have final covers equivalent to those on landfill cells that are being closed under today's rules.

Old Municipal Dumps: Areas used by a community for the disposal of its municipal wastes that did not operate under a state permit. Typically such sites operated as open dumps where waste was not checked for hazardous constituents such as pesticides and was not covered on a regular schedule. Open burning was common.

Recirculation of Leachate: USEPA Subtitle D regulations allow for landfill leachate to be recirculated back into the lined waste fill area as an alternative leachate treatment

option. However, Minnesota rules currently do not allow any liquids, including leachate, to be disposed in landfills. The MPCA has approved temporary pilot projects involving the recirculation of landfill leachate at several facilities. The purpose of the pilot projects is to gather data and information pertaining to leachate recirculation so that the MPCA can make a determination whether to modify Minnesota Rules to allow for leachate recirculation as a long term leachate treatment option. The pilot projects include several different designs and systems for recirculating landfill leachate. Some of the pilot projects incorporate highly technical and mechanical systems for pumping leachate from the storage area and recirculating it through a series of infiltration galleries buried within the layers of waste. Other pilot projects involve minimal technology and equipment where leachate is sprayed on the working face of the landfill and allowed to infiltrate.

Unlined Landfills: Landfills where the cells or phases are not underlain by an engineered liner that collects leachate.

Volatile Organic Compounds (VOCs): Volatile organic compounds are chemicals that are present in petroleum products, paints, glues, solvents, cleaning products, and many other items commonly found around the house or garage. Many VOCs are also used in the production of plastics, food packaging, synthetic fibers, and other materials which eventually are disposed of at MMSW landfills.